Chewaucan Redband Trout

Existing Populations

The Chewaucan Redband Trout SMU is comprised of four populations (Table 1). Three populations, Chewaucan, Crooked, and Willow, are within the Lake Abert basin and were historically connected to the Chewaucan Marsh. The fourth population, Foster, occupies a small isolated stream in the Summer Lake basin. Lake Abert and Summer Lake are remnants of ancient Lake Chewaucan and naturally separated by large sand dunes. Populations were identified based on Bowers et al. (1999) and reviews by ODFW staff (Table 1).

Table 1. Description, existence status, and life history of redband trout populations in the Chewaucan SMU.

Exist	Population	Description	Life History
Yes	Chewaucan	Chewaucan River and tributaries upstream of Rivers End Reservoir.	Resident/Migratory
Yes	Crooked	Crooked Creek and tributaries.	Resident/ Migratory
Yes	Willow	Willow Creek and tributaries.	Resident/Migratory
Yes	Foster	Foster Creek – Summer Lake Basin.	Resident

Distribution

Analysis of the distribution criterion is based on 1:100,000 GIS hydrography of redband trout distribution (Flitcroft and Dambacher 2001). A population passes the distribution criterion if it satisfies two of three metrics – the current distribution must 1) occupy >10% of the total stream distance in the populations basin, 2) total more than ten km (six miles), or 3) be connected to other populations. Only the Foster population fails the distribution criterion (Table 2).

Table 2. Distance of current distribution, total stream distance in each basin, percent of each basin occupied, and presence of migratory corridors for redband trout populations in the Chewaucan SMU.

Population	Current (km)	Total Basin Distance (km)	% Occupied	Connected to Other Pops.	Pass / Fail
Chewaucan	295.5	995.4	29.7	Yes	Pass
Crooked	30.7	219.8	14.0	No	Pass
Willow	29.9	130.2	23.0	No	Pass
Foster	≈ 2	--	--	No	Fail

Historically, Chewaucan, Willow, and Crooked populations were connected to Chewaucan Marsh. The marsh supported the migratory life history of redband trout and provided the opportunity for populations to mix. However, the Chewaucan Marsh was diked, channelized, and drained for agricultural purposes. In addition, three large weirs were constructed on the lower Chewaucan River, as well as one on Crooked Creek and one on Willow Creek, that were all impassable to fish movement. These activities eliminated the migratory life history of redband trout. In 1994 Rivers End Reservoir was constructed near the mouth of the river and since then large migratory redband trout have been observed in the Chewaucan River and Crooked Creek (Tinniswood In Press). However, migratory fish returning upstream to the upper Chewaucan and Crooked Creek were unable to pass the weirs, preventing mixing between all populations. Beginning in 2000 adfluvial adults downstream of the weirs in Chewaucan River were trapped and hauled upstream allowing for Willow Creek and Crooked Creek redband trout to potentially mix with redband trout in the Chewaucan River. A fish ladder was completed on

the lowest weir on the Chewaucan River in 2004 and passage projects at the two other weirs will be completed in 2006. Given that passage is now possible on the Chewaucan River, the Chewaucan redband trout population is considered to be connected to other populations (Table 2). Fish rearing in Rivers End Reservoir are still unable to move past the weirs on Willow and Crooked creeks.

Foster Creek is a small, spring-fed stream that flows into Summer Lake from Winter Rim. The distribution of redband trout is less than two kilometers and the population is isolated from other streams and populations. Based on this extremely limited distribution and isolation, the Foster population is at risk of extinction due to stochastic events and fails the distribution criterion (Table 2).

Abundance

Data describing the abundance of constituent populations of the Chewaucan Redband Trout SMU over the last 30 years do not exist, therefore minimum abundance thresholds cannot be calculated. Instead, mean density of a given population serves as a surrogate criterion. Mean density estimates are compared to density benchmarks for redband trout populations in eastern Oregon streams (Dambacher and Jones In press). A population passes the abundance criterion if the average density is classified as 'moderate' or 'high' in three of the previous five years. Populations with a 'low' rating for three of the last five years fail the criterion and warranted for further investigation. When density estimates for the last five years are not available, the criterion is applied to only those years for which data are present (Table 3).

Table 3. Mean density, age 1+ fish/m^2 (number of samples), of redband trout populations collected during 1999 basin wide population estimate (Dambacher et al. 2001).

Population	1999	Assessment	Pass / Fail
Chewaucan	0.14 (30)	Moderate	Pass
Crooked	0.19 (3)	Moderate	Pass
Willow	0.15 (2)	Moderate	Pass
Foster	--	Moderate	Pass

Using a probability sample design, ODFW conducted an SMU level population estimate of redband trout in 1999 in the Lake Abert Basin (Dambacher et al. 2001). Population and density estimates were conducted at 35 randomly selected, spatially balanced sample sites throughout the SMU. Redband trout in the entire SMU were estimated at 147,878 +/- 41 %(95% CI) age 1+ individuals. Average redband trout density for the SMU was moderate relative to other eastern Oregon streams (Dambacher and Jones In Press). Average density was calculated for all sites within a population (Table 3). Based on these data, all populations in Lake Abert basin pass the abundance criterion.

