Appendix B. Willamette/Lower Columbia Technical Review Team Population Identification

MEMORANDUM

To: NOAA Fisheries, Oregon Dept. of Fish and Wildlife, and the Willamette Restoration Initiative
From: Willamette/Lower Columbia Technical Recovery Team
Re: Population Evaluation for Oregon State Tributary Populations of Lower Columbia River and Upper Willamette River Chinook Salmon, Chum Salmon, Coho Salmon, and Steelhead.
Date: 5 January 2004

The Willamette Lower Columbia Technical Recovery Team (WLC TRT) met on the 4th and 5th of December 2003 at the Silver Falls State Park, Sublimity, Oregon to evaluate the current status of the 46 Oregon State salmonid populations within the WLC Domain. In addition, six fisheries biologists from the Oregon Department of Fish and Wildlife (ODFW) were present at the meeting to assist the TRT in evaluating the populations and to participate in the evaluation as a means of better understanding the process and interpreting the results. General guidelines for the methodology used can be found in the enclosed "General Methods" document. Additional information on the scoring procedure can be found in the July 7, 2003 memorandum to the Broad Sense Recovery Group and the December 3, 2003 memorandum concerning the evaluation of listed salmon and steelhead populations in Washington State tributaries to the Lower Columbia River. Specific information on each of the populations was provided by the six "Status Report" documents and the "Oregon Habitat Atlas". This information, in conjunction with personal knowledge provided by the TRT members and staff, in addition to information provided by ODFW biologists (Dick Caldwell, Suzanne Knapp, Kathryn Kostow, Steve Mamoyac, Tom Stahl, and Jeff Ziller) present at the meeting, provided the technical basis for population evaluations. TRT members that participated in the population evaluation were Tom Backman, Craig Busack, Paul McElhany, Jim Myers, Dan Rawding, Ashley Steel, Cleve Steward, Tim Whitesel, and Chuck Willis[1].

I. Attribute Scoring

Each TRT member evaluated the five population attributes according to the score category descriptions originally described in the TRT's Viability Report. For each attribute, every member was allotted 10 points to assign to the categories in a manner that reflected the TRT members certainty. For example, if the Abundance Attribute information was consistent with a score of 2 with little underlying variability the TRT member might put all 10 points in the 2 category for Abundance (Example 1). Alternatively, if the information contained a substantial level of variation (due to ocean conditions, fluctuating harvest, etc.) the TRT member might place some of the points in the 1 and 3 category to convey this uncertainty (Example 2). While the attribute score (mean) for this set of examples would be the same; the TRT felt it is generally important to convey some of the inherent uncertainty that exists in evaluating biological systems.

[1] Chuck Willis was a candidate for TRT membership on the date of the evaluation. His scores are included with the TRTs.

Table 1: Evaluation scenarios for population attributes. Example 1 is indicative of a reviewer assigning a Category 2 probability of persistence with very little uncertainty. Example 2 is representative of a reviewer assigning the same mean Category 2 score, but with a higher level of uncertainty.

Example 1:

Attribute\Score	0	1	2	3	4
Abundance	0	0	10	0	0

Example 2:

Attribute\Score	0	1	2	3	4
Abundance	1	2	4	2	1

For each attribute TRT members also evaluated the quality of the data compiled for each attribute and each population. Guidelines for evaluating data quality were presented in the Viability Criteria and the General Methods documents and were discussed by the TRT members prior to the population evaluation.

II. Population Scoring

Population attributes were combined as described using the factor weighting described in the Viability Criteria in the Viability Report. For the initial evaluation of the current population status, the TRT acknowledged that there was generally no monitoring of juvenile outmigrant growth rate (JOM) in most populations. To incorporate "no data" scores of 0 into population evaluations was thought to be unhelpful in evaluating the initial status of most populations. Only in those populations where JOM data was available, was it included in the computed population score. [Note: this was described in more detail in the July 7 TRT memo.]

III. TRT Evaluation Process: Adjustments and Concerns

During the course of the population evaluations, a number of issues were raised regarding unique population conditions or data interpretation, especially in cases where anecdotal rather than quantitative information was available. Where possible, the TRT modified existing guidelines to accommodate the current evaluation. In most cases, as more information becomes available these guidelines may no longer be relevant.

A. Missing or Unavailable Data

TRT members were concerned about the absence of adult abundance for a number of salmon and steelhead populations; however, the TRT concluded that there was sufficient information (direct or anecdotal) to justify evaluating each population using available information rather than assigning default scores (as was the case with some Washington State populations).

ODFW personnel identified a number of data sets that were not included in the information compiled in the TRT Status Review Documents. In some instances population information had been revised, such as the percentage of hatchery fish in run estimates, but the TRT data did not reflect the most recent revision. Where possible, ODFW personnel provided general summaries

of the missing information. It was the opinion of the TRT that if the missing information had been available it would probably not have substantially changed the persistence category of the populations being evaluated.

In discussions between the TRT and ODFW personnel it was clear that abundance information for most populations was lacking for the last return year or two. Improvements in ocean conditions during the last three years have resulted in a general increase in abundance for most Columbia River salmonid populations. Some TRT members noted that these short-term improvements demonstrated that these populations were still capable of responding to environmental changes. It was the general consensus of the TRT that short-term increases in abundance, even dramatic improvements, were not thought to be substantial enough to represent a significant decrease in the long-term risk of extinction for most populations as it was equally likely that population abundance might decline precipitously following a downturn in ocean conditions. This was especially the case in those populations that were thought to be limited by freshwater habitat conditions.

B. Accessible Habitat Issues

For all populations there were some differences in how TRT members interpreted the information available. In most cases these differences were relatively minor and reflected a weighting of factors based on professional opinion. One of the issues that did result in considerable discussion was the status of populations that existed wholly or largely above impassable barriers.

