Deschutes Bull Trout

Existing Populations

The Deschutes Bull Trout SMU is comprised of eight populations, three of which are classified as extinct (Table 1). Populations are identified according to those defined in the USFWS Deschutes River Chapter of the Bull Trout Draft Recovery Plan (2004). This review considers bull trout in the Metolius River basin as two distinct population complexes, Jefferson and Jack, however, individual PIT tagged bull trout have shown a high degree of fidelity to the same spawning stream and may be indicative of a finer population structure (S. Marx, ODFW Deschutes Watershed Fish District, personal communication). Extinct populations were inferred from historical distributions (USFWS 2004, Buchanan et al. 1997, Ratliff and Howell 1992).

Table 1. Populations, existence status, and life history of the Deschutes Bull Trout SMU.

Exist	Population	Description	Life History
Yes	Warm Springs	Warm Springs River and tributaries.	Resident/ Migratory
Yes	Shitike	Shitike River and tributaries.	Resident/ Migratory
Yes	Whitewater	Whitewater River and tributaries.	Resident/ migratory
Yes	Jefferson Complex	Jefferson and Candle Creeks and tributaries.	Resident/ Migratory
Yes	Jack Complex	Canyon and Jack Creeks, Heising Springs and Metolius River and tributaries.	Resident/ Migratory
No	Suttle Lake	Suttle and Blue Lakes and Link Creek.	
No	Upper Deschutes	Deschutes River and tributaries above Big Falls.	
No	Crescent Lake	Crescent Lake.	

Historically, bull trout populations existed in Crescent Lake and the upper Deschutes River. The population structure of the Upper Deschutes is unknown and may have consisted of multiple distinct populations. This review identifies bull trout in Crescent Lake as a discreet historical population due to the expression of an adfluvial life history strategy (Buchanan et al. 1997, Ratliff and Howell 1992); other possible populations in the upper Deschutes River are treated as a single entity. The Upper Deschutes population was reproductively isolated from the lower Deschutes populations by Big Falls. The last bull trout observed in the upper Deschutes was in 1959 in Crescent Lake. Bull trout in the Upper Deschutes population were eliminated by a combination of factors including the construction of irrigation storage dams (Crane Prairie, Crescent Lake, and Wickiup) which blocked access to and inundated spawning grounds, increased water temperatures and altered flow regimes, overharvest, and competition with non-native trout.

A historic population also existed in Suttle and Blue lakes, which was possibly eliminated by the construction of an outlet dam, overharvest, and competition with introduced brook trout and brown trout (USFWS 2004, Buchanan et al. 1997).

Distribution

Analysis of the distribution criterion is based on 1:100,000 GIS hydrography of bull trout distribution (Hanson 2001, Buchanan et al. 1997). These data are primarily based on summer distribution sampling that often represent the most restricted distribution. A population fails the criterion if spawning and juvenile rearing distribution is: 1) less than ten km, 2) not connected to other populations, or 3) occupies less than 50% of the historic distribution when historic

distribution data are available. In basins where the GIS hydrography does not depict historical distribution, the results will show populations occupy 100% of the historical range. Though this is likely accurate for Deschutes River bull trout, these results should be interpreted with care since historical data are not always available. All existing populations pass the distribution criterion (Table 2).

Table 2. Distribution data used to evaluate Deschutes bull trout populations.

Population	Spawning Distribution (km)	% of Historical	Connected to Other Pops.	Pass/Fail
Warm Springs	33.2	<100*	Yes	Pass
Shitike	38.1	100	Yes	Pass
Whitewater	20.1	100	Yes	Pass
Jefferson Complex	35.5	100	Yes	Pass
Jack Complex	37.7	100	Yes	Pass
Suttle Lake		*Extinct population*		
Upper Deschutes		*Extinct population*		
Crescent Lake		*Extinct population*		

** Bull Trout no longer present in Mill Creek, a tributary to Warm Springs River that is now occupied with only brook trout (USFWS 2004).*

