

Willamette Bull Trout

Existing Populations

The Willamette Bull Trout SMU includes four existing populations and three classified as extinct (Table 1). Populations were identified according to those defined in the USFWS Willamette River Chapter of the Bull Trout Draft Recovery Plan (2004), Ratliff and Howell (1992), and review by ODFW biologists.

Table 1. Populations, existence status, and life history for the Willamette Bull Trout SMU.

Exist	Population	Description	Life History
No	Clackamas	Clackamas River and tributaries.	
No	North Santiam	North Santiam River and tributaries.	
No	South Santiam	South Santiam River and tributaries.	
Yes	Trail Bridge	McKenzie River above Trail Bridge Dam.	Resident / Migratory
Yes	McKenzie	Mouth to Trail Bridge Dam.	Resident / Migratory
Yes	SF McKenzie	South Fork McKenzie River above Cougar Dam.	Migratory
Yes	MF Willamette	Middle Fork Willamette River above Hills Creek Dam.	Unknown

The population in the Middle Fork Willamette River was classified as ‘probably extinct’ by Buchanan et al. (1997). In an effort to rehabilitate bull trout in the Middle Fork Willamette Basin, ODFW and USFS released more than 10,000 bull trout fry from the McKenzie River population (Anderson Creek) into cold water springs and tributaries above Hills Creek Dam from 1997 to 2004 (ODFW and USFW 1998, Taylor and Reasoner 2000, Seals and Reis 2003, ODFW unpublished data). ODFW and USFS biologists observed sub-adults and adult bull trout in 2003 and 2004 and there have been several confirmed sightings of bull trout reported by anglers (USFWS 2004). This review treats bull trout in the Middle Fork Willamette as an existing population.

The Clackamas population is considered extinct. The last documented bull trout observation occurred in 1960 (Goetz 1989), and surveys between 1992 and 1999 failed to detect bull trout in the Clackamas River and its tributaries. Based on historical creel data, bull trout in the Clackamas River expressed a fluvial life history (USFWS 2004).

The historical record, although limited, documents bull trout in the North and South Santiam basins (Goetz 1994). The last verified observation of bull trout in North Santiam basin was in 1945, and 1953 in the South Santiam basin (Goetz 1989). Whether the few documented bull trout sightings in the Santiam Basin are indicative of discreet populations or represent highly mobile migrants is undetermined. Surveys in the 1990s failed to detect bull trout in either watershed. The North Santiam and South Santiam populations are considered extinct.

Distribution

Analysis of the distribution criterion is based on information summarized in Willamette River Chapter of the Bull Trout Draft Recovery Plan (USFWS 2004) and Ziller and Taylor (2000). A population failed the criterion if spawning and resident distribution is: 1) less than ten km, or 2) not connected to other populations. Knowledge of the historical bull trout distribution is insufficient; thus the percent of historical habitat currently occupied is not calculated for the Willamette SMU.

Prior to dam construction, bull trout in the McKenzie River watershed functioned as a single population (USFWS 2004, Taylor and Reasoner 2000). Spawning and juvenile rearing occurred in the upper watershed and large fluvial adults reared in the mainstem McKenzie and upper Willamette rivers. Dams built on the South Fork McKenzie (Cougar Dam) and upper McKenzie River (Trail Bridge Dam) divide the original population into three small discrete populations, prevent movement into portions of the upper watershed, and fragment spawning habitat.

All populations in the McKenzie River basin fail the distribution criterion based on limited spawning distribution and isolation above Trail Bridge and Cougar dams. Bull trout in the McKenzie population utilize up to 170 Km of the McKenzie River and its tributaries throughout their life cycle. Large fluvial adults have been observed downstream of Leaburg Dam and a few individuals pass over the dam each year (USFWS 2004). However, spawning distribution is limited to a total of five km in Anderson and Olallie creeks (Table 2). Because of the extremely limited and localized spawning distribution, the McKenzie population is at an increased risk of the impacts of stochastic events (USFWS 2004). The spawning distribution of the SF McKenzie and Trail Bridge populations are more restricted and therefore the populations are also at risk of extinction due to stochastic events.

