Cutthroat Trout

Coastal Cutthroat Trout

Interim Risk Assessment

Coastal cutthroat trout were assessed using the same six interim criteria used to assess the anadromous salmon species. Lack of quantitative coastal cutthroat trout spawning data limited our ability to assess populations for the abundance and productivity criteria consistent with the method used for many of the salmon and steelhead populations and outlined in the Native Fish Conservation Policy (NFCP). For the abundance and productivity criteria, we assessed the coastal cutthroat trout populations based on the intent of the criteria (described below). The following assessments are based on available data in conjunction with anecdotal evidence and the professional opinion of local ODFW biologists. The available data come from a variety of sources. Some are from efforts directed at enumerating coastal cutthroat trout, but much is from efforts directed at salmon or steelhead in coastal basins. The datasets are for various time periods and geographic areas. No datasets are available that have collected abundance information on coastal cutthroat trout in a consistent manner over the fish's entire range. Many of the available datasets have used different methodologies, making comparisons problematic. Time and staff were not available to analyze all of the available coastal cutthroat trout data and to develop relationships between datasets. ODFW hopes to expend this level of effort when a conservation plan is developed for each of the coastal cutthroat trout Species Management Units.

Species Management Units and Populations

Species Management Units (SMUs) for coastal cutthroat trout were identified in correspondence with the NOAA Fisheries Evolutionarily Significant Units (ESU) designated for coastal cutthroat trout during NOAA Fisheries' 1999 status review. Recent evidence (Wenburg and Bentzen 2001) indicates that coastal cutthroat trout populations are structured at the creek or tributary level, however, for the ease of these assessments, and since ODFW often manages fisheries at the level of a basin or subbasin, the population boundaries identified here are a grouping of creeks or tributaries. For this assessment, populations were identified geographically by grouping 5th field hydrologic unit codes (HUCs) to identify major basins or subbasins. Populations were kept within the area of a 4th field HUC to allow for greater detail within large basins. These population delineations will be reviewed during future conservation planning efforts. ODFW also recognizes that within the boundaries of most of these populations there are isolated groups of cutthroat trout that have evolved above barriers and should be considered unique.

Within populations there are known elements of life-history diversity, the most recognized being migration patterns. Coastal cutthroat trout in western Oregon may be classified into any of four life-history strategies; an anadromous strategy where individuals migrate to the estuary and/or ocean before returning to freshwater to spawn, an adfluvial strategy where individuals migrate from a lake to smaller tributaries to spawn, a fluvial strategy where individuals migrate to small streams from other parts of the watershed to spawn, and a resident strategy where individuals both reside and spawn in small streams (Trotter 1997). Isolated, allopatric, above barrier populations exist throughout the species' range, as well as populations that are sympatric with many other salmonids.

ODFW believes that most coastal cutthroat trout populations in Oregon exhibit all of the life-history strategies that can be expected based on the fishs access to larger streams, lakes, or an ocean/estuary environment. The interactions of the different life-history strategies with one another are poorly understood. Some information has shown that coastal cutthroat trout of one

life-history strategy can contribute to another. For example, resident coastal cutthroat trout in headwater streams or above barriers appear to produce smolts or migrants that adopt the anadromous strategy (Johnson 1999; Bown and Craig 2002).

Because of an apparent intermingling of life-history strategies, all life-history strategies of coastal cutthroat trout present within the boundaries of a population are considered for this assessment to be components of one diverse population. This assessment approach is consistent with the approach adopted by the U.S. Fish and Wildlife Service (Bown and Craig 2002) and is supported by Wenburg and Bentzen (2001), who indicated that coastal cutthroat trout populations are structured at the creek or tributary level, rather than among individual life-history types within a basin. ODFW will undertake a more in-depth consideration of the most appropriate population boundaries and structure for coastal cutthroat trout when conservation plans are developed for each SMU.

Existing Populations

The criterion used in this assessment to determine the existence of historic coastal cutthroat trout populations was intended to ensure that coastal cutthroat trout are found throughout the population boundaries identified in this report. Since genetic sampling has found differentiation of coastal cutthroat trout at the stream or tributary level, the criterion was developed to ensure some level of genetic differentiation exists within the population boundaries. The criterion used is the same criterion used for the habitat use distribution criterion - populations were considered to exist and not be at risk of extinction if coastal cutthroat trout were found to be distributed throughout more than 50% of their historic habitat. While this may seem to be using one measurement to assess two criteria, the standard used here for existence is much higher than was used in the assessment of this criterion for most of the other species assessed in this report.

Habitat Use Distribution

A population passed the habitat use distribution criterion if coastal cutthroat trout inhabited 50% or more of their historic habitat. Coastal cutthroat trout distribution data were not sufficiently comprehensive to assess all populations of coastal cutthroat trout. Instead, we used the results of fish presence surveys on private and public forestland (compiled by ODFW, Oregon Department of Forestry (ODF), the U.S. Forest Service (USFS), and the Bureau of Land Management (BLM)), juvenile sampling focused on other species, and routine or occasional sampling conducted by ODFW watershed districts. These sources of data were used to make an assessment of the frequency with which coastal cutthroat trout were found during these surveys and the distribution of the surveys throughout a geographic area. Distribution patterns seen in sampling were expanded for the entire population. If similar distribution patterns were observed within the boundaries of several populations within an SMU, it was presumed that a similar distribution would be seen in the remaining populations that did not have sufficient data.

Abundance

There were no spawner abundance data for coastal cutthroat trout in any of the SMUs that could be used to assess the abundance criterion as written in the NFCP's interim criteria. However, utilizing distribution and fish density data, we felt there was significant evidence to assess the "intent" of the abundance criterion. Populations were assessed to determine whether coastal cutthroat trout abundance was below a critical level in three of the last five years. A "critical level" was considered to occur when sampling within the distribution range of a population found very few to no cutthroat in a significant portion (greater than 50%) of the sampling sites.

Because there was no way to determine the abundance of an entire population, we relied on the assumption that when populations are near carrying capacity most of the habitat will be occupied at reasonable abundances and when a population becomes depressed there will be some areas where abundances will be quite low or the fish will be non-existent. The critical level threshold of greater than 50% of sites sampled was chosen to account for the preponderance of sampling conducted for forest practices on headwater streams (where some sites sampled would be above the historic range of coastal cutthroat trout and making an estimate of total abundance of trout at a site is not attempted) and also sampling related to monitoring of salmon and steelhead (where cutthroat trout abundances could be expected to be somewhat low due to competition for habitat). Abundance was measured in coastal cutthroat trout densities (fish/meter^2) observed in surveys. All available data were not thoroughly compiled and analyzed for this assessment. In some cases, we relied on the local ODFW biologists' assessment of the available data to help determine the status of coastal cutthroat trout populations. Where data was not compiled and analyzed or where data was not available, the status of populations were inferred from other populations within the same SMU. Surveys were not always conducted at each site for several consecutive years. In some instances, there were only a few surveys conducted within a population boundary. We presumed that conditions seen as a consistent pattern among the populations were indicative of the entire SMU. It was the professional opinion of the local ODFW biologists (Confer, VanDyke – Rogue Watershed District; Gray, Muck – Umpqua Watershed District; Buckman, Braun – North Coast Watershed District; Alsbury – North Willamette Watershed District; Ziller, Mamoyac – South Willamette Watershed District; French – Deschutes Watershed District) that freshwater habitat conditions have remained fairly stable in most areas where surveys were conducted over the last ten to 15 years and therefore surveys conducted only once were likely to be indicative of what would be seen in adjacent years. Data for individual populations was sometimes compiled from various surveys conducted over several years. In these cases, we relied on the professional opinion of the local ODFW biologists to assess whether the population was below a critical level in three of the last five years.

Productivity

Few data were available to adequately assess productivity for coastal cutthroat trout as called for in the NFCP interim criteria. However, it was possible to assess the populations under the "intent" of the productivity criterion. Data were analyzed to determine whether populations (or life history types within populations) had the ability to rebound to average densities after a period of low abundance or showed long periods of stable abundance. Local biologists could not document any populations (as defined in this report) that had been at low abundances. It was possible, however, to identify many populations for which the local biologists were aware of catastrophic events such as floods, debris torrents, or droughts that would have significantly reduced the densities of coastal cutthroat trout in certain portions of the basin that were affected by the event. To assess productivity, local ODFW biologists were asked to consider surveys that were conducted after these events and whether coastal cutthroat trout were found missing or in very low densities. In those situations where the biologists believed the abundance of coastal cutthroat trout had rebuilt after catastrophic events, it was taken as evidence of a productive population and was used to pass the productivity criterion. It was also possible to compare density data for some coastal cutthroat trout populations, or the anadromous portion of the population, for several years in a row or at times that were many years apart. Consistent densities over a period of time that were believed by the local biologists to represent full utilization of the habitat were also used to pass this criterion.

The loss of an historical life-history strategy in a population was deemed a threat to the productivity of a population and caused the population to fail the productivity criterion. Data showing a prolonged period of very low abundances of a particular life-history type was considered the same as the loss of that life-history.

Reproductive Independence

This criterion was assessed based on the presence of hatchery coastal cutthroat trout on the spawning grounds in three of the last five years. There was no data available that identified the composition of coastal cutthroat trout spawners on the spawning grounds However, since stocking of hatchery coastal cutthroat trout in Oregon streams was ceased by 1996, we presumed that there were no hatchery coastal cutthroat trout on the spawning grounds in any of the last five years. All populations of coastal cutthroat trout in all of the SMUs passed this criterion.

Hybridization

The hybridization criterion was passed for coastal cutthroat trout populations if the occurrence of interspecific hybridization with non-native trout was rare or non-existent. There is virtually no known occurrence of non-native trout in the streams where coastal cutthroat trout reside. For this reason, interspecific hybridization has not been identified as an issue for coastal cutthroat trout. All populations within Oregon passed this criterion. It is important to note that hybridization of coastal cutthroat trout with native rainbow trout and steelhead is likely occurring naturally where the two species are sympatric (Hawkins 1997). Natural hybridization between two native species in their historic range, however, was not the focus of this criterion.

Oregon Coast Coastal Cutthroat Trout

Species Management Unit Description

The Oregon Coast Coastal Cutthroat Trout Species Management Unit (SMU) includes all populations of cutthroat trout inhabiting ocean tributary streams from the Necanicum River south to the Sixes River. The Oregon Coast Coastal Cutthroat Trout SMU passed all six interim criteria and its conservation risk classification for this Status Report is "not at risk."

Existing Populations

The Oregon Coast Coastal Cutthroat Trout SMU is comprised in this report of 24 historical populations (Table 170). All four life-history types are present within the SMU and within several populations.

It is the professional opinion of the local ODFW biologists (Confer, Gray, Muck, Buckman, Braun, personal communications) that coastal cutthroat trout are found at least seasonally in virtually 100% of the available habitats for cutthroat trout in each of the 24 populations in the Oregon Coast SMU, verifying that all historical populations continue to exist. ODF fish presence surveys and other monitoring (including the ODFW Western Oregon Rearing Project and watershed council rapid bio-assessments) have found coastal cutthroat trout in all populations over the last seven years. It is presumed that some proportion of the coastal cutthroat trout found in headwater streams are resident fish. Fluvial fish are believed to be present in most large river systems. Adfluvial cutthroat trout are present in areas that permit this life-history strategy (i.e., Devils Lake, Loon Lake, Siltcoos Lake, etc.). Anadromous cutthroat trout are thought to be present in all Oregon coastal streams that lack an upstream barrier to fish passage near the ocean entrance point (Hooton 1997).

Table 170. Description, status, and life-history of Oregon Coast Coastal Cutthroat Trout SMU populations.

Exist	Population	Description	Life-history Strategies Present
Yes	Necanicum	Necanicum River.	Resident/Fluvial/Anadromous
Yes	Nehalem	Nehalem River.	Resident/Fluvial/Adfluvial/Anadromous
Yes	Rockaway	Coastal Tributaries near Rockaway.	Resident/Adfluvial/Anadromous
Yes	Tillamook	All tributaries to Tillamook Bay.	Resident/Fluvial/Anadromous
Yes	Netarts	Netarts Bay and surrounding Coastal Tributaries.	Resident/Anadromous
Yes	Nestucca	Nestucca River.	Resident/Fluvial/Anadromous
Yes	Neskowin	Neskowin Creek and Sand Lake watersheds.	Resident/Anadromous
Yes	Salmon	Salmon River.	Resident/Fluvial/Anadromous
Yes	Devils Lake	Devils Lake.	Resident/Adfluvial/Anadromous
Yes	Siletz	Siletz River.	Resident/Fluvial/Anadromous
Yes	Depoe Bay	Coastal Tributaries near Depot Bay.	Resident/Anadromous
Yes	Yaquina	Yaquina River.	Resident/Fluvial/Adfluvial/Anadromous
Yes	Beaver	Beaver Creek plus coastal tributaries between the Alsea and Yaquina rivers.	Resident/Anadromous
Yes	Alsea	Alsea River.	Resident/Fluvial/Adfluvial/Anadromous
Yes	Yachats	Coastal tributaries from Siuslaw River to Alsea River.	Resident/Fluvial/Adfluvial/Anadromous
Yes	Siuslaw	Siuslaw River.	Resident/Fluvial/Adfluvial/Anadromous
Yes	Siltcoos	Tributaries to Siltcoos and Tahkenitch Lakes.	Resident/Adfluvial/Anadromous
Yes	Lower Umpqua	Umpqua River basin upstream to mouth of North Fork Umpqua River.	Resident/Fluvial/Adfluvial/Anadromous
Yes	Upper Umpqua	North and South Fork Umpqua River basins.	Resident/Fluvial/Adfluvial/Anadromous
Yes	Tenmile	Tributaries to Tenmile and Eel lakes.	Resident/Adfluvial/Anadromous
Yes	Coos	Coos River.	Resident/Fluvial/Anadromous
Yes	Coquille	Coquille River.	Resident/Fluvial/Anadromous
Yes	Floras	Floras Creek basin plus coastal tributaries north to the Coquille River.	Resident/Adfluvial/Anadromous
Yes	Sixes	Sixes River.	Resident/Fluvial/Anadromous

Habitat Use Distribution

Fish presence survey and ODFW Western Oregon Rearing Project (WORP) juvenile monitoring data show that coastal cutthroat trout are present throughout the Oregon Coast SMU and are found distributed widely in each major watershed. Since coastal cutthroat trout are rarely the target species in biological studies, we relied on this data and the assessment of other data by ODFW local district biologists (Confer – Rogue Watershed District; Gray, Muck – Umpqua Watershed District and Buckman, Braun – North Coast Watershed District) to assess populations for this criterion.

Over the past seven years, coastal cutthroat trout have been found in ODF fish presence surveys in the headwaters of virtually all perennial streams in the Oregon Coast SMU, as well as many seasonal streams. These headwater areas are presumed to be the historical limit of coastal cutthroat trout distribution. It is also presumed that coastal cutthroat trout occupy all available habitat downstream of these headwater areas. Lorensen et al (1993) reported that, in any given drainage greater than 40 hectares, there was an 80% chance that coastal cutthroat trout would be present. WORP coast-wide snorkel surveys of pools from randomly selected stream reaches

(~1000 meters) conducted since 1998 have found cutthroat (> 90 mm forklength) at greater than 75% of all sites sampled. Three-quarters of these sites were in this SMU (Figure 38), and were chosen from a stream network based on juvenile coho distribution. It is presumed that cutthroat would have been found in almost all reaches if sampling also included non-pool habitat. Periodic sampling by local biologists continue to document the existence of the 40 isolated groups of coastal cutthroat trout in this SMU above natural barriers that were described in ODFW's 1995 Biennial Report on the Status of Wild Fish in Oregon (Kostow 1995). Based on the above information, we conclude that virtually all historical habitat is still being used by coastal cutthroat trout in each population today. All populations and the Oregon Coast Coastal Cutthroat Trout SMU pass this criterion.