Current spawning and juvenile rearing distribution is concentrated in three populations of the Metolius River basin. Spawning also occurs on the Warm Springs Indian Reservation in the upper reaches of the Warm Springs River and Shitike Creek. The spawning distribution within each population is relatively extensive. Adult and sub-adult bull trout in the Metolius populations utilize, the lower reaches of Crooked River (up to Opal Springs Dam), the Deschutes River between Lake Billy Chinook and Big Falls and lower Squaw Creek Bull trout from Warm Springs and Shitike creeks utilize the Deschutes River down to Sherars Falls (USFWS 2004). The construction of the Pelton\Round Butte Hydroelectric complex isolated populations on the Warm Springs Reservation from those in the Metolius - Lake Billy Chinook basin (Ratliff et al. 1996, Buchanan et al. 1997).

Knowledge of historical distribution is incomplete. To the best of our knowledge, bull trout utilized most of the Deschutes River basin throughout their life history (Ratliff et al.1996, Buchanan et al. 1997). Foraging bull trout used to occupy the Crooked River up to Prineville and were reported in Trout and Squaw creeks (USFWS 2004, Buchanan et al. 1997).

Abundance

Abundance of spawning bull trout has been monitored since 1986 in the Jack and Jefferson complexes and on the Warm Springs Reservation since 1998 (USFWS 2004). The USFWS Draft Recovery Plan (2004) provides estimates of adult bull trout abundance in each population based on redd count data collected between 1998 and 2002 and a 2.3 fish per redd expansion factor (Ratliff et al. 1996, Dunham et al. 2001, USFWS 2004). These estimates were used to assess the abundance criterion (Table 3). Populations of bull trout with fewer than 100 spawning adults are considered at risk of inbreeding and fail the interim risk criteria. The sum of interconnected populations also must exceed 1,000 adults to avoid risk of genetic drift (Rieman and Allendorf 2001). Thus an SMU or an isolated population must total greater than 1,000 reproductive adults in order to pass this criterion.

Table 3. Estimated adult abundance of Deschutes bull trout populations based on USFWS 2004.

Population	Estimated Adult Abundance	Pass/Fail
Warm Springs	214	Pass
Shitike	279	Pass
Whitewater	0-60	Fail
Jefferson Complex	410	Pass
Jack Complex	706	Pass
Suttle Lake	*Extinct population*	
Upper Deschutes	*Extinct population*	
Crescent Lake	*Extinct population*	

The Whitewater population is estimated to contain fewer than 100 adults, however, estimates of abundance in Whitewater may be conservative due to the difficult nature of redd surveys. Whitewater River is remote, difficult to access, and frequently turbid due to glacial run-off (USFWS 2004). This population is considered at risk of extinction due to inbreeding and fails the criterion until population abundance can be better assessed.

The estimated total number of adult bull trout in the SMU averaged 1,640 between 1998 and 2002, and ranged from 915 to 2,208 (USFWS 2004). Based on this estimate the SMU is not considered at risk of genetic drift (>1,000) (Reiman and Allendorf 2001). However, the Pelton Round Butte Hydroelectric Project prevents mixing between the Metolius populations and Warm Springs and Shitike populations. Because Warm Springs and Shitike have a total estimate of 500 adults combine these populations may be at risk of genetic drift until passage can be established at the hydroelectric facility and mixing among all population occurs.

Productivity

Productivity is evaluated using abundance estimates generated from annual redd counts. A population passes the productivity criterion if it displays a stable or increasing trend over the past five years. A decreasing trend is cause for a population to fail the productivity criterion. Trends in abundance for the Deschutes SMU populations are evaluated using data sets of annual census redd counts. This review recognizes the difficulties associated with characterizing population trend using redd counts given the inherent variability in redd detection and souces of statistical error (Dunham et al. 2001, Maxell 1999, Rieman and Myers 1997). The evaluation of productivity based on apparent population trend is made with caution and subject to uncertainty.