One aspect of this discussion focused on whether the type of impassable barrier was important to population persistence. Some argued that hatchery weirs that were currently impassable, could quickly transition to passable structures, while restoring passage above large dams would be a lengthy process with only limited downstream passage opportunities. A majority of the TRT felt that in evaluating the status of a population, the question of barrier's influence must be considered using the "current" policy of allowing fish passage rather than evaluating the impact of possible future actions.

In the case of populations that have been isolated from a substantial portion of their historical spawning and rearing habitat, the status of passage programs became a significant factor in evaluating population persistence. Where passage has been "restored" through recently initiated trap and haul programs (e.g., Green Peter Dam, Cougar Dam, and Dexter and other Middle Fork Willamette River dams) it was unclear whether the adult abundance and productivity information and habitat information from above the dams should be included in the attribute evaluation. Some members argued that these populations should be considered "experimental" until sufficient spawner/recruit information was available to substantiate the sustainability of these programs. The inherent requirement of these programs for continuous intervention to sustain the populations also necessitates a commitment by the managing agencies to developing and maintaining the programs. Alternatively, other TRT members felt that where information was available it was important to convey the potential for production that these above dam areas offer. Some TRT reviewers provided habitat evaluations using both scenarios (including and excluding habitat above the dam). An example of this information is provided in Table 2 to highlight the potential change in habitat status when areas above impassable impoundments become passable on a consistent and sustainable basis. This information could be critical to prioritizing populations for recovery.

Table 2: Alternatives for Habitat evaluations where habitat above the dam is excluded or considered.

Example 1: Middle Fork Willamette River Spring-Run Chinook Salmon Habitat

Attribute\Score	0	1	2	3	4	Average
Habitat w/o upstream area	5	4	1	0	0	0.6
Habitat w/ upstream area	0	3	5	2	0	1.9

In the case of the Middle Fork Willamette River spring-run chinook salmon, there was also the issue of returning adults that had been naturally produced above the dams as part of the reintroduction program. Many TRT members felt compelled to include these adults in their abundance and productivity evaluations, while other TRT members concluded that in the absence of passage over the dams these adults would not find adequate spawning habitat to successfully reproduce. Furthermore, the relatively low reproductive success of adults (as expressed in a high adult to redd ratio) above Dexter Dam persuaded some TRT members to discount much of the above dam productivity. As in the evaluation of Washington State tributaries to the Columbia River, there was no attempt during the meeting to reconcile these two positions. In future meetings the TRT hopes to address this issue and establish more specific guidelines for determining when passage programs evolve from experimental relocations to extant populations that contribute to the sustainability of the population and ESU.

C. Expanded Range and Additional Populations

In a related issue, TRT members discussed the scoring criteria in relation to those basins where access has been provided to areas that were not historically utilized by the population under consideration (i.e. laddering of Punchbowl Falls). Most TRT members, however, did not consider these expansions as having a significant effect on the population score, and the population was evaluated based on its use of its historical range. In the case of the laddering of Willamette Falls, introductions of fall-run chinook salmon and coho salmon above the falls were not considered (these fish were specifically excluded from the ESU in the ESA listing). In some cases range expansion may have had a negative impact on other species. For example, access by winter run steelhead into summer run steelhead historical spawning areas may lead to genetic introgression and competition between these two populations.

The evaluation of spawning populations or aggregations that had not been identified by the TRT as being historically present generated considerable debate. In one case, early-run fall chinook salmon in the Sandy River were evaluated as a population, despite the uncertainty of their historical legacy. There is considerable information on the abundance and life history characteristics of this population. Furthermore, this population appears to have persisted for at least for the last six generations, albeit at low abundance levels. Sandy River early-run fall chinook salmon appeared to represent an important biological resource for the stratum, and the ESU, and was therefore incorporated into the population evaluation process. In contrast, winter steelhead in the Westside tributaries of the Upper Willamette River were not included in the evaluation. There is little information to establish whether winter steelhead were historically present in the major Willamette River tributaries that drain the Coastal Range, and although

some late-run winter steelhead are found have been identified in the Yamhill River by ODFW it is unclear whether these are native, the result of introductions, or strays from the Santiam River Basin. There is a paucity of information available regarding the abundance of late-run steelhead in Yamhill River, Tualatin River, or Rickeall Creek, or whether these spawning aggregations are self sustaining. When information on steelhead in these tributaries does become available further discussion will be necessary to determine whether these fish should be considered a demographically independent population (DIP), subpopulation associated with a larger DIP (such as the North Santiam River), or a non-sustainable spawning aggregation.

Uncertainty also exisits regarding the number of coho populations in the Clackamas River. One hypothesis suggests that a single coho population currently exists in the Clackamas. An alternative hypothesis suggests that there are currently two populations; an early run population derived from introduced hatchery stock and a late run population that is a remnant of the native stock. The TRT recognized a single historical coho population in the Clackamas. The TRT did not attempt to reach consensus on the current number of coho populations in the Clackamas and variability in scores among TRT members may reflect variability in interpretation of available data on current population structure.

Scappoose Creek winter-run steelhead were an additional population that was not considered in the evaluation. The exclusion of the population was an related to a misinterpretation of the boundary between the Southwest Washington Steelhead ESU and the Lower Columbia River Steelhead ESU. The TRT will endeavor to resolve the issue of population and ESU boundaries with NOAA Fisheries in the near future.

E. Mainstem Willamette River: TRT members and ODFW biologists were concerned that the habitat assessment portion of the population evaluations were focused on tributary basins and did not include conditions in the mainstem of the Willamette River. This is analogous to the exclusion of mainstem areas of the Columbia River and the Columbia River Estuary during the evaluations of both the Oregon and Washington tributaries of the Lower Columbia River. While there was a consensus that impaired habitat in mainstem areas could, and probably does, have a profound effect on juvenile rearing and juvenile and adult migration success, the purpose of the current population evaluations was to provide information for subbasin planners. TRT members considered that mainstem conditions were reflected in abundance and productivity numbers; however, for the evaluations of the other population criteria limited mainstem information was available to the TRT. The TRT decided to proceed with the habitat evaluations using available information and that members should make note of their score sheets of any specific mainstem factors that influenced their persistence categorizations. Additionally, the issue of habitat conditions in the mainstem reaches of the Lower Columbia River and Upper Willamette River and the Columbia River estuary should be dealt with in greater detail in the near future by the TRT.

