

Catlow Valley Redband Trout

Existing Populations

The Catlow Valley Redband Trout SMU is comprised of five populations (Table 1). Three exist in Home, Threemile, and Skull creeks, located on the east side of the valley. These populations drain the Catlow Rim on the west side of South Steens Mountain. Two populations exist on Hart Mountain on the west side of Catlow Valley in Rock and Guano creeks. Rock Creek flows north into the valley and Guano Creek flows south off Hart Mountain and eventually north through Catlow Slough to Catlow Valley. All streams historically flowed into pluvial Lake Catlow before it dried 10,000 years ago.

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

| Exist | Population | Description | Life history |
|-------|------------|------------------------------|--------------------|
| Yes | Home | Home Creek and tributaries. | Resident |
| Yes | Threemile | Threemile Creek. | Resident |
| Yes | Skull | Skull Creek and tributaries. | Resident |
| Yes | Rock | Rock Creek and tributaries. | Resident/migratory |
| Yes | Guano | Guano Creek. | Resident |

This review identifies Guano as an existing redband trout population. Some controversy exists over whether redband trout are native to the system. Mention of native trout in historical documents does not specify species (OSGC 1957), however the biogeography and zoological history of Catlow Valley suggest redband trout may be the original and native trout species. Tui chub were documented in Guano Creek as well as the other streams in Catlow Valley where redband trout are also present (Williams and Bond 1981, Hubbs and Miller 1948). This review considers redband trout to be the native salmonid species in Guano Creek until genetic studies and other research can clarify the zoological history of the creek. Currently, Lahontan cutthroat trout and cutthroat x redband trout hybrids occupy Guano Creek and the presence of redband trout is uncertain. Limited population surveys occurred in 1992 and 1995, the later targeting Tui chub (ODFW, Aquatic Inventory Project, unpublished data). Neither survey documented redband trout. If redband trout are present in the basin the distribution and abundance are severely limited. The population will not be considered extinct until a thorough and appropriate survey is conducted.

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. Guano, Threemile, and Skull populations did not meet any of the three metrics and failed the distribution criterion (Table 2). Rock and Home populations occupy greater than ten km of habitat and 10% of the stream distance within their respective basins and pass the criterion.

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 Catlow Valley SMU (Flitcroft and Dambacher 2001).

| Population | Current (km) | Total Basin Distance (km) | % Occupied | Connected to Other Pops. | Pass/Fail |
|------------|--------------|---------------------------|------------|--------------------------|-----------|
| Home | 37.1 | 81.0 | 45.8 | No | Pass |
| Threemile | 3.5 | 38.6 | 9.0 | No | Fail |
| Skull | 3.5 | 90.6 | 3.8 | No | Fail |
| Rock | 24.7 | 183.4 | 13.5 | No | Pass |
| Guano | 0.0 | 209.6 | 0.0 | No | Fail |

Even though redband trout are present in most perennial streams in Catlow Valley, the distribution is highly fragmented (Table 2). Connection does not exist between any populations, which prevents genetic mixing, limits opportunities to express a migratory life history, and increases risk of extinction from stochastic events. Rock and Guano creeks have been isolated from other populations since the drying of pluvial Lake Catlow 10,000 years ago. Due to this extended isolation, redband trout in Rock Creek are thought to be genetically unique (Bowers et al. 1999). In recent history, Catlow Marsh (Garrison Lake) was drained for agricultural purposes isolating Skull, Threemile, and Home creeks. Reconnection to Garrison Lake and other populations may require consecutive high water years or a change in climate.

Access to lakes and larger water bodies where a migratory life history may be expressed is available only during high water years in Rock Creek, Threemile Creek, and Skull Creek. Redband trout in Rock Creek have periodic access to Rock Creek Reservoir; however their ability to return to spawning grounds is uncertain (Bowers et al. 1999). Redband trout in Threemile Creek have access to Threemile Reservoir when water quality and flow are adequate. In 1998 a fish screen was installed on Threemile Creek and Threemile Reservoir was reconstructed to ensure access to the reservoir during high water years. In 1999 passage was provided from Skull Creek Reservoir, high in the watershed, to the upper reaches of Skull Creek.

Distribution of redband trout in Guano Creek is undetermined. Redband trout were not detected during surveys in 1992 (six sites) and 1995 (five sites) (ODFW, Aquatic Inventory Project, unpublished data). Stream reaches of Guano Creek were classified as absent – based on opinion by local biologists (Flitcroft and Dambacher 2001). However, anecdotal information suggests native redband trout are present in Guano Creek, and if so, then distribution is likely limited and highly fragmented.