All populations pass the productivity criterion. Jefferson and Jack complexes and Shitike show an increasing trend in abundance, and Warm Springs appears stable (Figure 1). Data to assess productivity of the Whitewater population are not available due to difficult access and turbid water conditions. Even though the population has a low abundance this review assumes it is minimally self-sustaining given trends of the other Metolius Basin populations, an adfluvial life history, intact stream habitat, and an absence of non-native species. The population passes the productivity criterion.

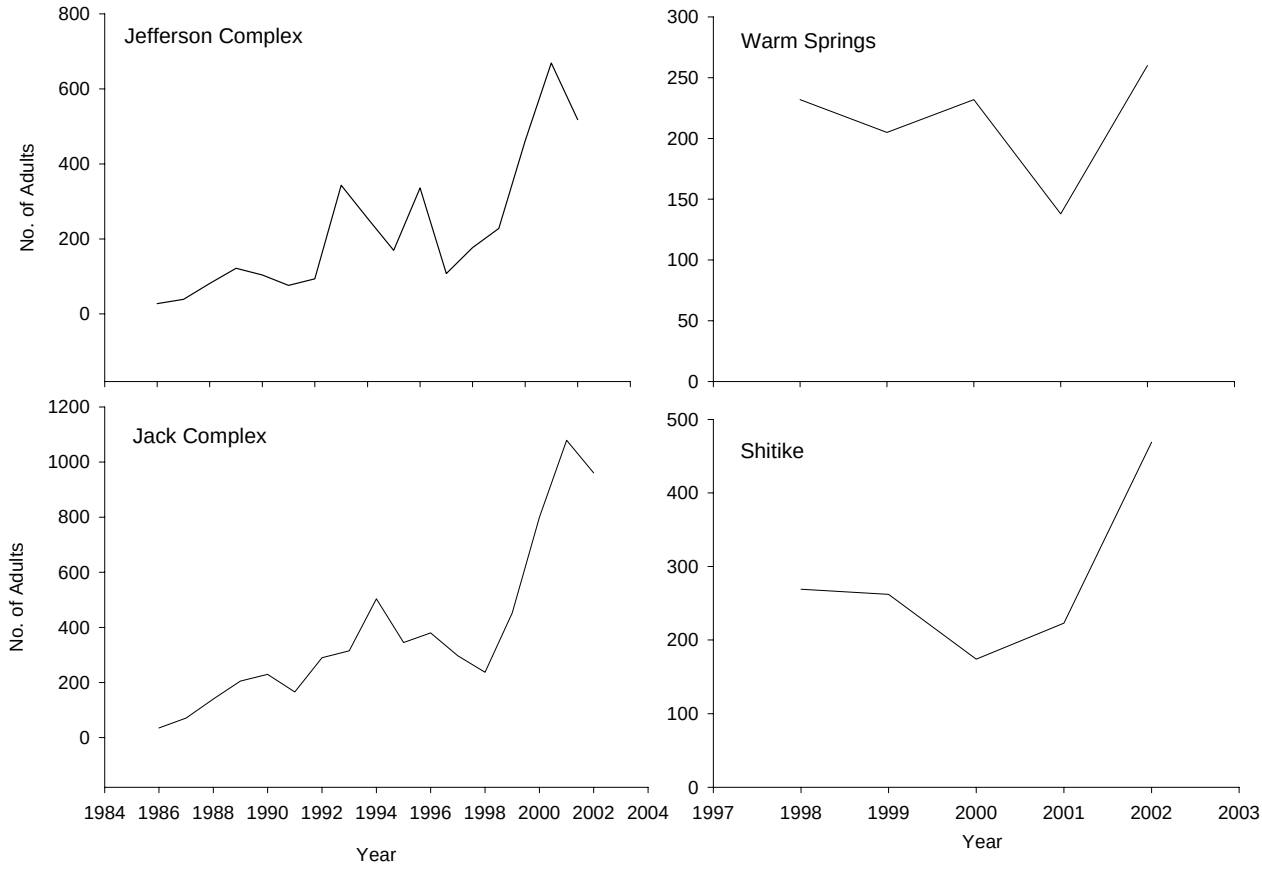

Figure 1. Trends in population abundance for Deschutes Bull Trout SMU populations.