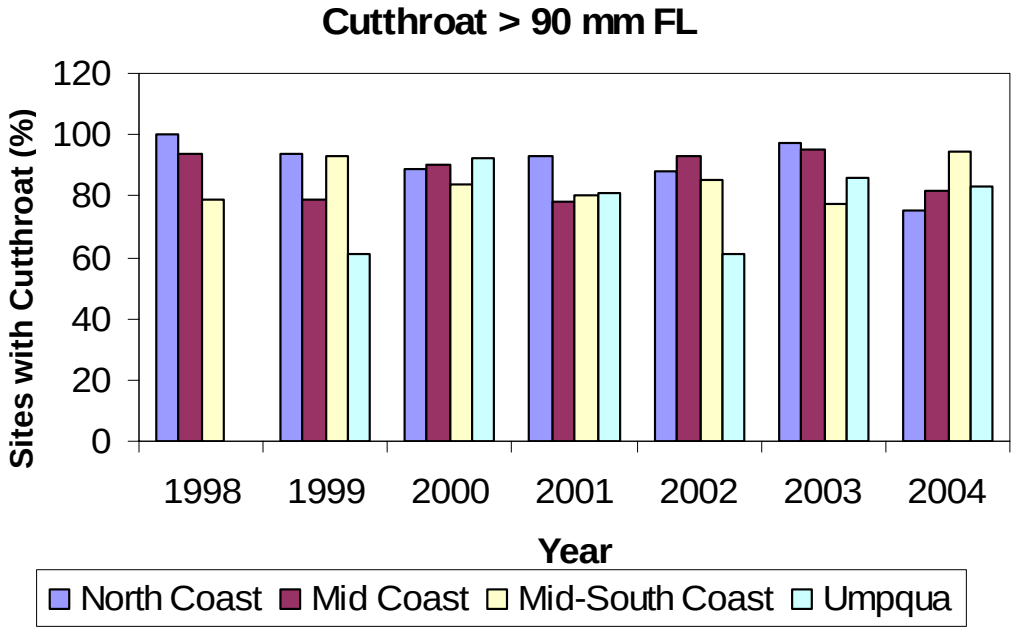


Figure 39. The percent of sites per monitoring area within the Oregon Coast SMU that had at least one cutthroat trout during Western Oregon Rearing Project sampling in juvenile coho habitat. Sites were 1,000 meter stream reaches in which only pools were snorkeled.

Abundance

During various sampling activities, ODFW biologists have found coastal cutthroat trout in virtually every stream within the Oregon Coast SMU, including 40 isolated groups of cutthroat trout above natural barriers that were described in ODFW's 1995 Biennial Report on the Status of Wild Fish in Oregon (Kostow 1995).

To assess the abundance criterion, local ODFW biologists in the Oregon Coast Coastal Cutthroat Trout SMU were asked to review the results of the various sampling efforts that have been conducted over the last ten years to identify those locations within the distribution range of coastal cutthroat trout where abundances were found at critical levels (as defined in the Coastal Cutthroat Trout Assessment Methods section). The biologists had difficulty identifying any sites within the distribution of coastal cutthroat trout in the SMU where very few or no cutthroat trout were found. In the few cases where abundances were found to be at critical levels, the location

was near the upper limit of cutthroat distribution in the headwaters of streams where habitat is limited or in streams that had gone dry during drought conditions.

Coastal cutthroat trout are often found in high densities, with a variety of year classes present, and near carrying capacity in many pools (ODFW Southwest Regional Fish Management Meeting Report, 1995). Umpqua Watershed District sampling found densities of cutthroat trout in the Coos and Coquille River basins varied from 0.66 fish per square meter where cutthroat trout were allopatric and 0.12 fish per meter square where they were sympatric with other salmonid species.

Densities of cutthroat trout in the Oregon Coast SMU appear to have remained stable (no decrease) or may have increased over the last ten years. Densities of cutthroat trout in the Yachats River watershed remained stable from 1998 through 2003 (Mid-Coast Watersheds Council Rapid Bio-Assessment, 1998 - 2003). WORP sampling found densities of cutthroat trout in the Drift Creek sub-basin of the Alsea basin over the last seven years were comparable to densities seen during the Alsea Watershed Study in the 1960s. Data collected in the Salmon River estuary from 1999 through 2003 shows an apparent increase in anadromous coastal cutthroat trout (Figure 40). Catch per unit effort increased ten-fold from 0.21 cutthroat per seine haul in 1999 to 2.14 cutthroat per seine haul in 2003 (Krentz and Cornwell unpublished data). Data from ten Oregon Plan Lifecycle Monitoring migrant fish traps do not show a clear pattern in abundance of coastal cutthroat trout migrants (Figure 41), however, the number of migrants seen on an annual basis considered with the size of the stream being sampled suggests abundances above critical levels. The professional opinion of local ODFW biologists is that these streams are representative of the entire SMU and the stability of the densities of cutthroat documented in them are believed to have occurred throughout the SMU (ODFW,Gray, Muck, Buckman, Braun, personal communications).

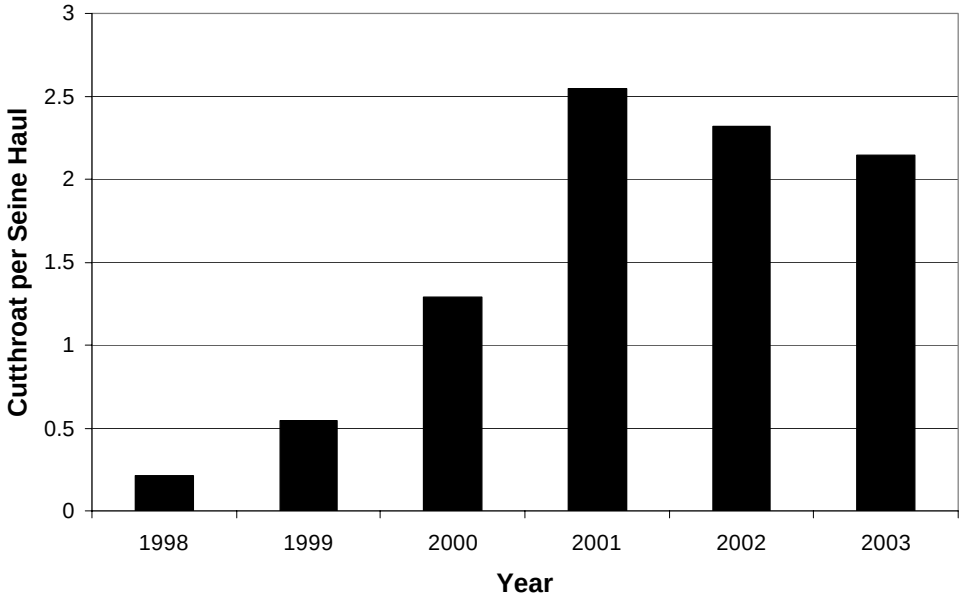
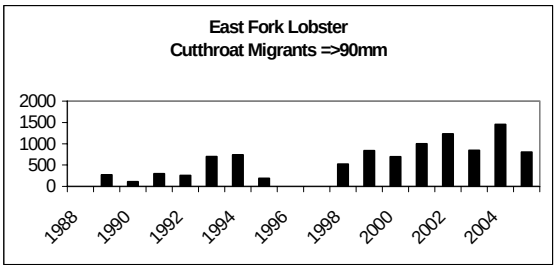
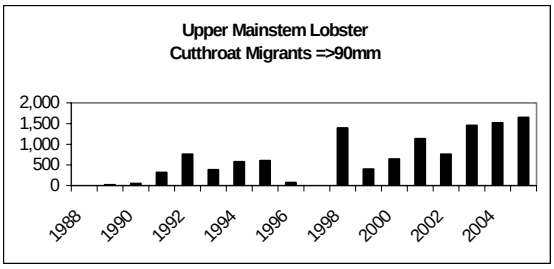
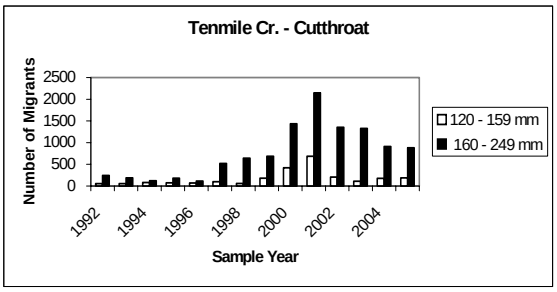
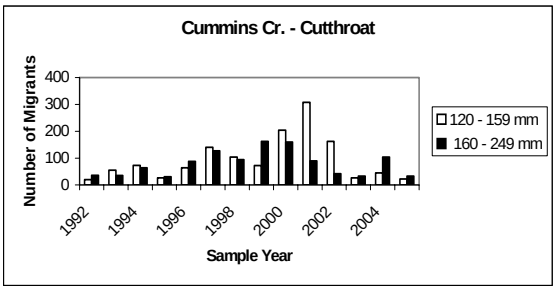


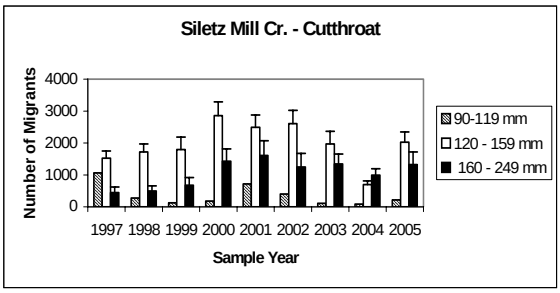
Figure 40. Catch per Unit Effort in the Salmon River Estuary 1998-2003 (Source Krentz & Cornwell, unpublished data).

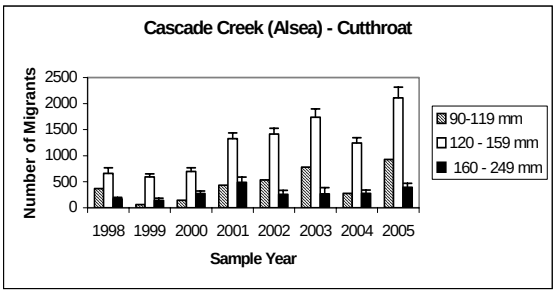

East Fork Lobster
Cutthroat Migrants =>90mm
2000
1500
1000
500
0
1988
1990
1992
1994
1996
1998
2000
2002
2004

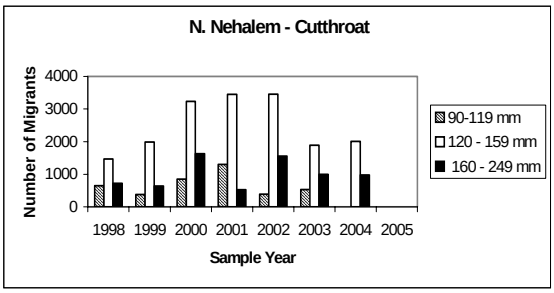

Upper Mainstem Lobster
Cutthroat Migrants =>90mm
2,000
1,500
1,000
500
0
1988
1990
1992
1994
1996
1998
2000
2002
2004

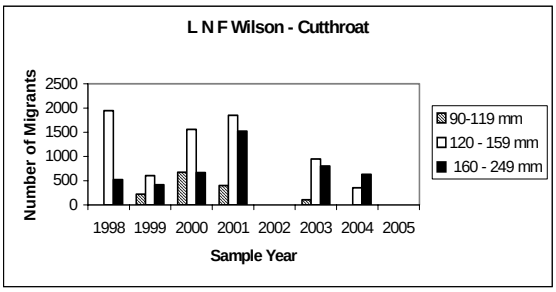

Tenmile Cr. - Cutthroat
Number of Migrants
2500
2000
1500
1000
500
0
1992
1994
1996
1998
2000
2002
2004
Sample Year
120 - 159 mm
160 - 249 mm

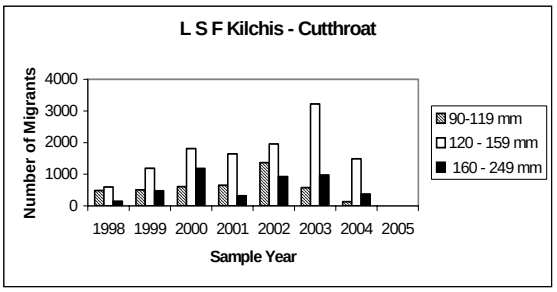

Cummins Cr. - Cutthroat
Number of Migrants
400
300
200
100
0
1992
1994
1996
1998
2000
2002
2004
Sample Year
120 - 159 mm
160 - 249 mm


Siletz Mill Cr. - Cutthroat
Number of Migrants
4000
3000
2000
1000
0
1997 1998 1999 2000 2001 2002 2003 2004 2005
Sample Year
90-119 mm
120 - 159 mm
160 - 249 mm


Cascade Creek (Alsea) - Cutthroat
Number of Migrants
2500
2000
1500
1000
500
0
1998 1999 2000 2001 2002 2003 2004 2005
Sample Year
90-119 mm
120 - 159 mm
160 - 249 mm


N. Nehalem - Cutthroat
Number of Migrants
4000
3000
2000
1000
0
1998 1999 2000 2001 2002 2003 2004 2005
Sample Year
90-119 mm
120 - 159 mm
160 - 249 mm


L N F Wilson - Cutthroat
Number of Migrants
2500
2000
1500
1000
500
0
1998 1999 2000 2001 2002 2003 2004 2005
Sample Year
90-119 mm
120 - 159 mm
160 - 249 mm


L S F Kilchis - Cutthroat
Number of Migrants
4000
3000
2000
1000
0
1998 1999 2000 2001 2002 2003 2004 2005
Sample Year
90-119 mm
120 - 159 mm
160 - 249 mm

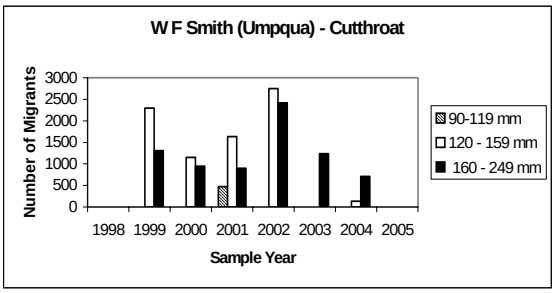

W F Smith (Umpqua) - Cutthroat
Number of Migrants
3000
2500
2000
1500
1000
500
0
1998 1999 2000 2001 2002 2003 2004 2005
Sample Year
90-119 mm
120 - 159 mm
160 - 249 mm

Figure 41. Expanded numbers of coastal cutthroat trout downstream migrants captured in ten ODFW Lifecycle Monitoring Program migrant traps. Years in which expansions could not be made were not graphed.