F. Zero Category

According to Table 2 (TRT Scoring of Population Attributes) the zero category score includes extirpated populations or those population with a low (0-40%) probability of persistence. During the evaluation of several populations with critical low abundance or highly impaired habitat, some members felt uneasy about putting all of their attribute points in the zero category, despite the weight of the evidence. This slight inflation of the scores did not appear to have a large effect on the overall population score. TRT members concluded that the population scores were

still extremely low and would not generate undo optimism about the relative health of the population.

IV. Comparison of WLC TRT and ODFW Scores

The table below presents the population persistence categories based on the weighted average of the population attribute persistence categories, averaged over all TRT or ODFW members. Different ODFW personnel provided scores for populations on the 4th of December (LCR Chinook, LCR coho, and LCR chum) and 5th of December (LCR steelhead, UWR chinook, UWR steelhead), which may explain some differences in the ODFW evaluations. Furthermore, scores from the 4th of December were reviewed and discussed prior to the population evaluations on the 5th of December.

Lower Columbia River Chinook Salmon	Population Score	Population Score
Strata/Population	**WLC TRT**	**ODFW**
Coastal Stratum		
Youngs Bay Fall Run	1.12	1.59
Big Creek Fall Run	1.19	1.94
Clatskanie River Fall Run	1.24	2.01
Scappoose Creek Fall Run	0.99	1.73
Cascade Spring Run Stratum		
Sandy River Spring Run	1.88	2.24
Cascade Fall Run Stratum		
Clackamas River Fall Run	1.01	1.71
Sandy River Fall (early) Run	1.10	2.23
Cascade Late-Fall Run Stratum		
Sandy River Late-Fall Run	1.35	1.79
Gorge Spring Run Stratum		
Hood River Spring Run	0.61	0.29
Gorge Fall Run Stratum		
Lower Gorge Fall Run	0.96	1.73
Upper Gorge Fall Run	0.92	1.61
Hood River Fall Run	0.95	1.96

Lower Columbia River Coho Salmon	Population Score	Population Score
Strata/Population	**WLC TRT**	**ODFW**
Coastal Stratum		
Youngs Bay	0.86	1.43
Big Creek	0.81	1.42
Clatskanie River	0.85	1.68
Scappoose Creek	1.11	1.88
Cascade Stratum		
Clackamas River	1.79	2.27
Sandy River	1.66	2.24
Gorge Stratum		
Lower Gorge	0.84	1.48
Upper Gorge	0.75	1.66
Hood River	0.89	0.42

Lower Columbia River Chum Salmon	Population Score	Population Score
Strata/Population	**WLC TRT**	**ODFW**

Coastal Stratum		
Youngs Bay	0.52	0.62
Big Creek	0.53	0.62
Clatskanie River	0.47	0.59
Scappoose River	0.48	0.58
Cascade Stratum		
Clackamas River	0.44	0.31
Sandy River	0.51	0.32
Gorge Stratum		
Lower Gorge	1.17	1.36
Upper Gorge	0.59	0.67

Lower Columbia River Steelhead Salmon	Population Score	Population Score
Strata/Population	**WLC TRT**	**ODFW**
Cascade Winter Run Stratum		
Clackamas River Winter Run	1.54	1.75
Sandy River Winter Run	1.52	1.82
Gorge Winter Run Stratum		
Lower Gorge Winter Run	0.94	0.82
Upper Gorge Winter Run	0.96	1.29
Hood River Winter Run	1.63	1.92
Gorge Summer Run Stratum		
Hood River Summer Run	1.37	1.41

Upper Willamette River Chinook Salmon	Population Score	Population Score
Strata/Population	**WLC TRT**	**ODFW**
Clackamas River Spring Run	1.66	1.85
Molalla River Spring Run	0.62	0.92
North Santiam River Spring Run	0.71	1.00
South Santiam River Spring Run	0.84	1.12
Calapooia River Spring Run	0.65	0.93
McKenzie River Spring Run	1.85	2.04
Middle Fork Willamette River Spring Run	0.64	0.59

Upper Willamette River Steelhead Salmon	Population Score	Population Score
Strata/Population	**WLC TRT**	**ODFW**
Molalla River Winter Run	1.18	1.92
North Santiam River Winter Run	1.45	1.85
South Santiam River Winter Run	1.48	1.90
Calapooia River Winter Run	1.48	1.85

Individual Population Attribute Scores

Lower Columbia River Chinook Salmon (Oregon)

Youngs Bay Fall-Run Chinook Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	3.25	4.38	2.13	0.25	0.00	0.94	3.25
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	3.00	4.75	1.88	0.38	0.00	0.96	3.00
Habitat	1.00	5.13	3.38	0.50	0.00	1.34	1.00
Spatial Structure	0.88	3.50	4.13	1.50	0.00	1.63	0.88

Big Creek Fall-Run Chinook Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	2.13	4.88	2.63	0.38	0.00	1.13	1.29
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	1.63	5.13	2.75	0.50	0.00	1.21	1.00
Habitat	1.38	5.38	2.88	0.38	0.00	1.23	1.25
Spatial Structure	1.25	4.75	2.88	1.00	0.00	1.35	1.43

Clatskanie River Fall-Run Chinook Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	2.13	4.63	2.63	0.63	0.00	1.18	1.43
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	1.75	4.13	3.38	0.75	0.00	1.31	1.00
Habitat	2.38	4.75	2.50	0.38	0.00	1.09	1.38
Spatial Structure	1.25	3.75	3.63	1.38	0.00	1.51	1.43