Reproductive Independence

All populations in the Deschutes Bull Trout SMU are native fish sustained by natural production and pass the reproductive independence criterion.

Hybridization

A population is considered to pass the hybridization criterion if brook trout x bull trout hybrids are rare 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, then it is assumed hybrids are common where bull trout and brook trout are sympatric.

Brook trout were stocked into streams, rivers, and high alpine lakes in the Deschutes River basin. Brook trout currently occur in the Warm Springs River, Shitike Creek, and Canyon Creek (Jack Complex). In Canyon Creek brook trout occur upstream of cold water reaches where bull trout are more abundant. This population passes the hybridization criterion because bull trout and brook trout are rarely sympatric and hybridization is rare. The degree of hybridization in Warm Springs and Shitike populations is undocumented. These populations fail the hybridization criterion until data are available to quantify hybridization (Table 4).

Table 4. Occurrence of brook trout and hybridization for Deschutes bull trout populations.

Population	Brook Trout	Pass/Fail
Warm Springs	Yes	Fail
Shitike	Yes	Fail
Whitewater	No	Pass
Jefferson Complex	No	Pass
Jack Complex	Yes	Pass*
Suttle Lake	*Extinct population*	
Upper Deschutes	*Extinct population*	
Crescent Lake	*Extinct population*	

** Brook trout are present but hybridization is uncommon.*

Assessment Conclusions

The Deschutes Bull Trout SMU contains eight populations, three of which are considered extinct. Bull trout no longer exist in the upper Deschutes River basin, Crescent Lake, and Suttle Lake. Movement between populations in the Warm Springs Indian Reservation and the Metolius River basin is impeded by the Pelton\Round Butte Hydroelectric Project. Jack and Jefferson complexes are two of the most abundant and productive in Oregon; both populations pass all interim criteria and are considered "not at risk". Hybridization with brook trout is assumed to be common in Warm Springs and Shitike creeks. The SMU is classified as "potentially at risk", failing the hybridization and extinction criteria (Figure 2). 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.

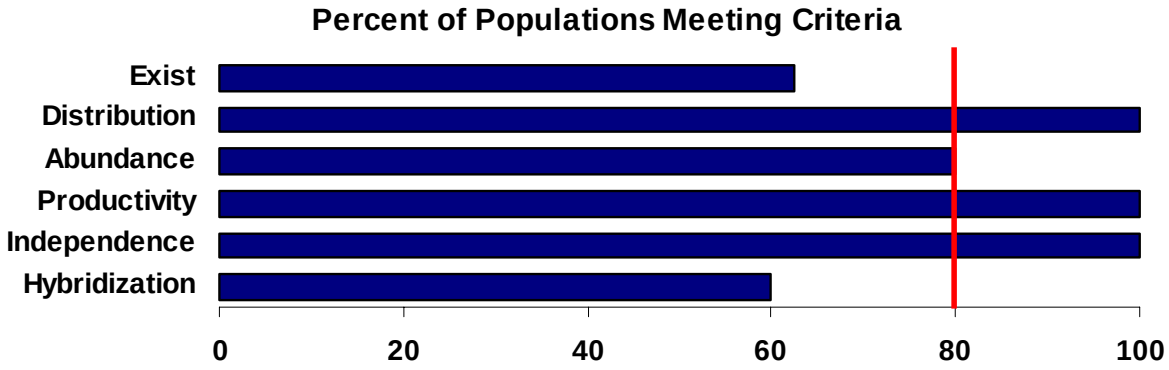

Figure 2. Assessment outcome for each of the six interim criteria with respect to the 80% threshold identified by the NFCP.