The relatively stable densities of cutthroat trout found throughout the SMU in random and routine sampling along with the virtual absence of areas of low abundance suggests all populations of coastal cutthroat trout have been above critical levels in all of the last five years. The stable or increasing nature of these densities over the decades that sampling has occurred indicates that the populations have stayed above these critical levels for some time. All of the Oregon Coast SMU populations passed the abundance criterion. The SMU also passes the criterion.

Productivity

Coastal cutthroat trout are abundant and widely distributed in virtually all stream segments in this SMU. Sampling in conjunction with forestry activities throughout the SMU has found cutthroat in most headwater reaches. Lorensen, et al. (1993) reported that, in any given drainage greater than 40 ha within the Oregon Coast SMU, there was an 80% chance that coastal cutthroat trout would be present. Local ODFW biologists have noted that the 40 isolated groups of coastal cutthroat trout above natural barriers described by ODFW in 1995 (Kostow 1995) have continued to maintain stable levels over the recent decades that sampling has occurred. The densities of cutthroat (fish/m^2 of pool habitat) seen in the past five years in the Drift Creek (Alsea) subbasin (WORP) are comparable to those densities seen in the subbasin in the 1960s (Alsea Watershed Study). Similar coastal cutthroat trout densities have been documented in areas throughout the SMU. All historical life-history strategies continue to be expressed.

Anadromous coastal cutthroat trout are the only life-history type in this SMU that have experienced a documented decline in abundance in the last several decades. Densities of adults during annual North Coast Watershed District snorkel surveys in the Nestucca, Trask, and Wilson rivers had declined during the 1980s and 1990s (Figure 42). This is believed to be a result of poor ocean survival conditions. Coho salmon in the same areas also declined during these years. Densities of the anadromous life-history type have increased significantly since 2000 (ODFW, Knutsen, unpublished data), demonstrating the ability for coastal cutthroat trout with their multiple life-history strategies to respond in the face of environmental variability. The catch per unit effort of anadromous coastal cutthroat trout in the Salmon River estuary also increased over this time period (Krentz and Cornwell, unpublished data)(Figure 40). During the period the anadromous life-history type declined, local ODFW biologists believe overall cutthroat abundances were stable in these basins.

ODFW Watershed District biologists in the Oregon Coast Coastal Cutthroat Trout SMU, as stated in the abundance criterion section, have found few streams during various sampling efforts where coastal cutthroat trout are not present in expected densities for the habitat present. This includes streams that have experienced catastrophic events such as droughts, floods, and debris torrents that would likely have reduced or eliminated the abundance of coastal cutthroat trout. Streams that go dry during the summer months have been found to support reasonable densities of cutthroat the following spring. Most areas that have been found with low numbers of cutthroat trout due to a debris torrent have been found to contain reasonable densities of cutthroat a few years after the event. Examples of such resilience in coastal cutthroat trout have been identified in almost every basin by the local biologists.

The productivity criterion is intended to assess the ability of population levels to rebuild after experiencing low abundances. The stable level of cutthroat found in the Alsea from the 1960s to the present along with their almost universal distribution is evidence that this population is fully utilizing the available habitat and maintains abundances near capacity. Similar densities of cutthroat have been found in most, if not all, of the other populations in conjunction with juvenile coho sampling from the 1980s to the present. These densities have been found before and after catastrophic events such as 100-year floods, debris torrents, and severe droughts. The fact that stable densities of cutthroat trout are found in almost all streams in this SMU despite events that undoubtedly diminished their abundance, provides evidence that all coastal cutthroat trout populations in the Oregon Coast SMU pass the productivity criterion.

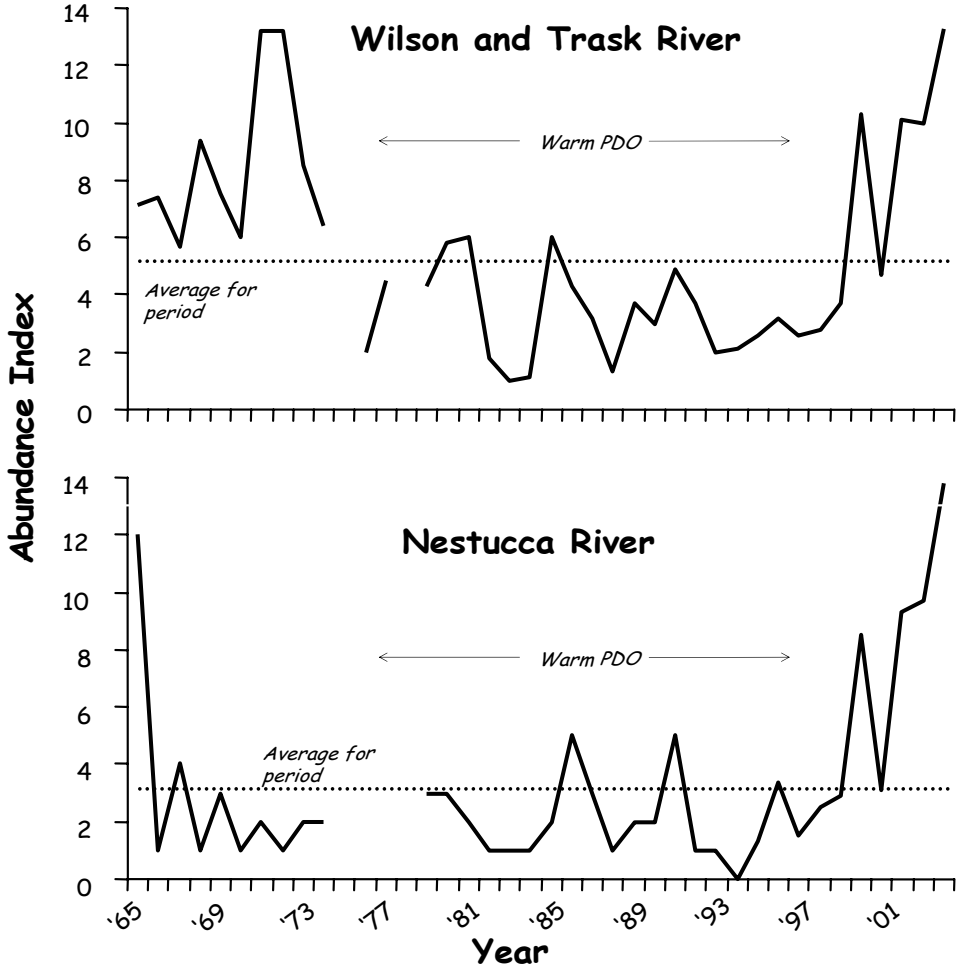


Figure 42. Abundance of adult anadromous coastal cutthroat trout in the Wilson and Trask rivers (combined) and the Nestucca River based on ODFW snorkel surveys 1965-2004. Abundance Index is based upon number of observations per pool surveyed. Dotted line represents the mean number of observations per pool for the period. Surveys were not conducted in 1975 and 1978 (Wilson River), and 1975 and 1977-78 (Trask and Nestucca rivers). Period of low ocean productivity (warm Pacific Decadal Oscillation, PDO) is identified. (From ODFW, Knutsen, unpublished data).

Reproductive Independence

Data specific to reproductive independence are not available for Oregon Coast coastal cutthroat trout. Instead we used current and historical stocking records to evaluate the risk of hatchery origin cutthroat trout to native coastal cutthroat trout. Stocking has occurred throughout most of

the SMU. All stocking of hatchery cutthroat trout in the state was ceased in 1996 and many of the programs in the Oregon Coast SMU were discontinued prior to that. The residual effects of hatchery cutthroat on wild coastal cutthroat have not been determined. However, since no stocking of hatchery fish has occurred in the last eight years, the presence of hatchery fish on the spawning grounds is unlikely, therefore all populations passed this criterion.

Hybridization

Interspecific hybridization with non-native trout has not been identified as an issue for Oregon Coast coastal cutthroat trout.

Summary

Our final assessment of the Oregon Coast Coastal Cutthroat Trout SMU is "Not at Risk". There is substantial quantitative and qualitative data that indicate this species appears to be able to quickly respond to changes in habitat quality or quantity and to populate those habitats to capacity. Populations of coastal cutthroat trout have persisted where they are isolated and where they interact with populations of other salmonid and non-salmonid species. There is no conservation risk to this species at this time. Many of the datasets used in this assessment were developed with different protocols and assumptions, making it difficult to compare between datasets. During conservation plan development for the Oregon Coast Coastal Cutthroat Trout SMU these datasets will be analyzed thoroughly to ensure this interim assessment is accurate.

Southern Oregon Coastal Cutthroat Trout

Species Management Unit Description

The Southern Oregon Coastal Cutthroat Trout SMU includes all populations of cutthroat trout inhabiting ocean tributary streams from Elk River south to the Oregon/California border. The Southern Oregon Coastal Cutthroat Trout SMU passed all six interim criteria and its conservation risk classification for this Status Report is "not at risk".

Existing Populations

The Southern Oregon Coastal Cutthroat Trout SMU in this report is comprised of 12 historical populations (Table 1). Resident, fluvial, and anadromous life-history types are present within the SMU.

It is the professional opinion of the local ODFW biologists (Confer, VanDyke, personal communications) that coastal cutthroat trout are found at least seasonally in virtually 100% of the available habitats for cutthroat trout in each of the 12 populations in the Southern Oregon SMU, verifying that all historical populations continue to exist. Sampling associated with forest practices and salmon or steelhead monitoring has found coastal cutthroat trout in all populations. Fluvial cutthroat trout are confirmed in Middle Rogue, Upper Rogue, and Applegate River populations and are believed to be present in other large river systems. Anadromous cutthroat trout are thought to be present in all Oregon coastal streams that lack an upstream barrier to fish passage near the ocean entrance point (Hooton 1997).

Table 1. Description, status, and life history of Southern Oregon Coastal Cutthroat Trout SMU populations.

Exist	Population	Description	Life-history
Yes	Upper Rogue	Upstream of Gold Ray Dam.	Fluvial/Resident
Yes	Middle Rogue	Illinois River to Gold Ray Dam.	Resident/Fluvial/Anadromous
Yes	Lower Rogue	Mouth to Illinois River.	Resident/Fluvial/Anadromous
Yes	Applegate	Applegate River.	Fluvial/Resident
Yes	Illinois	Illinois River.	Resident/Fluvial/Anadromous
Yes	Elk	Elk River.	Resident/Fluvial/Anadromous
Yes	Euchre	Euchre Creek and coastal tributaries from Elk to Rogue.	Resident/Anadromous
Yes	Hunter	Hunter Creek.	Resident/Fluvial/Anadromous
Yes	Pistol	Pistol River.	Resident/Fluvial/Anadromous
Yes	Coastal Creeks	Coastal Creeks between Rogue River and Chetco River.	Resident/Anadromous
Yes	Chetco	Chetco River.	Resident/Fluvial/Anadromous
Yes	Winchuck	Winchuck River.	Resident/Fluvial/Anadromous

Habitat Use Distribution

Fish presence survey data in association with forest operations and Oregon Plan Western Oregon Rearing Project (WORP) survey data suggests that coastal cutthroat trout are present throughout the Southern Oregon Coastal Cutthroat Trout SMU and are found distributed widely in each major watershed. Since coastal cutthroat trout are rarely the target species in biological studies, we relied on this data and the assessment of other data by local ODFW district biologists (Confer, VanDyke – Rogue Watershed District) to assess populations under this criterion.

It is the professional opinion of local ODFW biologists that all life-history types of coastal cutthroat trout expected are present and widely distributed throughout the entire Southern Oregon SMU (Confer, VanDyke, personal communication). Coast-wide snorkel surveys of pools from randomly selected stream reaches (~1,000 meters) conducted since 1998 have found cutthroat trout (> 90 mm forklength) at over 30% of sites sampled in three of the last five years (WORP) (Figure 1). Sites were chosen from a stream network based on juvenile coho distribution. It is presumed that cutthroat would have been found in almost all reaches if sampling also included non-pool habitat. In 2003-2004 cutthroat were present at 88-95% of non-Rogue basin sites that were chosen from a stream network based on juvenile steelhead distribution (WORP). For sampling within steelhead distribution of the Rogue basin, cutthroat were found at 29-82% of sites (Figure 2). Due to the sampling protocol and the aggressive nature of juvenile steelhead, it is believed these data also underestimate the distribution of coastal cutthroat trout. Based on these patterns of distribution and the professional opinion of the local biologists, all populations passed this criterion, as did the SMU.

Abundance

During various sampling activities, ODFW biologists have found coastal cutthroat trout in virtually every stream within the Southern Oregon SMU, including 21 isolated groups of cutthroat trout above natural barriers that were described in ODFW's 1995 Biennial Report on the Status of Wild Fish in Oregon (Kostow 1995).

To assess the abundance criterion, local ODFW biologists in the Southern Oregon Coastal Cutthroat Trout SMU were asked to review the results of the various sampling efforts that have been conducted over the last ten years to identify those locations within the distribution range of coastal cutthroat trout where abundances were found at critical levels (as defined in the Coastal Cutthroat Trout Assessment Methods section). Very few sites in the SMU could be identified where very few or no cutthroat trout were found. In the few cases where abundances were found to be at critical levels, the location was either near the upper limit of cutthroat distribution in the headwaters of streams where habitat is limited, or in an area where significant steelhead juveniles were present that likely out-competed cutthroat trout for occupation of the habitat. Even including these areas of expected low abundances of coastal cutthroat trout, the proportion of these areas to all areas sampled is still well below the criterion level of >50%. It is the professional opinion of the local ODFW biologists that the sampling efforts reviewed are indicative of the abundance of each coastal cutthroat trout population within the Southern Oregon SMU.

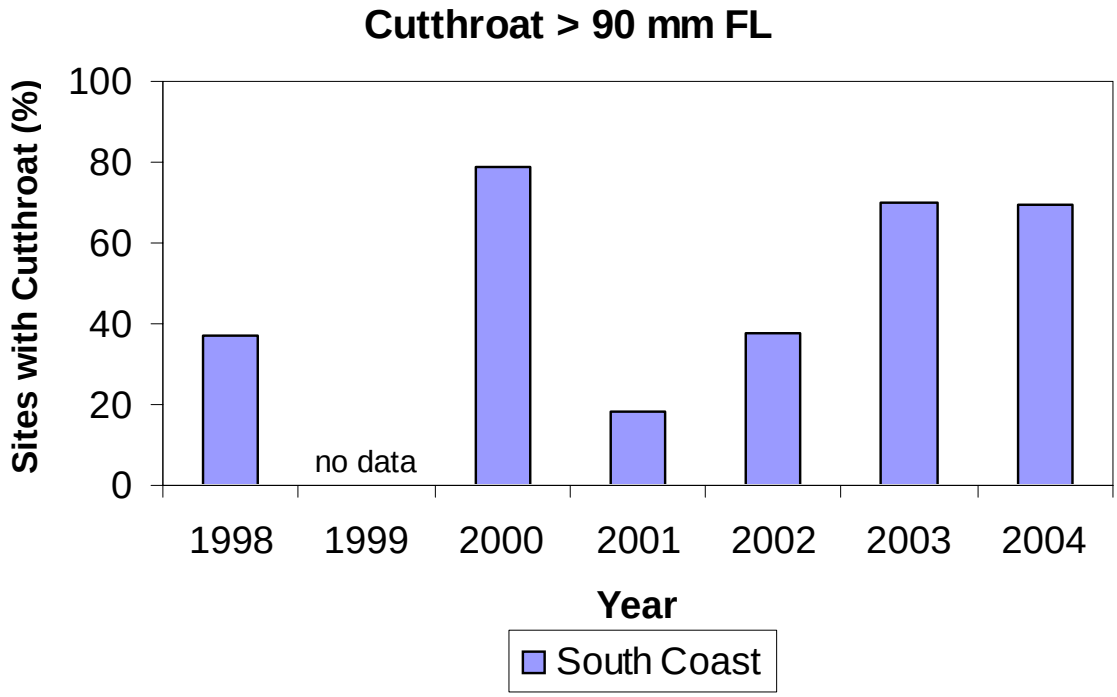


Figure 1. The percent of sites within the Southern Oregon SMU that had at least one cutthroat trout during Western Oregon Rearing Project sampling in juvenile coho habitat. Sites were 1,000 meter stream reaches in which only pools were snorkeled.