Scappoose Creek Fall-Run Chinook Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	4.25	3.88	1.25	0.50	0.13	0.84	0.29
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	2.75	3.75	2.50	1.00	0.00	1.18	0.57
Habitat	2.75	4.88	2.13	0.25	0.00	0.99	1.38
Spatial Structure	2.38	3.63	2.75	1.25	0.00	1.29	1.29

Clackamas River Fall-Run Chinook Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	3.88	4.75	1.38	0.00	0.00	0.75	1.43
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	1.75	4.00	3.38	0.88	0.00	1.34	1.14
Habitat	2.38	5.00	2.38	0.25	0.00	1.05	1.38
Spatial Structure	1.88	3.63	2.75	1.75	0.00	1.44	1.71

Sandy River Fall-Run Chinook Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	3.00	4.50	2.38	0.13	0.00	0.96	1.29
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	2.25	4.50	2.63	0.63	0.00	1.16	1.14
Habitat	1.88	4.88	3.38	0.38	0.00	1.28	1.38
Spatial Structure	2.00	4.00	3.13	0.88	0.00	1.29	1.43

Lower Gorge Fall-Run Chinook Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	5.00	3.29	1.00	0.57	0.14	0.76	0.13
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	3.86	4.29	1.57	0.29	0.00	0.83	0.71
Habitat	1.50	3.25	3.88	1.00	0.13	1.45	1.29
Spatial Structure	2.43	4.14	2.57	0.86	0.00	1.19	0.86

Upper Gorge Fall-Run Chinook Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	5.14	3.29	0.86	0.57	0.14	0.73	0.14
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	4.43	4.00	1.57	0.29	0.00	0.80	0.57
Habitat	1.63	4.13	3.38	0.75	0.13	1.36	1.25
Spatial Structure	2.86	4.14	2.14	1.00	0.00	1.14	1.00

Hood River Fall-Run Chinook Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	4.38	4.25	1.38	0.00	0.00	0.70	1.43
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	1.88	4.63	2.75	0.75	0.00	1.24	1.00
Habitat	2.38	5.13	2.38	0.13	0.00	1.03	1.25
Spatial Structure	2.00	3.88	3.13	1.00	0.00	1.31	1.00

Sandy River Late-Fall-Run Chinook Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	2.13	4.25	3.13	0.50	0.00	1.20	1.57
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	0.75	3.50	4.13	1.50	0.13	1.68	1.57
Habitat	1.00	4.88	3.50	0.63	0.00	1.38	1.43
Spatial Structure	1.38	4.00	3.25	1.25	0.00	1.43	1.29

Sandy River Spring-Run Chinook Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	0.38	2.25	4.25	2.25	0.88	2.10	1.71
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	0.88	3.50	4.00	1.63	0.00	1.64	1.71
Habitat	0.88	3.63	3.75	1.75	0.00	1.64	1.38
Spatial Structure	0.75	3.50	3.88	1.75	0.13	1.70	1.57

Hood River Spring-Run Chinook Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	7.38	2.13	0.50	0.00	0.00	0.31	2.14
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	7.38	2.00	0.63	0.00	0.00	0.33	2.33
Habitat	1.13	4.38	3.50	1.00	0.00	1.44	1.63
Spatial Structure	4.38	2.75	1.88	0.88	0.13	0.96	1.57

Lower Columbia River Coho Salmon (Oregon)

Youngs Bays Coho Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	5.14	3.86	0.86	0.14	0.00	0.60	1.29
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	4.86	3.86	1.00	0.29	0.00	0.67	1.14
Habitat	1.71	4.71	3.71	0.43	0.00	1.34	1.50
Spatial Structure	1.86	3.86	3.29	1.00	0.00	1.34	1.14

Big Creek Coho Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	5.43	3.43	1.00	0.14	0.00	0.59	1.43
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	4.86	3.57	1.14	0.57	0.00	0.76	1.29
Habitat	1.14	5.29	3.14	0.43	0.00	1.29	1.43
Spatial Structure	3.43	3.57	2.14	0.86	0.00	1.04	1.29

Clatskanie River Coho Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	5.00	3.71	1.14	0.14	0.00	0.64	1.43
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	4.71	3.86	1.00	0.43	0.00	0.71	1.29
Habitat	2.00	4.71	2.71	0.57	0.00	1.19	1.43
Spatial Structure	2.71	3.29	2.43	1.57	0.00	1.29	1.00

Scappoose River Coho Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	3.00	4.43	2.14	0.43	0.00	1.00	1.29
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	2.00	3.86	3.14	1.00	0.00	1.31	1.00
Habitat	2.43	4.57	2.57	0.43	0.00	1.10	1.43
Spatial Structure	2.57	3.57	2.43	1.43	0.00	1.27	1.00

Clackamas Coho Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	0.71	2.86	3.86	2.57	0.00	1.83	2.43
JOM	0.14	0.57	2.14	1.43	0.00	0.91	1.00
Diversity	0.57	2.57	4.43	2.29	0.14	1.89	1.57
Habitat	1.43	3.86	3.43	1.29	0.00	1.46	1.14
Spatial Structure	0.43	2.71	4.29	2.57	0.00	1.90	1.43

Sandy River Coho Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	0.57	3.86	4.14	1.43	0.00	1.64	2.43
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	0.86	3.29	4.29	1.43	0.17	1.68	1.14
Habitat	0.71	3.86	4.29	1.71	0.00	1.76	1.43
Spatial Structure	1.00	3.43	4.29	1.29	0.00	1.59	1.29

Lower Gorge Coho Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	5.71	2.86	1.14	0.29	0.00	0.60	0.00
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	4.29	3.71	1.57	0.43	0.00	0.81	0.43
Habitat	1.43	3.43	4.00	1.00	0.14	1.50	1.29
Spatial Structure	4.29	3.00	2.00	0.71	0.00	0.91	0.57

