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.

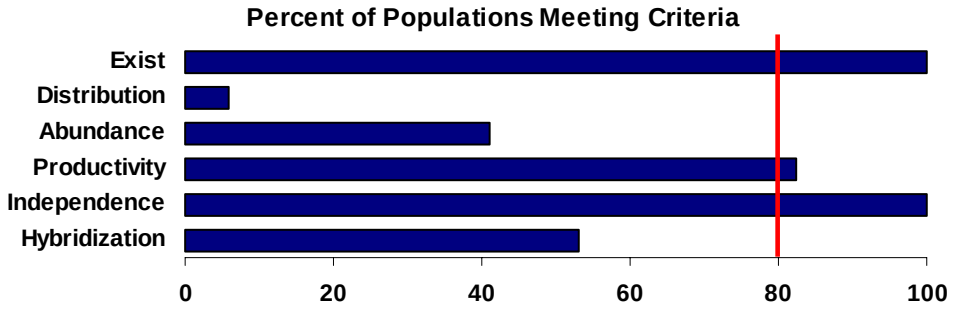

Figure 1. Assessment outcome for each of the six interim criteria with respect to the 80% threshold identified by the NFCP.