Measures of density from the Chewaucan River and Dairy Creek collected in 1998 were relatively low (Bowers et al. 1999). Densities ranged from 0.005 to 0.072 age 1+ fish/m^2, only two of eight sites had densities greater than 0.05 age 1+ fish/m^2. Although this may be a cause of concern for redband trout in both streams, these sample sites were not representative of the population as a whole; sites were not randomly selected or surveyed in the tributary streams. Dairy Creek and parts of the Chewaucan River are subject to poor habitat quality and recreational fishing pressure. The differences exhibited between the 1999 and 1998 data sets reflect the variable nature of redband trout abundance at a local scale.

Density and abundance of redband trout in Foster Creek has not been adequately evaluated. A survey of redband trout in 1998 captured 17 fish in one 100 meter sample site (ODFW, Lakeview field office, unpublished data). Even though this measure may not be representitiveof the population, it does provide a general indication of abundance given the short distance of the distribution. Based on these data, a conservative estimate, classifies density of redband trout at this site as 'moderate'. However, it is unknown if a 2002 forest fire has impacted abundance (B. Tinniswood, ODFW Klamath Watershed District Office, pers. comm.). The Foster Creek redband trout population passes the abundance criterion, although a more thorough evaluation of abundance is necessary.

Productivity

Data are not available to quantitatively assess productivity and the intrinsic potential of population increase for redband trout in the Chewaucan 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. 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 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. In many populations the intrinsic potential productivity is uncertain; these populations fail the criterion until productivity can be adequately assessed. Only the Chewaucan population passes the productivity criterion (Table 4).

Table 4. Factors influencing productivity of Chewaucan SMU redband trout populations.

Population	Factors	Pass/Fail
Chewaucan	Moderate abundance; widely distributed throughout diverse habitats; access to Lands End Reservoir fosters a migratory life history; habitat in lower Chewaucan River and Dairy Creek severely degraded – habitat in tributaries and upper reaches in good condition; brook trout present in upper reaches, largemouth bass and brown bullheads present in lower river.	Pass
Crooked	Moderate abundance; adequately distributed; habitat degraded; no access to Rivers End Reservoir therefore migratory fish unable to return to spawning grounds.	Fail
Willow	Moderate abundance; adequately distributed; lacks connectivity to habitats capable of supporting a migratory life history; habitat quality degraded.	Fail
Foster	Moderate abundance; severely limited distribution; lacks a migratory life history, habitat impacted by forest fire in 2002.	Fail

Reproductive Independence

Data specific to reproductive independence do not exist for the Chewaucan Redband Trout SMU. Instead this review uses current and historical stocking records to evaluate the current risk of hatchery origin rainbow trout to native redband 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 species.

Planting of domestic rainbow trout was extensive in the Chewaucan population from 1925 to 1998. Rainbow trout were also stocked periodically in Crooked Creek during the same period and Willow Creek in the 1940's. The stocking program was eliminated in 1998 due to concerns of risk to native redband trout (Bowers et al. 1999). Foster Creek has not been stocked with domestic rainbow trout.

The extent and impact of interbreeding between redband trout and domestic rainbow trout is uncertain. Behnke (1992) found a slight hybrid influence in Dairy Creek (Chewaucan population), however, he stated that trout predominately retain the native genotype and should be considered to be representative of native redband trout. All populations pass the reproductive independence criterion since stocking of rainbow trout has ceased and evidence of mixing is minimal.

Hybridization

Non-native cutthroat trout are not present in the Chewaucan Redband Trout SMU and not a threat to redband trout. All populations pass the hybridization criterion.

Assessment Conclusions

The Chewaucan Redband Trout SMU consists of four populations, three in Lake Abert basin and one in Summer Lake Basin. Lake Abert and Summer Lake are remnants of ancient lake Chewaucan and naturally separated by large sand dunes. Redband trout in Lake Abert basin are distributed throughout the basin and moderately abundant. Degraded habitat conditions and barriers to migration are the most persistent threats to populations in the SMU. Foster Creek population has an extremely limited distribution and is isolated from large water bodies and other populations. The SMU met four of the six interim criteria and is classified as 'potentially 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.

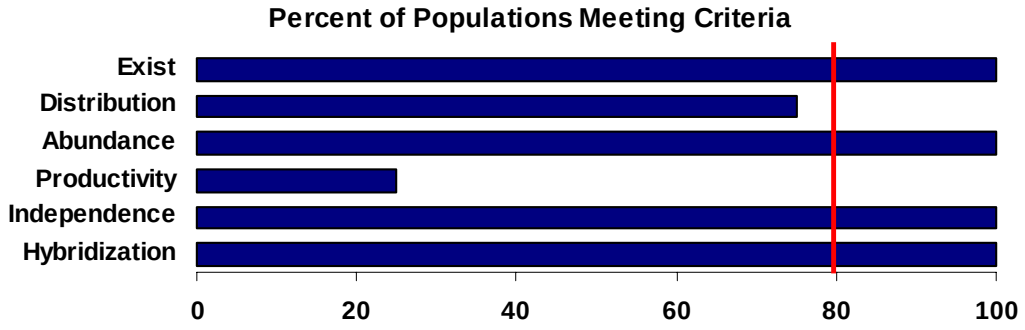

Figure 1. Assessment outcome for each of the six interim criteria with respect to the 80% threshold identified by the NFCP.