Upper Gorge Coho Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	5.86	3.14	0.86	0.14	0.00	0.53	0.14
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	4.29	3.71	1.71	0.29	0.00	0.80	0.29
Habitat	1.86	4.43	3.29	0.43	0.00	1.23	1.29
Spatial Structure	4.43	3.00	2.00	0.57	0.00	0.87	0.71

Hood River Coho Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	5.29	3.71	0.71	0.29	0.00	0.60	1.14
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	3.14	3.57	2.43	0.86	0.00	1.10	1.00
Habitat	1.57	4.86	2.86	0.71	0.00	1.27	1.29
Spatial Structure	2.57	3.57	2.57	1.00	0.00	1.17	1.00

Lower Columbia River Chum Salmon (Oregon)

Youngs Bay Chum Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	7.57	2.29	0.14	0.00	0.00	0.26	0.57
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	5.43	3.57	1.00	0.00	0.00	0.56	0.71
Habitat	1.86	5.71	2.14	0.14	0.00	1.04	1.43
Spatial Structure	4.43	4.00	1.43	0.14	0.00	0.73	0.71

Big Creek Chum Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	7.43	2.43	0.14	0.00	0.00	0.27	0.57
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	5.29	3.71	1.00	0.00	0.00	0.57	0.71
Habitat	2.29	5.29	2.14	0.14	0.00	1.00	1.43
Spatial Structure	4.57	3.57	1.43	0.43	0.00	0.77	0.86

Clatskanie River Chum Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	7.57	2.29	0.14	0.00	0.00	0.26	0.43
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	5.57	3.43	1.00	0.00	0.00	0.54	0.29
Habitat	3.57	4.57	1.57	0.14	0.00	0.81	1.43
Spatial Structure	4.57	3.86	1.43	0.14	0.00	0.71	0.71

Scappoose Chum Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	7.57	2.29	0.14	0.00	0.00	0.26	0.43
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	5.57	3.43	1.00	0.00	0.00	0.54	0.43
Habitat	3.86	4.57	1.29	0.14	0.00	0.76	1.43
Spatial Structure	4.29	3.86	1.43	0.43	0.00	0.80	0.86

Clackamas River Chum Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	7.71	2.14	0.14	0.00	0.00	0.24	0.29
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	5.86	3.14	1.00	0.00	0.00	0.51	0.43
Habitat	3.86	4.71	1.43	0.00	0.00	0.76	1.43
Spatial Structure	5.14	3.43	1.29	0.14	0.00	0.64	0.86

Sandy River Chum Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	7.57	2.29	0.14	0.00	0.00	0.26	0.29
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	5.57	3.43	1.00	0.00	0.00	0.54	0.29
Habitat	2.86	4.71	2.00	0.43	0.00	1.00	1.29
Spatial Structure	4.71	3.29	1.57	0.43	0.00	0.77	0.86

Lower Gorge Chum Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	3.43	3.57	2.57	0.43	0.00	1.00	0.86
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	1.86	3.57	3.57	1.00	0.00	1.37	1.14
Habitat	1.57	4.57	3.57	0.29	0.00	1.26	1.29
Spatial Structure	1.86	3.57	3.57	1.00	0.00	1.37	1.00

Upper Gorge Chum Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	6.71	2.86	0.43	0.00	0.00	0.37	0.86
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	4.57	3.86	1.57	0.00	0.00	0.70	0.57
Habitat	2.57	5.29	2.00	0.14	0.00	0.97	1.29
Spatial Structure	4.29	4.00	1.57	0.14	0.00	0.76	0.86

Lower Columbia River Steelhead (Oregon)

Clackamas River Winter Steelhead

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	1.25	4.13	3.38	1.25	0.00	1.46	2.13
JOM	0.00	0.00	1.25	0.00	0.00	0.25	0.13
Diversity	0.88	3.88	3.88	1.38	0.00	1.58	1.43
Habitat	1.29	3.14	3.86	1.71	0.00	1.60	1.43
Spatial Structure	0.75	3.63	3.75	1.88	0.00	1.68	1.29

Sandy River Winter Steelhead

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	1.13	4.00	3.88	1.00	0.00	1.48	2.13
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	1.00	3.88	3.63	1.50	0.00	1.56	1.13
Habitat	0.29	3.71	4.14	1.86	0.00	1.76	1.43
Spatial Structure	1.50	4.38	3.25	0.88	0.00	1.35	1.13

Lower Gorge Winter Steelhead

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	5.25	3.88	0.63	0.25	0.00	0.59	0.25
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	3.63	3.75	2.38	0.29	0.00	0.94	0.50
Habitat	1.14	2.86	4.43	1.43	0.14	1.66	1.29
Spatial Structure	2.75	3.00	3.00	1.13	0.13	1.29	0.88

Upper Gorge Winter Steelhead

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	4.88	3.88	1.00	0.25	0.00	0.66	0.25
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	4.00	3.63	2.13	0.25	0.00	0.86	0.75
Habitat	1.29	3.43	4.00	1.14	0.14	1.54	1.29
Spatial Structure	3.13	2.38	3.00	1.63	0.13	1.38	1.00

Hood River Winter Steelhead

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	1.00	3.50	4.38	1.13	0.00	1.56	1.63
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	0.50	3.00	4.38	2.13	0.00	1.81	1.29
Habitat	1.00	4.43	3.43	1.14	0.00	1.47	1.43
Spatial Structure	0.50	3.13	4.13	2.25	0.00	1.81	1.43

Hood River Summer Steelhead

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	2.13	4.75	2.63	0.50	0.00	1.15	1.75
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	1.88	4.25	3.25	0.63	0.00	1.26	1.00
Habitat	0.86	4.14	3.29	1.57	0.14	1.60	1.43
Spatial Structure	1.25	4.00	3.13	1.50	0.13	1.53	0.88