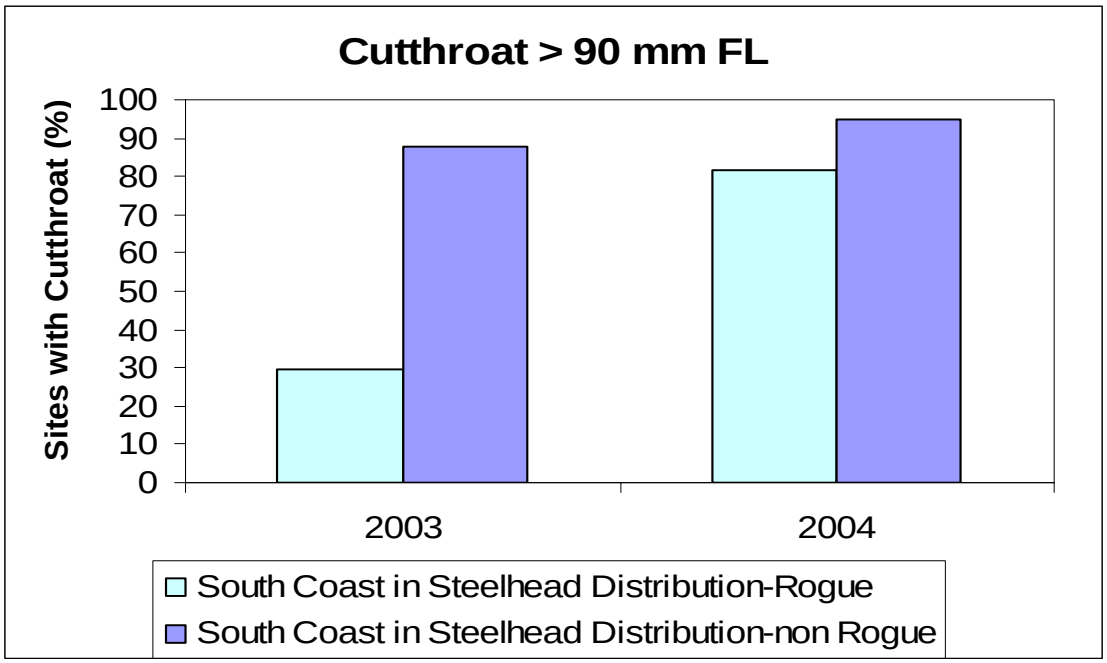


Figure 2. The percent of sites within the Southern Oregon SMU that had at least one cutthroat trout during Western Oregon Rearing Project sampling in juvenile steelhead habitat. Sites were 1,000 meter stream reaches in which only pools were snorkeled.

Sampling throughout the SMU, including areas above barriers, that has looked at cutthroat trout densities has found consistent densities of coastal cutthroat trout. They are thought to be the dominant trout in most headwater tributaries and small streams that directly enter the ocean. In the 1990s, multiple cutthroat trout age classes were found in most locations where resident cutthroat trout existed (Hooton 1997). Local biologists believe the present age class structure has not changed.

ODFW Rogue Watershed District's annual seining efforts in the Chetco, Hunter, Pistol, and Winchuck Rivers have consistently reported anadromous coastal cutthroat trout. Watershed district migrant trap data from Euchre and Hunter creeks, as well as Pistol and Winchuck rivers have also shown relatively consistent numbers of migratory cutthroat trout. The Rogue Watershed District believes the Elk River, Chetco River, and Winchuck River populations are stable, although they may be at somewhat lower levels relative to historical abundance (Confer, personal communication). The relative abundance of coastal cutthroat trout in Hunter Creek is believed to be stable or increasing. The Pistol River population is thought to be stable and healthy. It is the professional opinion of the local ODFW biologists (Confer, VanDyke, personal communications) that the status of these populations is indicative of the status of all Southern Oregon SMU coastal cutthroat trout populations.

The relatively healthy densities of cutthroat trout found throughout the SMU in random and routine sampling suggests all populations of coastal cutthroat trout have been above critical levels in each of the last five years. The stable nature of these densities over the decades that sampling has occurred indicates that the populations have stayed above critical levels for some time. For these reasons, all of the populations passed the abundance criterion. The SMU also passes the criterion.

Productivity

Coastal cutthroat trout are found in almost all stream segments in this SMU. Sampling in conjunction with forestry activities throughout the SMU has found cutthroat in most headwater reaches. Local ODFW biologists have noted that the 21 isolated groups of cutthroat trout above natural barriers that were described by ODFW in 1995 (Kostow 1995) have continued to maintain stable levels over the recent decades that sampling has occurred. All historical life-history strategies continue to be expressed.

ODFW Watershed District biologists in the Southern Oregon Coastal Cutthroat Trout SMU, as stated in the abundance criterion section, have found few streams during various sampling efforts where coastal cutthroat trout are not present in expected densities for the habitat present. This includes streams that have experienced catastrophic events such as fires, droughts, floods, and debris torrents that would likely have reduced or eliminated the abundance of coastal cutthroat trout. Local biologists have identified streams that go dry during the summer months, but have been found to support reasonable densities of cutthroat the following spring. Most areas that have been found with low numbers of cutthroat trout due to a debris torrent have been found to contain reasonable densities of cutthroat a few years after the event. Examples of such resilience in coastal cutthroat trout have been identified in almost every basin by the local biologists (ODFW, Confer, VanDyke, personal communications).

The productivity criterion is intended to assess the ability of population levels to rebuild after experiencing low abundances. The stable level of cutthroat found in most of the populations within the SMU, along with their almost universal distribution, is evidence that these populations fully utilize the available habitat and maintain abundances near capacity. These densities have

been found before and after catastrophic events such as fires, debris torrents, and severe droughts. The fact that stable densities of cutthroat trout are found in almost all streams in this SMU despite events that undoubtedly diminished their abundance, provides evidence that all coastal cutthroat trout populations in the Southern Oregon SMU pass the productivity criterion.

Reproductive Independence

Data specific to reproductive independence are not available for Southern Oregon Coastal Cutthroat Trout. Instead we used current and historical stocking records to evaluate the risk of hatchery origin cutthroat trout to native coastal cutthroat trout. Stocking has occurred throughout much of the SMU. All stocking of hatchery cutthroat trout in the Southern Oregon SMU was discontinued in 1985. The residual effects of hatchery cutthroat on wild coastal cutthroat have not been determined. However, since no stocking of hatchery fish has occurred in the last 19 years, all populations passed this criterion.

Hybridization

Interspecific hybridization with non-native trout has not been identified as an issue for Southern Oregon coastal cutthroat trout.

Summary

Our final assessment of the Southern Oregon Coastal Cutthroat Trout SMU is "Not at Risk". There is quantitative and qualitative data that indicate this species appears to be able to quickly respond to changes in habitat quality or quantity and to populate those habitats to capacity. Populations of coastal cutthroat trout have persisted where they are isolated and where they interact with populations of other salmonid and non-salmonid species. There is no conservation risk to this species at this time. Many of the datasets used in this assessment were developed with different protocols and assumptions, making it difficult to compare between datasets. During conservation plan development for the Southern Oregon Coastal Cutthroat Trout SMU these datasets will be analyzed thoroughly to ensure this interim assessment is accurate.

Lower Columbia River Coastal Cutthroat Trout

Species Management Unit Description

The Lower Columbia River Coastal Cutthroat Trout SMU includes all Oregon populations of coastal cutthroat trout inhabiting tributary streams of the Columbia River from the mouth of the Columbia River upstream to The Dalles Dam, including tributaries of the Willamette River below Willamette Falls. The Lower Columbia River coastal cutthroat SMU passed five of the six interim criteria and its conservation risk classification for this Status Report is "potentially at risk".

Existing Populations

The Lower Columbia River Coastal Cutthroat Trout SMU is comprised of eight historical populations (Table 1). It is the professional opinion of the local ODFW biologists (Braun, Alsbury, French, personal communications) that coastal cutthroat trout are found at least seasonally in virtually 100% of the available habitats for cutthroat trout in each of the eight populations in the Lower Columbia SMU, verifying that all historical populations continue to exist. All populations include resident, fluvial and anadromous fish.

Table 1. Description, status, and life history of Lower Columbia River Coastal Cutthroat Trout SMU populations.

Exist	Population	Description	Life-history
Yes	Youngs	Young's Bay tributaries/Big Creek.	Resident/Fluvial/Anadromous
Yes	Clatskanie	Clatskanie River/Beaver Creek/Plympton Creek.	Resident/Fluvial/Anadromous
Yes	Scappoose	Scappoose Creek/Johnson Creek.	Resident/Fluvial/Anadromous
Yes	Clackamas	Clackamas River.	Resident/Fluvial/Anadromous
Yes	Sandy	Sandy River.	Resident/Fluvial/Anadromous
Yes	Columbia Gorge	Columbia Gorge tributaries.	Resident/Fluvial/Anadromous
Yes	Hood	Hood River.	Resident/Fluvial/Anadromous
Yes	Fifteen Mile	Mill Creek/Five Mile/Fifteen Mile.	Resident/Fluvial/Anadromous

Habitat Use Distribution

Fish presence surveys related to forest operations suggests that cutthroat trout are present throughout the Lower Columbia River SMU and are found distributed widely in each major watershed. Since cutthroat trout are rarely the target species in biological studies, we relied on this data and the assessment of other data by local ODFW district biologists (Braun – North Coast Watershed District, Alsbury – North Willamette Watershed District, and French – Deschutes Watershed District) to assess each population for this criterion.

It is the professional opinion of local ODFW biologists that all life-history types of coastal cutthroat trout expected are present and widely distributed throughout most of the Lower Columbia River SMU (Braun, Alsbury, French, personal communications). There is some uncertainty as to the current and historical presence of the anadromous life-history strategy in the two populations above Bonneville Dam – the Hood and Fifteenmile populations. Sampling on private and federal forest lands over the past ten years has found coastal cutthroat trout in the headwaters of most perennial streams sampled in the Lower Columbia River SMU, as well as seasonal streams. These headwater areas are presumed to be the historical limit of coastal

cutthroat trout distribution. Periodic sampling by local biologists continues to document the existence of the 71 isolated groups of coastal cutthroat trout above natural barriers that were described in ODFW's 1995 Biennial Report on the Status of Wild Fish in Oregon (Kostow 1995). Watershed district sampling focused on various activities, or other species, typically has documented the presence of coastal cutthroat trout in most areas of a watershed. Local ODFW biologists believe the results of these various sampling efforts represents the actual distribution of coastal cutthroat trout in all eight populations within the SMU and that it verifies that virtually all historical habitat is currently being used by coastal cutthroat trout in each population. All populations and the SMU pass this criterion.

Abundance

To assess the abundance criterion, local ODFW biologists in the Lower Columbia River Coastal Cutthroat Trout SMU were asked to review the results of the various sampling efforts that have been conducted over the last ten years to identify those locations within the distribution range of coastal cutthroat trout where abundances were found at critical levels (as defined in the Coastal Cutthroat Trout Assessment Methods section). Very few sites in the SMU could be identified where very few or no cutthroat trout were found. In the few cases where abundances were found to be at critical levels, the location was either near the upper limit of cutthroat distribution in the headwaters of streams where habitat is limited, or in an area where significant steelhead juveniles were present that likely out-competed cutthroat trout for occupation of the habitat. Even including these areas of expected low abundances of coastal cutthroat trout, the proportion of these areas to all areas sampled is still well below the criterion level of >50%. It is the professional opinion of the local ODFW biologists that the sampling efforts reviewed are indicative of the abundance of each coastal cutthroat trout population within the Lower Columbia River SMU (Braun, Alsbury, French, personal communications).

Watershed district sampling in selected tributaries of the Hood River in the early to mid-1990s found moderate to high densities of coastal cutthroat trout. The local ODFW biologists believe current densities are simiar to those seen in the 1990s (French, personal communication). Periodic sampling in other streams in the SMU has found moderate densities of cutthroat as well. In routine and random sampling in this SMU over the past five years it has been rare to find a segment of a perennial stream that does not have cutthroat trout present.

Sampling of downstream migrants in the North Fork Scappoose River and upstream migrants in the Clackamas River do not show much of an upward or downward trend in abundance (Figure 1 and Figure 2). The Clackamas River dam counts are likely to be the anadromous life-history type coastal cutthroat trout and may be showing a similar increasing trend as was seen in the Oregon Coast SMU. The North Fork Scappoose River migrant trap data are also comparable to the migrant trap data collected in the Oregon coast SMU.

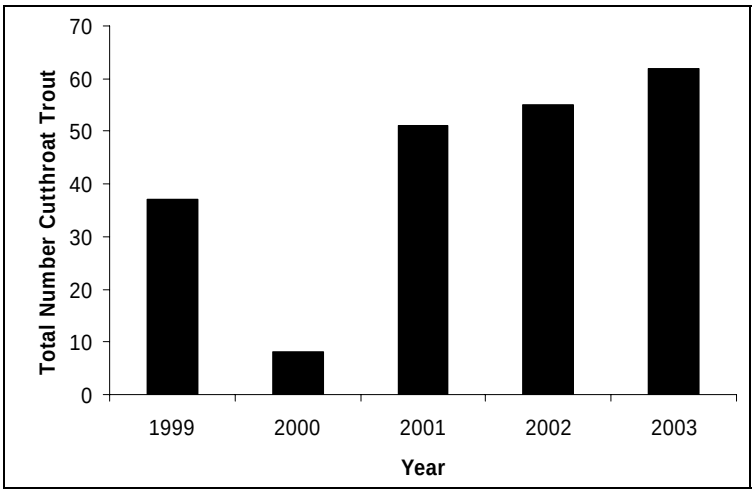


Figure 1. Cutthroat counted at the North Fork Clackamas River adult fish trap (Source Portland General Electric)

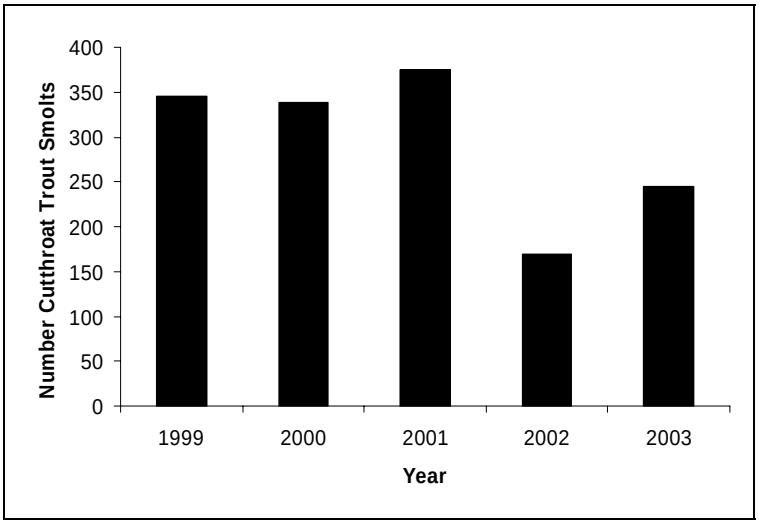


Figure 2. Cutthroat smolts counted at the North Fork Scappoose Creek migrant trap (Source ODFW LifeCycle Monitoring Project)

The relatively healthy densities of cutthroat trout found throughout the SMU in random and routine sampling suggests all populations of coastal cutthroat trout have been above critical levels in each of the last five years. The stable nature of these densities over the decades that sampling has occurred indicates that the populations have stayed above critical levels for some time. For these reasons, all of the populations passed the abundance criterion. The Lower Columbia River Coastal Cutthroat Trout SMU also passes the criterion.