Abundance

Data describing the abundance of constituent populations of the Catlow Valley Redband Trout SMU do not exist. 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 average density is classified as ‘moderate’ or ‘high’ in three of the previous five years. Populations with a ‘low’ rating fail the criterion and are 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. Guano and Skull populations fail the abundance criterion (Table 3).

Table 3. Mean density, age 1+ fish/m² (number of samples), of redband trout populations each year sampled.

| Population | 1995 | 1997 | 1999 | Assessment | Pass/Fail |
|------------|----------|-----------|-----------|------------|-----------|
| Home | | | 0.10 (16) | Moderate | Pass |
| Threemile | 0.05(23) | | 0.21 (3) | High | Pass |
| Skull | 0.0 (19) | 0.12 (3)* | 0.04 (1) | Low | Fail |
| Rock | | | 0.78 (13) | High | Pass |
| Guano | | | | -- | Fail |

* Extrapolated from presence/absence techniques (Dambacher and Jones In Press).

Data collected by ODFW.

Redband trout density and abundance in Threemile Creek has decreased significantly within the past 30 years. During the mid-1970s the stream population was estimated to be 1,700 age 1+ redband trout, with densities as high as 1.5 fish/m². The number of fish estimated in Threemile Reservoir was 890 age 1+ individuals (Kunkel 1976). In 1995, the population in Threemile Creek was estimated to total 265 age 1+ fish (+/- 41%, 95% CI) (Dambacher and Jones In Press). No redband trout were found in the reservoir and no migratory fish were observed. Basinwide surveys in 1999 found an average density of 0.21 age 1+ fish/m² (n = 3) in Threemile Creek. The Threemile population passes the abundance criterion, based on the relatively high densities observed within a very limited distribution during the 1999 survey (Table 3). However, this survey was conducted during high water years, and given current habitat conditions the Threemile Creek population is expected to decrease significantly during drought cycles.

Abundance of redband trout in Skull Creek is extremely low (Table 3). Repeated sampling efforts have detected few individuals; zero in 1995 (n = 19), 16 in 1997 (n = 3), and three in 1999 (n = 1). The population was estimated at 250 - 500 individuals in a two mile reach in 1997 (Dambacher and Jones In Press). Because abundance and densities are consistently low, even during high water years, Skull Creek fails the abundance criterion.

Similarly, the density and abundance of redband trout in Guano Creek is thought to be perilously low. Presence/absence surveys in Guano Creek did not detect redband trout in 1992 and 1995 (ODFW, Aquatic Inventory Project, unpublished data). The Guano population fails the abundance criterion until abundance is appropriately documented.

Using a probability sample design, ODFW conducted an SMU level population estimate of redband trout in 1999 in the Catlow Valley basin (Dambacher et al. 2001). Population and density estimates were conducted at 33 randomly selected, spatially balanced sample sites throughout the SMU. Redband trout were estimated at 54,866 +/- 33% (95% CI) age 1+ individuals. Average density among the sites was 0.423 age 1+ /m² (moderate). The large confidence interval suggests density varies widely among sample sites.

Productivity

Data are not available to quantitatively assess productivity and the intrinsic potential population increase for redband trout in the Catlow Valley 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 population 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

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.

Habitat surveys in Catlow Valley streams documented the best habitat was limited to canyon reaches and areas with cold spring water input (Dambacher and Stevens 1996, Dambacher and Jones In Press, Bowers et al. 1999). Although these areas act as refuge during drought cycles, the high gradient reaches are less than ideal habitats, which limits the intrinsic productivity. These populations will likely respond slowly to improved environmental conditions. Only the Rock Creek population passes the productivity criterion based on data that demonstrate redband trout quickly re-colonized available stream habitat at high densities during a wet year (Table 4).

Table 4. Factors influencing productivity of Catlow Valley SMU redband trout populations.

| Population | Factors | Pass/Fail |
|------------|---|-----------|
| Home | Distribution adequate; abundance moderate; not connected to habitat capable of supporting a migratory life history; portions of habitat highly degraded (Bowers et al. 1999, Dambacher and Stevens 1996) – actions to improve habitat quality are being implemented (USFWS 1997) but fish and habitat response has not been documented. | Fail |
| Threemile | Extremely limited distribution and abundance; lacks a migratory life history; portions of habitat highly degraded (Bowers et al. 1999, Dambacher and Stevens 1996) – actions to improve habitat quality are being implemented (USFWS 1997) including reconnecting the stream to Threemile Reservoir but fish and habitat response has not been documented. Comparisons of abundance between 1970s and 1990s indicate a negative trend in abundance (Kunkel 1976, Dambacher and Jones In Press). | Fail |
| Skull | Extremely limited distribution and low abundance; a migratory life history has not been documented; data suggests productivity may be episodic, resulting in a discontinuous age class structure (Dambacher and Jones In Press); numerous habitat improvement projects completed under the USFWS Conservation Agreement (USFWS 1997) including passage at Skull Creek Reservoir – fish and habitat response to these projects has not been documented. | Fail |
| Rock | Distribution and abundance high; surveys show recolonization of habitat during high water years with large fish at high density (Dambacher et al. 2001, ODFW Aquatic Inventory Project, unpublished data); land management changes on Hart Mountain Antelope Refuge has improved habitat condition. | Pass |
| Guano | Distribution and abundance is not documented, but likely extremely limited; no evidence of natural production of redband trout. | Fail |