Upper Willamette River Spring-Run Chinook Salmon

Clackamas River Spring-Run Chinook Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	0.75	2.88	4.75	1.50	0.13	1.74	1.63
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	2.25	3.25	3.63	0.88	0.00	1.31	1.50
Habitat	1.13	2.75	4.25	1.88	0.00	1.69	1.43
Spatial Structure	0.88	2.63	4.00	2.25	0.00	1.74	1.63

Molalla River Spring-Run Chinook Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	6.63	3.00	0.38	0.00	0.00	0.38	0.75
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	5.00	3.88	0.88	0.25	0.00	0.64	1.00
Habitat	3.13	4.00	2.50	0.38	0.00	1.01	1.25
Spatial Structure	3.88	3.38	2.13	0.63	0.00	0.95	1.13

North Santiam River Spring-Run Chinook Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	5.63	3.75	0.63	0.25	0.00	0.58	1.25
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	3.50	3.63	2.25	0.63	0.00	1.00	1.63
Habitat	3.38	4.38	2.00	0.25	0.00	0.91	1.43
Spatial Structure	4.88	4.00	0.88	0.25	0.00	0.65	1.86

South Santiam River Spring-Run Chinook Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	4.75	3.50	1.63	0.13	0.00	0.71	1.38
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	2.75	4.25	2.38	0.63	0.00	1.09	1.25
Habitat	2.75	4.38	2.63	0.38	0.00	1.08	1.43
Spatial Structure	4.38	3.88	1.50	0.25	0.00	0.76	1.63

Calapooia River Spring-Run Chinook Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	6.63	2.88	0.50	0.00	0.00	0.39	0.75
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	5.13	3.25	1.13	0.50	0.00	0.70	1.13
Habitat	2.75	4.25	2.63	0.38	0.00	1.06	1.43
Spatial Structure	4.00	3.25	1.88	0.88	0.00	0.96	1.13

McKenzie River Spring-Run Chinook Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	0.13	2.13	5.00	2.75	0.00	2.04	2.25
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	0.50	3.00	4.43	2.00	0.00	1.79	1.43
Habitat	0.75	3.13	4.00	2.13	0.00	1.75	1.57
Spatial Structure	1.13	4.50	3.25	1.13	0.00	1.44	1.63

Middle Fork Willamette River Spring-Run Chinook Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	6.25	2.75	0.88	0.13	0.00	0.49	1.13
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	2.38	4.00	2.75	0.88	0.00	1.21	1.25
Habitat	4.50	3.50	1.75	0.25	0.00	0.78	1.38
Spatial Structure	6.38	3.13	0.50	0.00	0.00	0.41	1.38

Upper Willamette River Winter Steelhead

Molalla River Winter Steelhead

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	3.13	3.88	2.63	0.38	0.00	1.03	1.29
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	1.13	3.88	4.13	1.00	0.00	1.51	1.29
Habitat	2.13	4.00	3.25	0.63	0.00	1.24	1.43
Spatial Structure	1.88	4.38	3.00	0.75	0.00	1.26	1.29

North Santiam River Winter Steelhead

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	1.00	3.13	3.75	1.75	0.00	1.59	1.25
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	1.25	4.25	3.13	1.38	0.00	1.46	1.50
Habitat	2.13	4.00	3.00	0.75	0.00	1.23	1.63
Spatial Structure	2.00	4.38	3.00	0.63	0.00	1.23	1.13

South Santiam Winter Steelhead

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	0.75	3.25	3.88	1.88	0.00	1.66	1.38
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	1.00	3.88	3.38	1.75	0.00	1.59	1.25
Habitat	2.00	4.38	3.00	0.63	0.00	1.23	1.38
Spatial Structure	3.13	3.50	2.75	0.63	0.00	1.09	1.13

Calapooia Winter Steelhead

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	1.25	4.13	3.50	1.00	0.00	1.41	1.50
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	0.75	3.38	4.25	1.63	0.25	1.78	1.63
Habitat	1.50	4.00	3.75	0.75	0.00	1.38	1.50
Spatial Structure	1.50	3.50	3.38	1.63	0.00	1.51	1.38

Exhibit B (Appendix B: Individual Population Attribute Scores)

Lower Columbia River Chinook Salmon—Coastal Fall-Run Stratum

Youngs Bay Fall-Run Chinook Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	3.25	4.38	2.13	0.25	0.00	0.94	3.25
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	3.00	4.75	1.88	0.38	0.00	0.96	3.00
Habitat	1.00	5.13	3.38	0.50	0.00	1.34	1.00
Spatial Structure	0.88	3.50	4.13	1.50	0.00	1.63	0.88

Productivity and Abundance: Most TRT members concluded that the extinction risk for this population was very high. Spawner surveys failed to find any returning adults in some years. Hatchery contribution to escapement in most years is probably very high.
JOM: Not rated.
Diversity: Hatchery fish make up a substantial portion of escapement. While many of the hatchery releases utilized within ESU tule fall-run hatchery stocks, the use of Rogue River fall run fish in Youngs Bay was of concern to the TRT.
Habitat: Conditions were moderately degraded through much of the basin. The effects of timber harvest may be significant in the upper reaches, while residential and agricultural land use was a factor among the lower reaches.
Spatial Structure: There was little information on fish distribution to use in evaluation. Dikes and tide gates have eliminated access to side channel spawning and rearing habitat. Two major barriers were also mentioned as restricting access. Some TRT members considered that the numerous tributaries entering Youngs Bays provided the *potential* for good fish distribution.