Productivity

Coastal cutthroat trout are found in almost all stream segments in the Lower Columbia River SMU. Sampling in conjunction with forestry activities throughout the SMU has found cutthroat in most headwater reaches. Local ODFW biologists have noted that the 71 isolated groups of cutthroat trout above natural barriers described by ODFW in 1995 (Kostow 1995) have continued to maintain stable levels over the recent decades that sampling has occurred.

ODFW Watershed District biologists in the Lower Columbia River Coastal Cutthroat Trout SMU, as stated in the abundance criterion section, have found few streams during various

sampling efforts where coastal cutthroat trout are not present in expected densities for the habitat present. This includes streams that have experienced catastrophic events such as droughts, floods, and debris torrents that would likely have reduced or eliminated the abundance of coastal cutthroat trout. Local biologists have identified streams that go dry during the summer months, but have been found to support reasonable densities of cutthroat the following spring. Most areas that have been found with low numbers of cutthroat trout due to a debris torrent have been found to contain reasonable densities of cutthroat a few years after the event. Examples of such resilience in coastal cutthroat trout have been identified in almost every basin by the local biologists (Braun, Alsbury, French, personal communications).

The productivity criterion is intended to assess the ability of population levels to rebuild after experiencing low abundances. The stable level of cutthroat found in most of the Lower Columbia River SMU along with their almost universal distribution is evidence that these populations fully utilize the available habitat and maintain abundances near capacity. The densities sampled have been found before and after catastrophic events such as 100 year floods, debris torrents, and severe droughts. The fact that stable densities of cutthroat trout are found in almost all streams in this SMU despite events that undoubtedly diminished their abundance, provides evidence that all coastal cutthroat trout populations in the Lower Columbia River SMU are productive.

Abundance of anadromous coastal cutthroat trout in the entire Lower Columbia River SMU is thought to have declined through the 1990s as a result of poor ocean survival conditions. Reports from anglers and local biologists suggest that the number of large cutthroat trout, presumably anadromous, in the populations below Bonneville Dam has increased in the last several years, demonstrating the ability for coastal cutthroat trout to rebound after low abundances. The continued low abundance of anadromous coastal cutthroat trout seen at Powerdale Dam on the Hood River is cause for some concern. The local ODFW biologist believes the anadromous life-history type in the Fifteenmile population is also at low abundances (French, personal communication). There is some uncertainty as to the historical existence of the anadromous life-history of coastal cutthroat trout in these populations above Bonneville Dam. The historical stocking of hatchery coastal cutthroat trout in the Hood River somewhat clouds the true abundance of anadromous coastal cutthroat trout seen at Powerdale Dam.

The Hood and Fifteenmile populations failed the productivity criterion due to the concern of an historical coastal cutthroat trout life-history being at extremely low levels. The loss of a life-history strategy would negatively impact the productivity of these populations. All other Lower Columbia River SMU coastal cutthroat trout populations passed the criterion. The SMU fails the criterion with less than 80% of the populations passing the criterion.

Reproductive Independence

Data specific to reproductive independence are not available for Lower Columbia River coastal cutthroat trout. Instead we used current and historical stocking records to evaluate the risk of hatchery origin cutthroat trout to native coastal cutthroat trout. Stocking occurred in the past throughout all of the SMU, with the exception of the Columbia Gorge and Fifteen Mile populations. All stocking of hatchery cutthroat trout in the state was ceased in 1996 and many of the programs in the Lower Columbia SMU were discontinued prior to that. The residual effects of hatchery cutthroat trout on wild coastal cutthroat trout have not been determined. Stocking of hatchery coastal cutthroat trout continues in tributaries of the Lower Columbia River in Washington. Some of these hatchery fish may enter Oregon tributaries and spawn, although this

has not been documented. It is believed that any spawning by hatchery fish from Washington would constitute less than 10% of all cutthroat spawners. All populations passed this criterion.

Hybridization

Interspecific hybridization with non-native trout has not been identified as an issue for Lower Columbia River coastal cutthroat trout.

Summary

Our final assessment of the Lower Columbia River Coastal Cutthroat Trout SMU is "Potentially at Risk". There is a limited amount of quantitative and qualitative data that indicate this species appears to be able to quickly respond to changes in habitat quality or quantity and to populate those habitats to capacity. Populations of coastal cutthroat trout have persisted where they are isolated and where they interact with populations of other salmonid and non-salmonid species. The potential loss of the anadromous life-history strategy in the Hood and Fifteenmile populations is cause for some concern. The status of this life-history strategy and its significance to the continued health of these populations will be more thoroughly explored when a conservation plan is developed for the Lower Columbia River Coastal Cutthroat Trout SMU. Some of the datasets used in this assessment were developed with different protocols and assumptions, making it difficult to compare between datasets. During conservation plan development these datasets will be analyzed thoroughly to ensure this interim assessment is accurate.

Willamette River Coastal Cutthroat Trout

Species Management Unit Description

The Willamette River Coastal Cutthroat Trout SMU includes all populations of cutthroat trout inhabiting tributary streams to the Willamette River above Willamette Falls, as well as portions of the mainstem Willamette. The Willamette River coastal cutthroat SMU passed all six interim criteria and its conservation risk classification for this Status Report is "not at risk".

Existing Populations

The Willamette River Coastal Cutthroat Trout SMU is comprised of 14 historical populations (Table 1).

It is the professional opinion of the local ODFW biologists (Alsbury, Mamoyac, Ziller, personal communications) that coastal cutthroat trout are found at least seasonally in virtually 100% of the available habitats for cutthroat trout in each of the 14 populations in the Willamette River SMU, verifying that all historical populations continue to exist. The entire SMU is located above Willamette Falls, which is a complete barrier to cutthroat trout upstream passage. No anadromous cutthroat trout are found within the SMU. Resident, fluvial, and adfluvial cutthroat trout life histories are believed to occur in each population that contains access to areas that would support such strategies.

Table 1. Description, status, and life history of Willamette River Coastal Cutthroat Trout SMU populations.

Extist	Population	Description	Life-history
Yes	Lower Willamette	Willamette Falls upstream to Santiam River.	Resident/Fluvial
Yes	Tualatin	Tualatin River.	Resident/Fluvial
Yes	Yamhill	Yamhill River.	Resident/Fluvial
Yes	Molalla	Molalla River.	Resident/Fluvial
Yes	Luckiamute	Luckiamute River.	Resident/Fluvial
Yes	North Santiam	North Santiam River.	Resident/Fluvial/Adfluvial
Yes	South Santiam	South Santiam River.	Resident/Fluvial/Adfluvial
Yes	Mid Willamette	Willamette River from Santiam River upstream to Coast and Middle forks.	Resident/Fluvial
Yes	Marys	Marys River.	Resident/Fluvial
Yes	Calapooia	Calapooia River.	Resident/Fluvial
Yes	Long Tom	Long Tom River.	Resident/Fluvial
Yes	McKenzie	McKenzie River.	Resident/Fluvial/Adfluvial
Yes	Middle Fork Willamette	Middle Fork Willamette River.	Resident/Fluvial/Adfluvial
Yes	Coast Fork Willamette	Coast Fork Willamette River.	Resident/Fluvial/Adfluvial

Habitat Use Distribution

Empirical and anecdotal evidence suggests that cutthroat trout are widespread throughout the Willamette River SMU and are found distributed widely in each major watershed. Since cutthroat trout are rarely the target species in biological studies, we rely on data and reports from local ODFW district biologists (Alsbury – North Willamette Watershed District and Mamoyac,

and Ziller – South Willamette Watershed District) and incidental documentation through various research activities.

It is the professional opinion of local ODFW biologists that all life-history types of coastal cutthroat trout expected are present and widely distributed throughout the entire Willamette River SMU (Alsbury, Mamoyac, Ziller, personal communications). Sampling on private and federal forest lands over the past ten years has found coastal cutthroat trout in the headwaters of most perennial streams sampled in the Willamette River SMU, as well as seasonal streams. These headwater areas are presumed to be the historical limit of coastal cutthroat trout distribution. Periodic sampling by local biologists continues to document the existence of the 104 isolated groups of coastal cutthroat trout above natural barriers that were described in ODFW's 1995 Biennial Report on the Status of Wild Fish in Oregon (Kostow 1995). Watershed district sampling focused on various activities or other species typically has documented the presence of coastal cutthroat trout in most areas of a watershed. Local ODFW biologists believe the results of these various sampling efforts represents the actual distribution of coastal cutthroat trout in all 14 populations within the SMU and that it verifies that virtually all historical habitat is currently being used by coastal cutthroat trout in each population. All populations and the SMU pass this criterion.

Abundance

Sampling throughout the SMU, including areas above barriers, that has looked at cutthroat trout densities has found consistent densities of coastal cutthroat trout. They are thought to be the dominant trout in most headwater tributaries. Multiple cutthroat trout age classes are present in most locations where resident cutthroat trout exist (Hooton 1997). Local biologists believe the present age class structure has not changed.

To assess the abundance criterion, local ODFW biologists in the Willamette River Coastal Cutthroat Trout SMU were asked to review the results of the various sampling efforts that have been conducted over the last ten years to identify those locations within the distribution range of coastal cutthroat trout where abundances were found at critical levels (as defined in the Coastal Cutthroat Trout Assessment Methods section). Very few sites in the SMU could be identified where very few or no cutthroat trout were found. In the few cases where abundances were found to be at critical levels, the location was either near the upper limit of cutthroat distribution in the headwaters of streams where habitat is limited, or in an area where significant steelhead juveniles or rainbow trout were present that likely out-competed cutthroat trout for occupation of the habitat. Even including these areas of expected low abundances of coastal cutthroat trout, the proportion of these areas to all areas sampled is still well below the criterion level of >50%. It is the professional opinion of the local ODFW biologists that the sampling efforts reviewed are indicative of the abundance of each coastal cutthroat trout population within the Willamette River SMU (Alsbury, Mamoyac, Ziller, personal communications).

ODFW seining conducted over the last six years has shown no declining or increasing trend in cutthroat numbers. In 2003 catch per unit effort (cutthroat per seine haul) ranged from 5.86 in the McKenzie River and 4.57 in the upper Willamette to 0.03 in the lower Willamette River. Seining is conducted during the summer (ODFW, Schroeder and Kenaston, unpublished data). Increased temperatures in the lower Willamette River likely account for the reduced catch per unit effort found there.

The relatively healthy densities of cutthroat trout found throughout the SMU in random and routine sampling suggests all populations of coastal cutthroat trout have been above critical

levels in each of the last five years. The stable nature of these densities over the decades that sampling has occurred indicates that the populations have stayed above critical levels for some time. For these reasons, all of the populations passed the abundance criterion. The Willamette River Coastal Cutthroat Trout SMU also passes the criterion.

Productivity

Coastal cutthroat trout are found in almost all stream segments in the Willamette River SMU. Sampling in conjunction with forestry activities throughout the SMU has found cutthroat in most headwater reaches. Local ODFW biologists have noted that the 104 isolated groups of cutthroat trout above natural barriers described by ODFW in 1995 (Kostow 1995) have continued to maintain stable levels over the recent decades that sampling has occurred. All historical life-history strategies continue to be expressed.

ODFW Watershed District biologists in the Willamette River Coastal Cutthroat Trout SMU, as stated in the abundance criterion section, have found few streams during various sampling efforts where coastal cutthroat trout are not present in expected densities for the habitat present. This includes streams that have experienced catastrophic events such as droughts, floods, and debris torrents that would likely have reduced or eliminated the abundance of coastal cutthroat trout. Local biologists have identified streams that go dry or become too warm that do not support cutthroat trout during the summer months, but have been found to support reasonable densities of cutthroat the following spring. Most areas that have been found with low numbers of cutthroat trout due to a debris torrent have been found to contain reasonable densities of cutthroat a few years after the event. Examples of such resilience in coastal cutthroat trout have been identified in almost every basin by the local biologists (Alsbury, Mamoyac, Ziller, personal communications).

The productivity criterion is intended to assess the ability of population abundances to rebuild after experiencing low abundances. The stable level of cutthroat found in the Willamette River SMU along with their almost universal distribution is evidence that these populations fully utilize the available habitat and maintain abundances near capacity. The densities sampled have been found before and after catastrophic events such as 100-year floods, debris torrents, and severe droughts. The fact that stable densities of cutthroat trout are found in almost all streams in this SMU despite events that undoubtedly diminished their abundance, provides evidence that all coastal cutthroat trout populations in the Willamette River SMU pass the productivity criterion.

Reproductive Independence

Data specific to reproductive independence are not available for Willamette River coastal cutthroat trout. Instead we used current and historical stocking records to evaluate the risk of hatchery origin cutthroat trout to native coastal cutthroat trout. Stocking has occurred throughout much of the SMU. All stocking of hatchery cutthroat trout in the Willamette River SMU was discontinued in 1980. The residual effects of hatchery cutthroat on wild coastal cutthroat have not been determined. However, since no stocking of hatchery fish has occurred in over twenty years, all populations passed this criterion.

Hybridization

Interspecific hybridization with non-native trout has not been identified as an issue for Willamette River coastal cutthroat trout.

Summary

Our final assessment of the Willamette River Coastal Cutthroat Trout SMU is "Not at Risk". There is substantial quantitative and qualitative data that indicate this species appears to be able to quickly respond to changes in habitat quality or quantity and to populate those habitats to capacity. Populations of coastal cutthroat trout have persisted where they are isolated and where they interact with populations of other salmonid and non-salmonid species. There is no conservation risk to this species at this time. Many of the datasets used in this assessment were developed with different protocols and assumptions, making it difficult to compare between datasets. During conservation plan development for the Willamette River Coastal Cutthroat Trout SMU these datasets will be analyzed thoroughly to ensure this interim assessment is accurate.

Inland Cutthroat Trout

Inland species of cutthroat trout are assessed using criteria similar to those designed for the anadromous salmon species. However, due to differences in ecology and life history and data limitations, metrics to assess the interim criteria are modified to more appropriately evaluate interior cutthroat trout in Oregon. These modifications reflect the intent of each criterion and identify populations and SMUs at risk. Changes and substitutions are described below.

Species Management Units and Populations

Species Management Units for cutthroat trout are defined by the major river and lake basins. Cutthroat trout within each basin are geographically isolated from populations in other SMUs (Behnke 1992). These basins coincide with ODFW management plans. Populations identified in this status review were based on geography, movement and genetic data, and reviews by ODFW staff.