Reproductive Independence

Data specific to reproductive independence do not exist for the Catlow Valley Redband Trout SMU. Instead this review uses current and historical stocking records to evaluate risk of introgression of native redband trout with hatchery origin rainbow trout. A population passes the criterion if hatchery origin rainbow trout are not currently stocked within the population, and if genetic analyses, when available, reveal evidence of minimal genetic mixing between hatchery and wild species.

Stocking of hatchery origin rainbow trout has not occurred in Threemile, Skull, and Home creeks. Hatchery rainbow trout were stocked regularly in Rock Creek between 1960 and 1979, and in Guano Creek during the 1960s (ODFW, historical stocking records). Stocking activities ceased in 1979. The effects of stocking on native populations are uncertain, although genetic analysis of samples collected in Guano Creek in 2004 is currently in progress. Because hatchery fish are no longer stocked and the SMU is managed for natural production, all populations pass the reproductive independence criterion.

Hybridization

A population is considered to pass the hybridization criterion if cutthroat trout x redband trout hybrids are rare (<5% of the population) or non-existent. We recognize the challenges associated with field identification of hybridized individuals and the potential error. Estimates provided here represent the minimum number of hybrids present. 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 redband trout are sympatric, we assume hybrids are common.

Interspecific hybridization with Lahontan cutthroat trout is a significant threat to redband trout in Guano Creek. Lahontan cutthroat trout were stocked in 1957, 1969, and 1973 and were captured regularly during presence/absence surveys in 1992 (ODFW, Aquatic Inventory Project, unpublished data). Hybrids were not documented during sampling, but records of ‘unknown trout’ were likely hybrids (ODFW, Aquatic Inventory Project, unpublished data). Since then numerous reports of hybrids have been reported (K. Jones, ODFW Aquatic Inventory Project, pers. comm.). Tissue samples from fish in Guano Creek were collected in 2004 genetic analysis of hybridization. Guano Creek fails the hybridization criterion until analysis can better describe the extent of hybridization. Cutthroat trout are not present in the other Catlow Valley populations and these populations pass the criterion.

Assessment Conclusions

The Catlow Valley Redband Trout SMU includes five populations in the closed interior basin of Catlow Valley. Even though redband trout are present in most perennial streams in Catlow Valley, the distribution is highly fragmented. Connection does not exist between any populations, which prevents genetic mixing, limits opportunities to express a migratory life history, and increases risk of extinction from stochastic events. Densities fluctuate accordingly with water years, although Skull and Guano populations appear extremely depressed in all conditions. The Guano population is also potentially threatened by hybridization with cutthroat trout. Eighty percent of the populations met three of the six interim criteria thereby classifying this SMU 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.

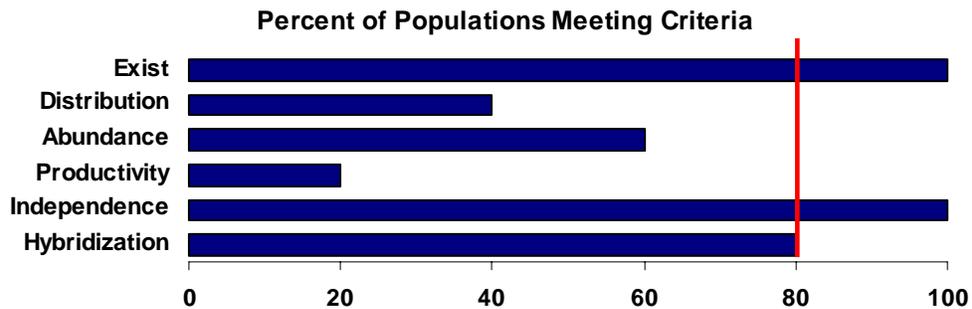


Figure 1. Assessment outcome for each of the six interim criteria with respect to the 80% threshold identified by the NFCP.