Big Creek Fall-Run Chinook Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	2.13	4.88	2.63	0.38	0.00	1.13	1.29
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	1.63	5.13	2.75	0.50	0.00	1.21	1.00
Habitat	1.38	5.38	2.88	0.38	0.00	1.23	1.25
Spatial Structure	1.25	4.75	2.88	1.00	0.00	1.35	1.43

Productivity and Abundance: Adult escapement to Big Creek is relatively good, although redd counts indicate that there is little natural reproduction in the basin and the majority of the fish return to the hatchery. The hatchery weir limits natural production to the less productive low reaches.
JOM: Not rated.
Diversity: Hatchery fish make up a substantial portion of escapement. Rogue River fall-run chinook salmon were released from this site for a number of years and it was unclear if there had been any introgression between the tule and Rogue River populations. Genetically this population resembles fish from the Spring Creek National Fish Hatchery (NFH), which suggests that the native population was effectively lost years ago. In the absence of any natural reproduction, the potential for local adaptation was considered minimal.

Habitat: Conditions were moderately degraded through much of the basin. The effects of timber harvest may be significant in the upper reaches, while residential and agricultural land use was a factor among the lower reaches. Riparian conditions were considered highly degraded.
Spatial Structure: Most TRT members considered the hatchery weirs on Big and Gnat Creek to be significant factors in limiting fish distribution.

Clatskanie River Fall-Run Chinook Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	2.13	4.63	2.63	0.63	0.00	1.18	1.43
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	1.75	4.13	3.38	0.75	0.00	1.31	1.00
Habitat	2.38	4.75	2.50	0.38	0.00	1.09	1.38
Spatial Structure	1.25	3.75	3.63	1.38	0.00	1.51	1.43

Productivity and Abundance: Escapement to this DIP has been consistently low; however, the redd counts have been critically low suggesting that few fish successfully reproduce. There have been few recent hatchery releases; however, the some TRT members suggested that many of the fish were strays from nearby hatchery programs.
JOM: Not rated.
Diversity: There was little life history information to review for the evaluation of these criteria. Age structure and run timing were consistent with tule fall-run chinook salmon. Most TRT members were unsure of the effect of hatchery strays on locally-spawning populations.
Habitat: TRT members were concerned that habitat quality in this DIP was not sufficient to sustain the population. Agriculture and residential develop had resulted in degradation in riparian and stream conditions.
Spatial Structure: This DIP consists of numerous small tributaries that offer the potential for broad distribution; however, habitat conditions limit the utility of many of the stream reaches.

Scappoose Creek Fall-Run Chinook Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	4.25	3.88	1.25	0.50	0.13	0.84	0.29
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	2.75	3.75	2.50	1.00	0.00	1.18	0.57
Habitat	2.75	4.88	2.13	0.25	0.00	0.99	1.38
Spatial Structure	2.38	3.63	2.75	1.25	0.00	1.29	1.29

Productivity and Abundance: Aside from anecdotal reports of chinook salmon there was no information available for this population. Most TRT members utilized the “no data” default of 5,5,0,0,0.
JOM: Not rated.
Diversity: The only diversity information indicated that there had been very few hatchery fish released into this DIP.
Habitat: Conditions in this DIP was generally moderately degraded. Residential development along the Columbia River in combination with agricultural land uses has moderately to severely impaired many lower stream reaches.

Spatial Structure: There was some uncertainty concerning the number of existing barriers in the Scappoose and Milton Creeks. Poor habitat conditions were also suggested a limitation to distribution.

Lower Columbia River Coho Salmon – Coastal Stratum

Youngs Bay Coho Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	5.14	3.86	0.86	0.14	0.00	0.60	1.29
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	4.86	3.86	1.00	0.29	0.00	0.67	1.14
Habitat	1.71	4.71	3.71	0.43	0.00	1.34	1.50
Spatial Structure	1.86	3.86	3.29	1.00	0.00	1.34	1.14

Productivity and Abundance: TRT comments focused on the declining trend in abundance, the 91% hatchery contribution to escapement, and the very low overall abundance (especially during the 1990s).
JOM: Not rated.
Diversity: Large scale hatchery releases and the relatively poor contribution of NORs to escapement were the major negative factors considered by the TRT.
Habitat: Poor habitat conditions exist through the tributaries to Youngs Bay. Development and timber harvest were among the factors lists as sources of degradation.
Spatial Structure: There were no major blockages identified (although there was some discussion of the hatchery weir on the Klaskanine as a potential impediment). Numerous small blockages (tide gates, culverts) may influence access to smaller tributaries and side channels. Patches of poor habitat could also affect the distribution of coho salmon.

Big Creek Coho Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	5.43	3.43	1.00	0.14	0.00	0.59	1.43
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	4.86	3.57	1.14	0.57	0.00	0.76	1.29
Habitat	1.14	5.29	3.14	0.43	0.00	1.29	1.43
Spatial Structure	3.43	3.57	2.14	0.86	0.00	1.04	1.29

Productivity and Abundance: Abundance estimates suggest that total escapement is very small and the hatchery contribution is very large.
JOM: Not rated.
Diversity: Large numbers of fish have been released form the Big Creek Hatchery; however, there is evidence that the Big Creek Hatchery broodstock is representative of the population. Hatchery fish make up a large fraction of the total escapement and there may be little opportunity to maintain a high degree of local adaptation.
Habitat: Moderately impaired conditions exist throughout the basin. Much of the degradation is the result of timber harvest in the upper basin and agricultural/residential development in lower the basin.
Spatial Structure: The Big Creek hatchery weir may prevent access to the upper Big Creek Basin. Dikes and agricultural diversions impair access to side channels and small tributaries.