Existing Populations

Assessment methods followed those outlined for anadromous salmon, and are based on whether a population is considered extinct or not at risk of extinction in the near future.

Distribution

Cutthroat trout populations with a limited distribution are at a high risk of extinction due to stochastic events. A small distribution will incorporate less diverse habitats and will not provide adequate refuge in the event of severe environmental alterations. In addition, populations with a limited distribution are less likely to produce sufficient numbers of fish to sustain population abundance adequate to avoid the deleterious effects of inbreeding and genetic drift. A minimum distance of ten km was chosen as a cutoff likely to identify cases of extreme limitation. This cutoff was based on professional judgment of the minimum habitat below which managers should take note of population status. A population with a distribution less than ten km fails the criterion.

Cutthroat trout without access to larger rivers and lakes through migratory corridors lack the opportunity to express a migratory life history strategy. Large migratory individuals returning to a population increases the reproductive potential and productivity of a population. Connectivity also ensures genetic exchange and gene flow between populations and minimizes the occurrence of genetic drift and inbreeding depression. A population isolated by barriers or without connection to other populations fails the distribution criterion.

Populations that occupy less than 50% of their historic habitat are indicative of populations in decline. However, historical distribution of Lahontan cutthroat trout in the Great Basin is undocumented. The metric describing the percent of historical habitat currently occupied by trout was not included as part of the distribution criterion.

Analysis of the distribution criterion is based on 1:100,000 GIS hydrography of cutthroat trout distribution. A population fails the criterion if distribution is: 1) less than ten km or 2) not connected to other populations or large rivers and migratory corridors.

Abundance

The abundance criterion was evaluated according to the number of reproductive adults present in each population. Unlike bull trout, guidelines to identify populations at risk of inbreeding and

genetic drift do not exist specifically for interior cutthroat trout species. Instead, we relied on more general recommendations. For the purposes of this review, populations of cutthroat trout with fewer than 50 adults are considered to be at risk of inbreeding depression and potential decrease in viability or reproductive fitness (Franklin 1980). Populations fewer than 500 adults are at risk of loss of genetic variation due to genetic drift (Franklin 1980, Soule 1980, Lande 1988, USFWS 2004). Populations with fewer than 50 adults fail the interim criterion. The sum of interconnected populations also must exceed 500 adults to avoid the risk of genetic drift. Thus an SMU or an isolated population must exceed 500 adults in order to pass the abundance criterion.

Productivity

Data are not available to quantitatively assess productivity as designed for salmon and steelhead. To provide a general assessment of potential productivity this review considers current distribution and abundance, regular (1-5 yrs.) connectivity within and between populations, life history strategies, habitat quality, and the presence of non-native species or hatchery fish of the same species. In the absence of quantitative data, this assessment of the productivity criterion is purely qualitative and based on conjecture and professional judgment.

A population's intrinsic productivity, the capacity to rebound quickly after a period of environmental constraint (e.g., drought, habitat degradation), depends on its ability to increase in abundance, re-colonize historical habitat, and exploit new habitats. A population that maintains multiple life history strategies during periods of environmental constraint has a greater potential for locating and re-colonizing habitats quickly. Large, migratory adult fish are highly fecund, further increasing the potential productivity. In addition, habitat quality and quantity also influences the intrinsic productivity of a population. Extensive high quality habitat buffers extreme environmental conditions. Populations with adequate and well-distributed refuge habitat can respond quickly to improving environmental conditions, increasing the probability that distribution and abundance will rebound quickly. Populations that persist in low quality habitat may also likely rebound in improving environmental conditions, but may not re-colonize historic habitat, or attain high levels of abundance.

A population that is widely distributed and exhibits high densities is assumed to have minimally rebounded from past drought or disturbance events. Connectivity to high quality refuge habitats capable of supporting multiple life history types during periods of extreme environmental conditions enables populations to rebound quickly. Thus, a population passes the criterion if it: 1) is connected to habitat capable of supporting multiple life histories and/or serving as refuge during periods of environmental constraint, 2) maintains multiple life history strategies, 3) is widely distributed, and 4) relatively abundant. A population may also pass the criterion if data indicate an increasing or stable trend in abundance. These qualities suggest populations are resilient and minimally able to rebound rapidly after periods of low abundance. This assessment, however, does not attempt to describe the degree to which populations may rebound. A population may pass the productivity criterion and not attain total abundance equivalent or greater than that prior to the previous low period. The presence of non-native species, hatchery fish, or significant habitat degradation may negatively affect productivity and cause a population to fail the criterion. In many populations the intrinsic potential productivity is uncertain; these populations fail the criterion until productivity can be adequately assessed.

We acknowledge that including measures of distribution and abundance may be redundant with other criteria, however given the lack of adequate data pertaining to this criterion these data

present the best surrogate. In light of this, the assessment of the productivity criterion gives greater weight to life history, habitat quality, and presence of non-native species.

Reproductive Independence

Data specific to reproductive independence do not exist for inland cutthroat trout. Instead this review uses current and historical stocking records to evaluate the risk of hatchery origin rainbow trout to native cutthroat trout. A population passes the criterion if hatchery origin rainbow trout are not currently stocked within the population, and if any available genetic analyses reveal minimal evidence of genetic mixing between hatchery and wild stocks.

Hybridization

A population is considered to pass the hybridization criterion if cutthroat trout x rainbow trout hybrids are rare (hybridized individuals comprise <5% of the population) or non-existent. For most populations the degree of hybridization is not quantified, but professional judgment and the frequency of hybrids encountered during sampling provides a general indication. In cases where little or no information is available and cutthroat trout and rainbow trout are sympatric, this review assumes hybrids are common and the population fails the hybridization criterion.

Alvord Cutthroat Trout

The Alvord basin of Southeastern Oregon and northwestern Nevada is a closed endorheic basin of the Great Basin. During the late Pleistocene Lake Alvord covered the valley floor. As the lake dried, approximately 10,000 years ago, cutthroat trout were restricted to the remaining permanent springs and creeks. The Alvord cutthroat trout was known to occupy Trout Creek in Oregon and Virgin Creek in Nevada, but probably also existed in larger streams in the basin (Williams and Bond 1983). Characters of Alvord cutthroat trout were provided by Behnke (1992) and was recently formally described as *Oncorhynchus clarki alvordensis* in Behnke (2002). The Alvord Cutthroat Trout SMU is comprised of one extinct population in the Alvord Lake basin (Table 1).

Table 1. Populations and existence status of the Alvord cutthroat trout SMU.

Exist	Population	Description
No	Trout	Trout and Little Trout creeks

Rainbow trout were thought to be introduced into Trout Creek in the 1920s. Introgression of Alvord cutthroat trout with introduced rainbow trout was first noted in collections made by Carl Hubbs in 1934 (Behnke 1992, Williams and Bond 1983). Trout collected in the 1970s exhibited only rainbow trout characters (Behnke 1992), indicating the rapid extinction of Alvord cutthroat trout through hybridization.

Coyote Lake Lahontan Cutthroat Trout

Existing Populations

Lahontan cutthroat trout populations in the Coyote Lakes basin are remnant of a larger population inhabiting pluvial Lake Lahontan during the Pleistocene era. Hydrologic access routes of founding cutthroat trout from Lake Lahontan basin into the Coyote Lakes basin have yet to be described (Coffin and Cowan 1995). The Coyote Lake Lahontan Cutthroat Trout SMU is comprised of five populations (Table 1). All populations express a resident life history strategy; however large individuals in the Willow and Whitehorse Complex populations suggest a migratory component may exist.

Table 1. Populations, existence status, and life history of the Coyote Lake Lahontan Cutthroat Trout SMU.

Exist	Population	Description	Life History
Yes	Willow	Willow Creek and tributaries.	Resident / Migratory
Yes	Whitehorse Complex	Whitehorse and Little Whitehorse Creeks, and tributaries.	Resident / Migratory
Yes	Doolittle	Doolittle Creek above barrier.	Resident
Yes	Cottonwood	Cottonwood Creek above barrier.	Resident
Yes	Antelope	Antelope Creek.	Resident

Lahontan cutthroat trout from Willow and Whitehorse creeks were transplanted into Cottonwood Creek in 1971 and 1980, and into Antelope Creek in 1972 (Hanson et al. 1993). Whether Lahontan cutthroat trout were present in these creeks prior to stocking activities is disputed (Behnke 1992, Hanson et al. 1993, Coffin and Cowan 1995, K. Jones, ODFW Research Biologist, Corvallis, OR personal communication). For the purpose of this review these populations are considered native. Lahontan cutthroat trout were also transplanted into Fifteenmile Creek above a natural barrier (Hanson et al. 1993), but they did not establish a self-sustaining population (ODFW Aquatic Inventory Project, unpublished data).

Nine naturalized populations exist in Pike, Little Alvord, Big Alvord, Cottonwood, Willow Mosquito, and Little McCoy creeks in the Alvord Lake Basin, and Denio and VanHorn Creeks in the Pueblo Valley basin. These populations were established through translocations from Willow and Whitehorse creeks between 1970 and 1981 for conservation purposes. A naturalized population in Guano Creek in the Catlow Valley basin was established in 1957 with Lahontan cutthroat trout collected from Willow Creek in 1955 and reared at Wallowa Hatchery. Lahontan cutthroat trout stocks from California were also stocked in Guano Creek (T, Walters, ODFW Malheur Watershed District Office, personal communication). These naturalized populations are not evaluated in this review.

Distribution

Analysis of the distribution criterion is based on 1:100,000 GIS hydrography of Lahontan cutthroat trout distribution developed by ODFW (Hanson 1999). A population fails the criterion if distribution is: 1) less than ten km or 2) not connected to other populations or large rivers and migratory corridors.

Populations within the Coyote Lake Lahontan Cutthroat Trout SMU are naturally isolated. Historically Willow, Antelope, and Whitehorse creeks flowed into pluvial Coyote Lake. These stream systems are no longer connected due to desiccation of the lake, a drier climate, and irrigation diversions and withdrawal. Currently Willow, Antelope, and Whitehorse creeks dry up

prior to the Coyote Lake sink (Kostow 1995), however it is unknown if Willow and Whitehorse creeks connect during consecutive high water years. Geologic barriers to upstream fish migration exist in Cottonwood and Doolittle creeks isolating populations upstream of the barriers (Jones et al. 1998). A 3-m-high headcut in lower Willow Creek may act as a barrier to upstream migration and is considered a recent feature caused by anthropogenic factors (K. Jones, ODFW Research Biologist, Corvallis OR, personal communication). Willow, Antelope, Cottonwood, and Doolittle populations fail the distribution criterion due to a lack of connection to other populations (Table 2). Fish in Doolittle and Cottonwood can potentially move downstream over the barriers and mix with the Whitehorse population, therefore the Whitehorse population is not considered isolated. The Antelope and Cottonwood populations are distributed over less than ten km, and are at extreme risk of extinction due to stochastic events.

Table 2. Distribution data used to evaluate Coyote Lake Lahontan cutthroat trout populations.

Population	Distribution (km)	Connected to other pops.	Pass/Fail
Willow	37.1	No	Fail
Whitehorse Complex	55.5	Yes	Pass
Doolittle	12.3	No	Fail
Cottonwood	2.5*	No	Fail
Antelope	6.9	No	Fail

** based in 1999 population surveys.*

Abundance

The abundance criterion was evaluated according to the number of reproductive adults present in each population. Populations with fewer than 50 adults fail the interim criterion. The sum of interconnected populations also must exceed 500 adults to avoid the risk of genetic drift. Thus an SMU or an isolated population must exceed 500 adults in order to pass the abundance criterion.

Coyote Lake Lahontan cutthroat trout abundance has been estimated every five years since 1985 (Hanson *et al.* 1993, Jones et al. 1998, ODFW unpublished data). All population surveys estimated the number of age 1 and older fish in each population. For the purposes of this review cutthroat trout age three years and greater were considered reproductive adults and calculated as approximately 7% of the age 1+ population (Jones et al. 1998). The evaluation of the abundance criterion was based on the most recent population estimate (Table 3). The 1989 Whitehorse Complex population estimate includes Doolittle and Cottonwood populations.

Table 3. Estimated adult abundance of Coyote Lake Lahontan cutthroat trout populations (Hanson et al. 1993, Jones et al. 1998, ODFW unpublished data)

	Number of Adults			
Population	1989	1994	1999	Pass / Fail
Willow	147	649	853	Pass
Whitehorse Complex	455*	821	1225	Pass
Doolittle	*	<100	116	Fail
Cottonwood	*	<100	<100	Fail
Antelope	--	--	--	Fail

**Whitehorse estimate includes fish in Doolittle and Cottonwood creeks.*

Abundance in Antelope Creek has not been evaluated. Given the distribution of this populations is fragmented and extremely limited, this review assumes abundance does not exceed 500 adults,

and is likely much less. The Antelope population fails the abundance criterion until abundance can be quantitatively assessed.

Productivity

Data are not available to quantitatively assess productivity and the intrinsic potential of population increase for all populations in the Coyote Lakes SMU. In the absence of these data a qualitative assessment of the productivity criterion is based on distribution and abundance, connectivity, life history, habitat quality, and presence of non-native species. For the purpose of this review, current distribution and abundance is treated as an indication of past population trend. A population that is widely distributed and exhibits high densities is assumed to have minimally rebounded from past drought or disturbance events. Connection to a diversity of high quality habitats capable of supporting multiple life history types during extreme environmental conditions enables populations to rebound quickly. The expression of a migratory life history can produce large, highly fecund adults that further increases the intrinsic productivity. Thus, a population passes the criterion if it: 1) is connected to habitat capable of supporting multiple life histories and/or serving as refuge during periods of environment constraint, 2) expresses multiple life history strategies, 3) is widely distributed, and 4) relatively abundant. A population may also pass the criterion if data indicate an increasing or stable trend in abundance. These qualities suggest populations are resilient and minimally able to rebound rapidly after periods of low abundance. This assessment, however, does not attempt to describe the degree to which populations may rebound. A population may pass the productivity criterion and not attain total abundance equivalent or greater than that prior to the previous low period. The presence of non-native species, hatchery fish, or significant habitat degradation may negatively affect productivity and cause a population to fail the criterion.

Table 4. Factors influencing productivity of Coyote Lake SMU cutthroat trout populations.

Population	Factors	Pass/Fail
Willow	Adequate distribution, but isolated from other populations; adult abundance increased between 1989 and 1999 suggesting that productivity was adequate to support population growth; impacts to habitat in lower reaches and presence of headcut potentially impacts the intrinsic potential.	Pass
Whitehorse Complex	Adequate distribution; adult abundance increased between 1989 and 1999 suggesting that productivity was adequate to support population growth; data provide no evidence of year class failures; lower portions of Whitehorse and Little Whitehorse creeks are severely impacted by grazing and agricultural practices; drying in the lower portion of Little Whitehorse Creek due to drought and grazing disrupts connectivity of Little Whitehorse to the greater Whitehorse system, this periodic connection potentially reduces productivity in the Whitehorse Complex.	Pass
Doolittle	Limited distribution and abundance; during dry years and summer months distribution shrinks to just a few beaver ponds which are severely impacted by heavy grazing; not connected to habitats capable of supporting a migratory life history.	Fail
Cottonwood	Extremely limited distribution; low abundance; and isolated from other populations; not connected to habitats capable of supporting a migratory life history.	Fail
Antelope	Extremely restricted and isolated distribution; abundance undocumented but likely limited; not connected to habitats capable of supporting a migratory life history.	Fail

Reproductive Independence

Data specific to reproductive independence do not exist for the Coyote Lakes SMU. Instead this review uses current and historical stocking records to evaluate the risk of hatchery origin rainbow trout to native cutthroat trout. A population passes the criterion if hatchery origin

rainbow trout are not currently stocked within the population, and if any available genetic analyses reveal minimal evidence of genetic mixing between hatchery and wild stocks.