Clatskanie River Coho Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	5.00	3.71	1.14	0.14	0.00	0.64	1.43
JOM	NR	NR	NR	NR	NR	NR	NR

Diversity	4.71	3.86	1.00	0.43	0.00	0.71	1.29
Habitat	2.00	4.71	2.71	0.57	0.00	1.19	1.43
Spatial Structure	2.71	3.29	2.43	1.57	0.00	1.29	1.00

Productivity and Abundance: Estimated escapement to this population is very low and most of the returning fish are of hatchery origin.
JOM: Not rated.
Diversity: Low effective spawning population size and the large number of hatchery introductions from other populations were mentioned by TRT members as factors influencing the low persistence probability scores.
Habitat: Agriculture land use, especially in the estuary areas, in combination with residential development and timber harvest all contributed to the degraded habitat condition.
Spatial Structure: There were no major blockages indicated within this DIP; however, dikes, water diversions, and tidal gates may all limit access to small tributaries and side channels.

Scappoose River Coho Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	3.00	4.43	2.14	0.43	0.00	1.00	1.29
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	2.00	3.86	3.14	1.00	0.00	1.31	1.00
Habitat	2.43	4.57	2.57	0.43	0.00	1.10	1.43
Spatial Structure	2.57	3.57	2.43	1.43	0.00	1.27	1.00

Productivity and Abundance: Recent improvements in escapement (up to the low 100s) follow a number of years of escapements of zero or near zero. Reliance on a single peak index count in many years introduces considerable uncertainty into the evaluation. TRT members also noted that there have been few direct hatchery introductions into this area in recent years.
JOM: Not rated.
Diversity: Small population size could have created a genetic bottleneck, or made the population susceptible to introgression by stray hatchery fish. Some TRT members focused on the absence of recent hatchery introductions.
Habitat: Conditions in this DIP are moderately to severely impaired. Agriculture and residential/urban development correlated strongly with severely impaired areas.
Spatial Structure: Numerous small blockages (tide gates, culverts) may influence access to smaller tributaries and side channels. Patches of poor habitat could also affect the distribution of coho salmon.

Lower Columbia River Chum Salmon – Coastal Stratum

Youngs Bay Chum Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	7.57	2.29	0.14	0.00	0.00	0.26	0.57
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	5.43	3.57	1.00	0.00	0.00	0.56	0.71
Habitat	1.86	5.71	2.14	0.14	0.00	1.04	1.43

Spatial Structure	4.43	4.00	1.43	0.14	0.00	0.73	0.71

Productivity and Abundance: Other than a few anecdotal reports, no chum salmon have been observed in the Youngs Bay area.
JOM: Not rated.
Diversity: No information is available, based on low escapement the potential for genetic loss is severe.
Habitat: Poor habitat conditions exist through the tributaries to Youngs Bay. Development and timber harvest were among the factors lists as sources of degradation.
Spatial Structure: There were no major blockages identified (although there was some discussion of the hatchery weir on the Klaskanine as a potential impediment). Numerous small blockages (tide gates, culverts) may influence access the smaller tributaries and side channels that are frequented by chum salmon.

Big Creek Chum Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	7.43	2.43	0.14	0.00	0.00	0.27	0.57
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	5.29	3.71	1.00	0.00	0.00	0.57	0.71
Habitat	2.29	5.29	2.14	0.14	0.00	1.00	1.43
Spatial Structure	4.57	3.57	1.43	0.43	0.00	0.77	0.86

Productivity and Abundance: Chum have been occasionally observed at the hatchery weir, recent returns have been at or near zero.
JOM: Not rated.
Diversity: Small population size increases the risk for genetic diversity loss either through population bottlenecks or introgression by stray fish.
Habitat: Habitat conditions are moderately impaired throughout much of the basin, agricultural land use in the lower basin and timber harvest activities in the upper basin were factors identified in habitat degradation..
Spatial Structure: The Big Creek hatchery weir may prevent access to the upper Big Creek Basin. Dikes and agricultural diversions impair access to side channels and small tributaries.

Clatskanie River Chum Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	7.57	2.29	0.14	0.00	0.00	0.26	0.43
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	5.57	3.43	1.00	0.00	0.00	0.54	0.29
Habitat	3.57	4.57	1.57	0.14	0.00	0.81	1.43
Spatial Structure	4.57	3.86	1.43	0.14	0.00	0.71	0.71

Productivity and Abundance: There was no information available for this population. Most TRT members utilized a default score.
JOM: Not rated.
Diversity: No information. Most members assumed that, if present, this population exists at a very low population abundance, making it susceptible to genetic bottlenecks or genetic introgression by stray adults.

Habitat: Conditions in the lower reaches of the tributaries to the Columbia River in this DIP are heavily impacted by agricultural land uses. Riparian conditions are severely impaired in these areas. Headwater areas are more impacted by timber harvest activities, although the degree of habitat degradation is moderate, relative to the lower reaches that would be more closely associated with spawning adult and juvenile chum salmon.
Spatial Structure: Dikes and tidal gates in lowland areas may have eliminated access to important side channels. Culverts may also limit access. Poor spatial structure was also related to low abundance.

Scappoose Chum Salmon

Attribute	0.00	1.00	2.00	3.00	4.00	Average	Data Quality
Productivity	7.57	2.29	0.14	0.00	0.00	0.26	0.43
JOM	NR	NR	NR	NR	NR	NR	NR
Diversity	5.57	3.43	1.00	0.00	0.00	0.54	0.43
Habitat	3.86	4.57	1.29	0.14	0.00	0.76	1.43
Spatial Structure	4.29	3.86	1.43	0.43	0.00	0.80	0.86

Productivity and Abundance: The is no current abundance information available. The majority of TRT members utilized a default score.
JOM: Not rated.
Diversity: No information. TRT members assumed that small population size increases the risk for genetic diversity loss either through population bottlenecks or introgression by stray fish.
Habitat: Habitat conditions are severely or moderately impaired throughout the basin, agricultural land use in the lower reaches, in addition to residential and urban development, were factors identified in habitat degradation.
Spatial Structure: Historically, there were a number of small dams that presented migrational barriers. It was unclear how many of these structures still exist. Dikes and culverts have eliminated access to side channel habitat that is utilized by chum. Most importantly, the low population size was a severe limitation to spatial structure.