Populations of Lahontan cutthroat trout in Coyote Lake basin are native. The only two known transplanting events occurred in 1971 and 1980 when cutthroat trout from Willow and Whitehorse creeks were transplanted into Cottonwood Creek above the barrier falls. In 1972 cutthroat trout from Whitehorse Creek were planted in Antelope Creek. Given that the translocated fish originated from local populations, these activities were not considered to have impacted fish in each population, but instead are considered conservation measures. All populations pass the reproductive independence criterion.

Hybridization

Lahontan cutthroat trout are the only fish species present in the Coyote Lakes SMU. Hybridization with non-native species is not a concern. All populations pass the hybridization criterion (Table 5).

Table 5. Occurrence of hatchery rainbow trout and hybridization for Coyote Lake Lahontan cutthroat trout populations.

Population	Presence of Hatchery Rainbow Trout	Pass/Fail
Willow	No	Pass
Whitehorse Complex	No	Pass
Doolittle	No	Pass
Cottonwood	No	Pass
Antelope	No	Pass

Assessment Conclusions

Lahontan cutthroat trout in the Coyote Lake basin are likely descendants of populations inhabiting pluvial Lake Lahontan during the Pleistocene era. The Coyote Lake SMU is comprised of five native cutthroat trout populations. Distribution is naturally fragmented, restricted by barrier falls and a discontinuous stream network. Three populations have low abundance and limited productivity. Ten naturalized populations were established during the 1970s in Alvord Lake basin and Catlow Valley for conservation purposes. These populations were not evaluated in this review. The SMU passes three of the six interim criteria and is classified as 'at risk' (Figure 1). Limited data sets and inferences from other information for populations in this SMU provide a qualified level of confidence in the assessment of the interim criteria.

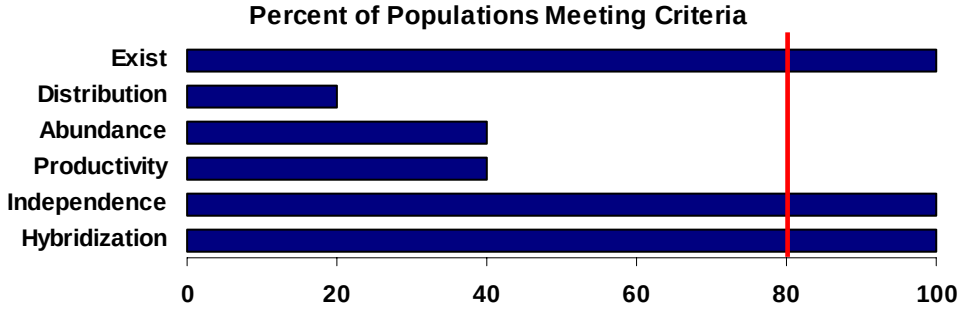


Figure 1. Assessment outcome for each of the six interim criteria with respect to the 80% threshold identified by the NFCP.

Quinn River Lahontan Cutthroat Trout

Existing Populations

Lahontan cutthroat trout populations in the Quinn River basin are remnant of a larger population inhabiting pluvial Lake Lahontan during the Pleistocene era. The Quinn River Lahontan Cutthroat Trout SMU is comprised of four populations (Table 1). The McDermitt, Tenmile, and Oregon Canyon populations are considered extinct due to hybridization and introgression with non-native hatchery rainbow trout (Coffin and Cowan 1995, Bowers *et al.* 1994, ODFW Aquatic Inventory Project, unpublished data, R. Perkins, ODFW Ontario Field Office, personal communication). The McDermitt population was also subject to strong competition with brook trout in the headwater reaches and brown trout in the lower reaches. Lahontan cutthroat trout in the Sage population are isolated above a man-made partial barrier and express a resident life history strategy.

Table 1. Populations, existence status, and life history of the Quinn River Lahontan Cutthroat Trout SMU.

Exist	Population	Description	Life History
No	McDermitt	McDermitt, Cottonwood, Payne, Indian creeks , Riser creek and tributaries	--
No	Tenmile	Tenmile Creek	--
Yes	Sage	Sage and Line Canyon Creeks	Resident
No	Oregon Canyon	Oregon Canyon Creek	--

Lahontan cutthroat trout from Sage Creek were transplanted into Tenmile Creek as a conservation measure. Since then they have hybridized with rainbow trout and pure Lahontan cutthroat trout no longer exist in Tenmile (R. Perkins, ODFW Ontario field office, pers. Comm..). Cutthroat trout were also introduced in Indian Creek (McDermitt population) in 1980 and 1981 (Hanson *et al.* 1993). Recent population surveys found cutthroat trout x rainbow trout hybrids in upper Indian Creek. Pure Lahontan cutthroat trout were not found and are considered extinct (ODFW Aquatic Inventory Project, unpublished data; M. Peacock and L. Briggs, University of Nevada, Reno, unpublished data).

Pure Lahontan cutthroat trout from Sage and Line Canyon creeks were introduced into Corral Canyon Creek (NV) as a conservation measure, to prevent the loss of the last population of pure Lahontan cutthroat trout in the basin, and to spread the risk of extinction.

Lahontan cutthroat trout are present in seven creeks in the Quinn River basin in Nevada; Washburn, Crowley, Eight-mile, South Fork Flat, Rebel, and Rock creeks, and the East Fork Quinn River. Status of these populations is not evaluated in this review.

Distribution

Analysis of the distribution criterion is based on 1:100,000 GIS hydrography of Lahontan cutthroat trout distribution developed by ODFW (Hanson 1999). A population fails the criterion if distribution is: 1) less than ten km or 2) not connected to other populations.

Distribution of Lahontan cutthroat trout in the Oregon portion of the Quinn River Basin is limited to 15 km in Sage and Line Canyon creeks (Table 2). The Sage population is isolated above a man-made barrier intended to slow the invasion of introduced rainbow trout and other non-native species (ODFW unpublished data). The initial barrier was not as much a vertical

structure, as a myriad of irrigation networks and channels that were difficult for fish to negotiate. Strategically placed boulders in a steep cascade were also thought to make passage challenging for trout. In 2002 the NW DPS Recovery Team installed a full spanning gabion barrier. The purpose of the barriers is to prolong the invasion of rainbow trout long enough to implement a sound and effective conservation plan. Given the isolated nature of the Sage population and its inability to mix with other populations, it fails the distribution criterion.

Table 2. Distribution data used to evaluate Quinn River Lahontan cutthroat trout populations.

Population	Distribution (km)	Connected to Other Pops.	Pass/Fail
McDermitt	*Extinct population*		
Tenmile	*Extinct population*		
Sage	15.4	No	Fail
Oregon Canyon	*Extinct population*		

Abundance

The abundance criterion was evaluated according to the number of reproductive adults present in each population. For the purposes of this review, populations with fewer than 50 adults fail the interim criterion. The sum of interconnected populations also must exceed 500 adults to avoid the risk of genetic drift. Thus an SMU or an isolated population must exceed 500 adults in order to pass the abundance criterion.

In 1992 Nevada Department of Wildlife reported estimates of 50 Lahontan cutthroat trout in each of Sage and Line Canyon creeks (Hanson et al. 1993).

In 1996 ODFW conducted a population survey to estimate abundance of Lahontan cutthroat trout in the McDermitt Creek basin using a stratified, systematic sample design (ODFW Aquatic Inventory Project, unpublished data). Lahontan cutthroat trout were detected only in Sage and Line Canyon creeks above a man-made barrier. The population was estimated at 7,340 (+\- 12%) age 0+ fish and 1,790 (+\- 20%) 1+ fish. For the purposes of this review, cutthroat trout age three years and greater are considered reproductive adults. Based on a length frequency distribution, fish age three years and greater comprised 11% of the population. Given that the number of adults was estimated to be fewer than 500 adults, the Sage population fails the abundance criterion (Table 3).

Table 3. Estimated adult abundance of Quinn River Lahontan cutthroat trout populations (ODFW Aquatic Inventory Project, unpublished data).

Population	Estimated Adult Abundance	Pass/Fail
McDermitt	*Extinct population*	
Tenmile	*Extinct population*	
Sage	197	Fail
Oregon Canyon	*Extinct population*	

Productivity

Data available to appropriately evaluate the productivity criterion are insufficient. Data are not available to quantitatively assess productivity and the intrinsic potential population increase for redband trout in the Quinn River SMU. In the absence of these data a qualitative assessment of the productivity criterion is based on distribution and abundance, connectivity, life history, habitat quality, and presence of non-native species. For the purposes of this review, current distribution and abundance is treated as an indication of past population trend. A population that

is widely distributed and exhibits high densities is assumed to have minimally rebounded from past drought or disturbance events. Connectivity to a diversity of high quality habitats capable of supporting multiple life history during extreme environmental conditions enables populations to rebound quickly. The expression of a migratory life history can produce large, highly fecund adults that further increases the intrinsic productivity. Thus, a population passes the criterion if it is 1) connected to habitat capable of supporting multiple life histories and/or serving as refuge during periods of environment constraint, 2) widely distributed, and 3) relatively abundant. A population may also pass the criterion if data indicate an increasing or stable trend in abundance. These qualities suggest populations are resilient and minimally able to rebound rapidly after periods of low abundance. This assessment, however, does not attempt to describe the degree to which populations may rebound. A population may pass the productivity criterion and not attain total abundance equivalent or greater than that prior to the previous low period. The presence of non-native species, hatchery fish, or significant habitat degradation may negatively affect productivity and cause a population to fail the criterion.

Although productivity appears to be adequate for the population to persist through drought years, the productivity of the Sage population is likely limited by poor habitat quality, inbreeding depression, absence of a migratory life history, and isolation (Coffin and Cowan 1995).

Table 4. Factors influencing productivity of Quinn River SMU cutthroat trout populations.

Population	Factors	Pass/Fail
McDermitt	*Extinct Population*	
Tenmile	*Extinct Population*	
Sage	Extremely limited distribution and abundance; poor habitat quality; lack of migratory life history; isolated; possible inbreeding depression (USFWS 1995).	Fail
Oregon Canyon	*Extinct Population*	

Reproductive Independence

Populations of Lahontan cutthroat trout in the Sage population are native fish sustained by natural production. There are no documented stocking events. The Sage population passes the reproductive independence criterion.

Hybridization

Hybridization with rainbow trout disrupts important long-term adaptations of cutthroat trout (Lundquist and Allendorf 2002) and is considered a significant threat to Lahontan cutthroat trout populations. Introduced hatchery rainbow trout and cutthroat trout x rainbow trout hybrids are prevalent in the McDermitt Creek basin (ODFW Aquatic Inventory Project, unpublished data). Hybridization with rainbow trout is the primary cause of extinction of pure Lahontan cutthroat trout in Tenmile, McDermitt, and Oregon Canyon populations (Hanson et al. 1993, R. Perkins, ODFW Ontario Field Office, personal communication).

A man-made barrier on Sage Creek was designed to slow the invasion of non-native rainbow trout. Genetic analysis of fish captured in Sage and Line Canyon creeks documented 20% of the samples in Sage Creek were cutthroat trout x rainbow trout hybrids. Samples from Line Canyon were all pure Lahontan Cutthroat trout (M. Peacock and L. Briggs, University of Nevada, Reno, unpublished data). Any degree of hybridization is considered a significant impact given the small population size of the pure cutthroat trout in the SMU. The Sage population fails the hybridization criterion.

Assessment Conclusions

Lahontan cutthroat trout populations in the Quinn River basin are remnants of a larger population inhabiting pluvial Lake Lahontan during the Pleistocene era. The Quinn River Lahontan Cutthroat Trout SMU is comprised of four populations, three of which are now extinct due to hybridization with non-native rainbow trout. Sage Creek is the only population to persist in the SMU, has an extremely limited distribution and abundance, and is vulnerable to hybridization. The population is located above a barrier designed to slow the invasion of rainbow and hybrid trout. Eight populations exist in Nevada and are not evaluated in this review. The SMU meets one of the six interim criteria and is classified as 'at risk'(Figure 1). Limited data sets and inferences from other information for populations in this SMU provide a qualified level of confidence in the assessment of the interim criteria.

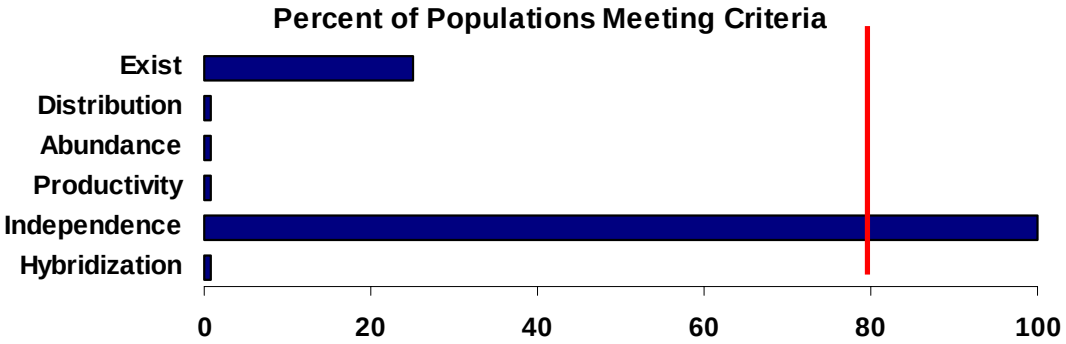


Figure 1. Assessment outcome for each of the six interim criteria with respect to the 80% threshold identified by the NFCP.

Westslope Cutthroat Trout

Existing Populations

Oregon populations of westslope cutthroat trout are disjunct from their greater contiguous distribution in the Upper Missouri and Columbia basins of Montana and Idaho (Behnke 1992). The Westslope Cutthroat Trout SMU is comprised of 17 populations in the upper mainstem John Day River basin (Table 1). Populations were identified according to those defined in the interagency westslope cutthroat trout range-wide assessment (Shepard et al. 2003). The interagency assessment identified westslope cutthroat trout in Laycock Creek and the Upper John Day Complex as a single population. This review considers trout in Laycock Creek as a separate population from the Upper John Day Complex due to the significant distance between the two creeks. Most populations express a resident life history strategy, although, migratory forms exist in the Upper John Day Complex and possibly in the Canyon Complex (Hemmingsen 1999a, Shepard et al. 2003).

Table 1. Populations, existence status, and life history of the John Day Westslope Cutthroat Trout SMU.

Exist	Population	Description	Life History
Yes	Upper John Day Complex	Includes upper mainstem river and tributaries.	Resident / Migratory
Yes	Strawberry	Strawberry, Slide, and Squaw Creeks.	Resident
Yes	Dixie	Dixie and Standard Creeks.	Resident
Yes	Indian	Indian, Little Indian, and Overholt Creeks.	Resident
Yes	Bear	Bear Creek.	Resident
Yes	Pine	Pine Creek.	Resident
Yes	Dog	Dog Creek.	Resident
Yes	Little Pine	Little Pine Creek.	Resident
Yes	Canyon Complex	Includes Berry, Crazy, and Canyon creeks and tributaries.	Resident / migratory
Yes	Laycock	Laycock Creek.	
Yes	Ingle	Ingle Creek.	Resident
Yes	Beech	Upper Beech, Bear, Cottonwood, and Lake creeks.	Resident
Yes	McClellan	McClellan Creek.	Resident
Yes	Birch	Birch Creek.	Resident
Yes	Moon	Moon Creek.	Resident
Yes	Belshaw	Belshaw Creek.	Resident
Yes	Fields	Fields, Last, Buck Cabin, and Wickiup creeks.	Resident

Three populations exist in the North Fork John Day basin, Desolation Creek, Lake Creek and Clear Creek. These populations are naturalized cutthroat trout, established through inter-basin transfers and plantings of hatchery fish (Gunckel 2002). The Desolation and Clear Creek populations were established in 1960 with westslope cutthroat trout from Deardorff Creek (Upper John Day Complex population) in order to provide a cold water fishery in the area. Olive Lake, the source of Lake Creek, was repeatedly planted with a variety of cutthroat trout subspecies, including westslope, between 1896 and 1994 (Gunckel 2002). Because westslope cutthroat trout never occupied the North Fork Basin historically and these three populations were established through stocking activities, the three populations in the North Fork John Day River are not evaluated in this assessment.

Distribution

Analysis of the distribution criterion is based on 1:100,000 GIS hydrography of westslope cutthroat trout distribution developed for the interagency westslope cutthroat trout range-wide assessment (Shepard et al. 2003). Measures quantifying historical distribution are derived from those delineated in the assessment (Shepard et al. 2003) and includes most tributary streams represented in a 4th field HUC. A population fails the criterion if distribution is: 1) less than ten km, 2) not connected to other populations, or 3) occupies less than 50% of the historical distribution. Although the original distribution of westslope cutthroat trout is not known with certainty (Behnke 1992), European exploration of the west (~1800s) is considered as the benchmark time for the historical distribution of westslope cutthroat trout (Shepard *et al.* 2003).

Distribution of westslope cutthroat trout is highly fragmented and limited to headwater streams in the upper John Day River basin. The upper John Day Complex is the only population to pass the distribution criterion (Table 2). This population occupies 54% of the historical distribution, is distributed over 92 km, and potentially is connected to other populations through large river migratory corridors. The remaining populations fail the distribution criterion either because they occupy less than ten km of stream distance or 50% of the historical distribution. The Birch population is isolated above an impassable diversion dam that prohibits connectivity to other populations and larger stream habitats (Shepard et al. 2003). Even though populations may still have access to migratory corridors, most populations are isolated from each other during the summer months due to elevated water temperatures and low flows (Kostow 1995). Functionally, these populations are isolated from each other due to the lack of movement, seasonal connectivity, and long distances between populations (Shepard et al. 2003).

Table 2. Distribution data used to evaluate westslope cutthroat trout populations (Shepard *et al.* 2003).

Population	Distribution (km)	% of Historical	Connected to Other Pops.	Pass/Fail
Upper John Day Complex	92.6	54	Yes	Pass
Strawberry	20.9	33	Yes	Fail
Dixie	18.5	32	Yes	Fail
Indian	24.6	37	Yes	Fail
Bear	2.0	5	Yes	Fail
Pine	6.4	17	Yes	Fail
Dog	2.8	23	Yes	Fail
Little Pine	3.6	44	Yes	Fail
Canyon Complex	72.2	31	Yes	Fail
Laycock	21.1	21	Yes	Fail
Ingle	5.2	24	Yes	Fail
Beech	34.7	15	Yes	Fail
McClellan	5.8	52	Yes	Fail
Birch	6.9	22	No	Fail
Moon	6.6	27	Yes	Fail
Belshaw	7.6	19	Yes	Fail
Fields	10.8	23	Yes	Fail

Abundance

Data appropriate to estimate abundance of each population is unavailable. Actual population sizes of westslope cutthroat trout are unknown. Instead, the abundance criterion is evaluated using two metrics developed and evaluated for the Interagency Westslope Cutthroat Trout Range-wide Assessment (Shepard et al. 2003). The first metric is a rough estimate of population size categorized as '<50', '50-500', '500-2,000', or '>2,000' adults. This review acknowledges the course nature of thes abundance categories, but given the paucity of data they represent our

'best guess'and are adequate for classifying abundance and describing status. The second metric is a qualitative characterization of density of adults and subadults as it relates to site potential: 'at or above site potential', 'slightly below site potential', or 'significantly below site potential'. Site potential classifications are based on how similar the measured abundance was to measured abundances from areas of similar types of habitat that were not impacted by human activities. Where no field data were available, abundance classes were subjective and based, to a large extent, on the quality of the habitats occupied. Populations rated as '< 50 adults' are considered to be at risk of inbreeding and failed the distribution criterion. Populations estimated as '50 – 500 adults' failed the criterion if density was rated as 'significantly below site potential'. Populations greater than 500 adults or those estimated between 50 and 500 adults and densities classified as 'at or above site potential' or 'slightly below site potential' passed the abundance criterion (Table 3).

Since many westslope cutthroat trout populations are on private land, access for data collection and monitoring is limited. Thus many of the classifications are judgment calls made by local professional biologists. The exceptions are the John Day, Strawberry, Indian, Bear, and Fields populations where ratings and estimates of population size are supported by multiple observations, field surveys, and data (Shepard et al. 2003) and classifications are made with greater certainty.

Table 3. Estimated adult abundance and density of westslope cutthroat trout populations (Shepard et al. 2003).

Population	Estimated Adult Abundance	Density Relative to Site Potential	Pass/Fail
Upper John Day Complex	500 – 2,000	Slightly below	Pass
Strawberry	50 - 500	Slightly below	Pass
Dixie	50 - 500	Significantly below	Fail
Indian	50 - 500	Slightly below	Pass
Bear	< 50	Significantly below	Fail
Pine	50 - 500	Significantly below	Fail
Dog	< 50	Significantly below	Fail
Little Pine	< 50	Significantly below	Fail
Canyon Complex	500 – 2,000	Significantly below	Pass
Laycock	--	Significantly below	Fail
Ingle	< 50	Significantly below	Fail
Beech	50 - 500	Significantly below	Fail
McClellan	50 - 500	--	Pass
Birch	< 50	Significantly below	Fail
Moon	500 – 2000	--	Pass
Belshaw	50 - 500	Significantly below	Fail
Fields	50 - 500	At or above	Pass

-- *not rated*

Productivity

Quantitative data appropriate to assess productivity of westslope cutthroat trout populations are not available. Information detailing population trends and productivity do not exist. Instead, the productivity criterion is assessed using a classification system developed for the interagency westslope cutthroat trout range-wide assessment (Shepard et al. 2003). Each population is classified as one of four categories. Populations classified as 'increasing or stable' and 'reduced from potential but stable' passed the productivity criterion. Populations fail the criterion if they are classified as 'reduced and declining' or 'reduced and declining rapidly'. These populations are typically characterized by year class failures, heavy angling pressure, fair to poor habitat

quality, or severe competition with non-native species. Since field data are not available for all populations except John Day and Canyon complexes, populations are assessed based on professional judgment of local biologists.

The Laycock population is not separately rated and is assumed to be similar to neighboring populations. Belshaw, Birch, and Bear populations fail the productivity criterion. The Bear population was noted to be declining rapidly (Table 4).

Table 4. Population trend of westslope cutthroat trout populations (Shepard et al. 2003).

Population	Population Trend	Pass/Fail
Upper John Day Complex	Reduced, but stable	Pass
Strawberry	Reduced, but stable	Pass
Dixie	Reduced, but stable	Pass
Indian	Reduced, but stable	Pass
Bear	Reduced, declining rapidly	Fail
Pine	Reduced, but stable	Pass
Dog	Reduced, but stable	Pass
Little Pine	Reduced, but stable	Pass
Canyon Complex	Reduced, but stable	Pass
Laycock	--	Pass
Ingle	Reduced, but stable	Pass
Beech	Reduced, but stable	Pass
McClellan	Reduced, but stable	Pass
Birch	Reduced, declining	Fail
Moon	Reduced, but stable	Pass
Belshaw	Reduced, declining	Fail
Fields	Reduced, but stable	Pass

-- *not rated*

Reproductive Independence

Data specific to reproductive independence and the potential influence of hatchery raised cutthroat trout do not exist for populations of westslope cutthroat trout. This review uses current and historical stocking records to evaluate the risk of hatchery origin cutthroat trout to populations of native westslope cutthroat trout. Populations where hatchery cutthroat trout are currently stocked fail the reproductive independence criterion. In some instances genetic and meristic studies may describe the degree of introgression between stocks in specific locales. A population passes the criterion if analyses show introgression is minimal.

Populations of westslope cutthroat trout in the upper John Day basin are native fish sustained by natural production. Only two documented stocking events are known. In 1912 Yellowstone cutthroat trout were planted in Deardorff Creek (Upper John Day Complex). In 1931, 117 cutthroat trout were stocked in Strawberry Lake (subspecies unknown) (Gunckel 2002). Neither of these events likely impacted westslope cutthroat trout. Cutthroat trout are not currently stocked in the basin and thus all populations pass the reproductive independence criterion.

Hybridization

Effects of hybridization with rainbow trout can be detrimental and are a threat to the continued existence of native westslope cutthroat trout populations. Introgression between the two species can result in the loss of important local adaptations that have evolved over thousand of years (Lundquist and Allendorf 2002, Allendorf et al. 2004). However, the degree of risk associated with hybridization is complex and difficult to evaluate. Westslope cutthroat trout hybridize with both non-native hatchery rainbow trout (anthropogenic hybridization) and native redband trout

(natural hybridization). Hybridization with hatchery rainbow trout is clearly a threat to native cutthroat trout populations, but natural hybridization with native rainbow trout is part of the natural evolutionary process (Allendorf et al. 2001). For the purposes of this review, natural hybridization is not considered to significantly impact westslope cutthroat trout populations. However, it is recognized that human induced habitat degradation may influence the speed and degree to which natural hybridization occurs. Pure westslope cutthroat trout persist in zones of allopatry where habitat conditions maintain some separation between the two species because of differences in habitat preferences. In cases where habitat degradation has eliminated or contracted zones of allopatry, pure westslope cutthroat trout populations may be in danger of extinction.

Westslope cutthroat trout x rainbow trout hybridization appears to be extensive in the John Day basin where both species are sympatric (Howell and Spruell 2003). Preliminary results of a study to describe the population structure and hybridization patterns of Oregon westslope cutthroat trout found evidence of hybridization in all of seven populations sampled (Hemmingsen and Starcevich 2001, Howell and Spruell 2003), however whether the rainbow trout in some populations are native or hatchery origin is unknown.

Hatchery rainbow trout were extensively planted in the John Day River and Canyon Creek before the stocking program ceased in 1997. Almost a half million fish were planted in the upper John Day River between 1948 and 1988. One million hatchery rainbow trout were stocked in Canyon Creek and Canyon Meadow Reservoir between 1925 and 1997 (Gunckel 2002). Hatchery origin rainbow trout were also planted in Fields Creek (1940), Strawberry Lake (1928-1941), and Beech Creek (1953) (Gunckel 2002). The degree to which these hatchery rainbow trout were able to persist is unknown, and it is undetermined if these fish moved into the upper tributaries of the John Day River where cutthroat trout reside. This review assumes hatchery rainbow trout moved into westslope cutthroat trout populations where barriers did not block access.

For the purposes of this review westslope cutthroat trout populations fail the hybridization criterion if hatchery rainbow trout were either planted on top of westslope cutthroat trout or had access from other stocking locations in nearby streams. Populations located above barriers to passage and that have no records of stocking pass the criterion. These populations likely contain native redband trout that co-evolved with westslope cutthroat trout (T. Unterwegner, ODFW John Day Field Office, personal communication). In instances where rainbow trout origin is uncertain cutthroat trout populations fail the criterion until genetic analysis can provide further insight (Table 5).

Some streams containing westslope cutthroat trout were never planted with hatchery rainbow trout or hatchery steelhead and are above water diversions or manmade dams that act as barriers to hatchery rainbow and even steelhead (T. Unterwegner, ODFW John Day Field Office, personal communication). These streams include Indian, Pine, Ingle, McClellan, Laycock, Birch, and Moon creeks (Shepard et al. 2003, T. Unterwegner, ODFW John Day Field Office, personal communication). Dog and Little Pine creeks are difficult for hatchery fish to access due to steep gradients, small irrigation diversions and mining activity that blocks passage. These streams contain native redband trout and are considered to not have been influenced by hatchery rainbow trout or hatchery trout.

Table 5. Occurrence of hatchery rainbow trout and evaluation of the hybridization criterion for the John Day Westslope Cutthroat Trout SMU. Stocked = hatchery rainbow trout stocked in or near the population. Barrier = a barrier blocks passage of hatchery rainbow trout and therefore are not present in the population.

Population	Hatchery Rainbow Trout	Pass/Fail
Upper John Day Complex	Stocked	Fail
Strawberry	Stocked	Fail
Dixie	Unknown	Fail
Indian	Barrier	Pass
Bear	Unknown	Fail
Pine	Barrier	Pass
Dog	Barrier	Pass
Little Pine	Barrier	Pass
Canyon Complex	Stocked	Fail
Laycock	Barrier	Pass
Ingle	Barrier	Pass
Beech	Stocked	Fail
McClellan	Barrier	Pass
Birch	Barrier	Pass
Moon	Barrier	Pass
Belshaw	Unknown	Fail
Fields	Stocked	Fail

Assessment Conclusions

All westslope cutthroat trout in Oregon exist in the John Day River Basin. These populations are disjunct from the greater contiguous distribution in the Upper Missouri and Columbia basins of Montana and Idaho. The Westslope Cutthroat Trout SMU consists of 17 population in the upper mainstem John Day River Basin. Distribution is highly fragmented and abundance and productivity are depressed. The SMU meets three of the six interim criteria, and is classified as 'at risk' (Figure 1). Limited data sets and inferences from other information for populations in this SMU provide a qualified level of confidence in the assessment of the interim criteria.

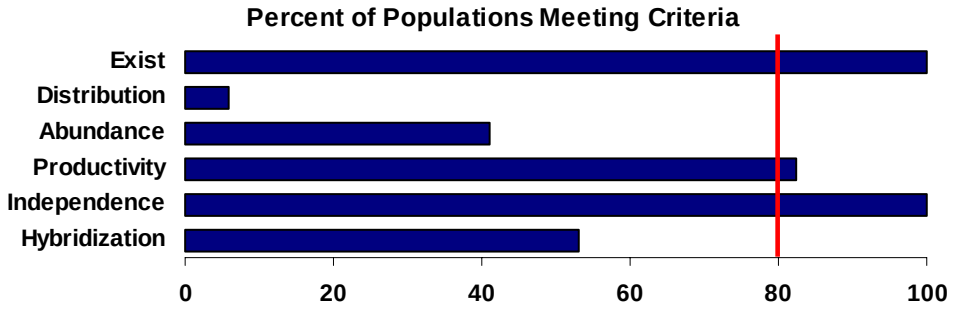


Figure 1. Assessment outcome for each of the six interim criteria with respect to the 80% threshold identified by the NFCP.