Lack of upstream passage at Trail Bridge and Cougar dams prevent adult bull trout that move downstream past these dams from returning to their natal streams. These fish are lost to the populations above the dams, impacting the abundance and productivity of these already small populations. Lack of upstream passage also prevents gene flow between populations. Fish from Trail Bridge and SF McKenzie populations can pass downstream and spawn in the McKenzie population, but fish originating in the McKenzie population cannot pass upstream and spawn in populations above the dams (Table 2).

The Middle Fork Willamette bull trout population fails the distribution criterion based on the lack of a documented spawning and isolation above Hills Creek Dam. Distribution of introduced bull trout in the Middle Fork Willamette River is thought to extend 46 km between Chuckle Springs and Hills Creek Dam (ODFW 2005 unpublished data). Spawning by this population is undocumented.

Table 2. Distribution data used to evaluate Willamette Bull Trout populations.

Population	Spawning Distribution (km)	Connected to other Pops.	Pass/Fail
Clackamas		<i>Extinct population</i>	
North Santiam		<i>Extinct population</i>	
South Santiam		<i>Extinct population</i>	
Trail Bridge	1.8	No	Fail
McKenzie	5	Yes	Fail
SF McKenzie	1.9	No	Fail
MF Willamette	Unknown	No	Fail

Abundance

The USFWS Draft Recovery Plan (2004) provided estimates of average number of adult bull trout in each population based on total redd counts and professional judgment of local biologists. These estimates were used to assess the abundance criterion (Table 3). Populations of bull trout with less than 100 spawning adults are considered at risk of inbreeding and fail the interim risk criterion. 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 adults spawning annually in order to pass this criterion.

Table 3. Estimated adult abundance of Willamette bull trout populations (USFWS 2004).

Population	Estimated Adult Abundance	Pass/Fail
Clackamas	<i>Extinct population</i>	
North Santiam	<i>Extinct population</i>	
South Santiam	<i>Extinct population</i>	
Trail Bridge	< 20	Fail
McKenzie	150-200	Pass
SF McKenzie	30-40	Fail
MF Willamette	Unknown	Fail

The number of adult bull trout in the Willamette SMU is estimated to be no more than 300 fish, two-thirds of which are thought to be in the McKenzie population (USFWS 2004). Since 1995, census redd counts of the McKenzie population have averaged 84 redds per year. Based on this average and a conservative 2.3 fish per redd conversion factor (Ratliff et al. 1996, Dunham et al. 2001) the number of adults in the McKenzie population is approximately 190 fish, similar to the estimated abundance reported by the Willamette Bull Trout Recovery Team (USFWS 2004). Only the McKenzie population passes the individual population abundance criterion (Table 3).

The estimated total number of adult bull trout in the SMU is 300 fish (<1,000)(USFWS 2004); thus the SMU is considered at risk of genetic drift. The three populations isolated above barriers to upstream migration have fewer than 1,000 adults, thus are also considered at risk of genetic drift.

Productivity

The assessment of the productivity criterion was based on trends of abundance over the past five years. A population passes the criterion if the abundance trend appears stable or increasing. A decreasing trend is cause for a population to fail the criterion. Trends in abundance for the Willamette SMU populations were 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 sources of statistical error (Dunham et al. 2001, Maxell 1999, Rieman and Myers 1997). The evaluation of the productivity criterion based on apparent population trend is made with caution and subject to uncertainty.

The SF McKenzie and Trail Bridge populations show increasing trends in redd counts and pass the productivity criterion (Figure 1) (USFWS 2004, Seals and Reis 2003). However the increasing trend in the Trail Bridge population is slight and the magnitude of the counts is perilously low. In addition, identification of bull trout redds is hindered by redd building activity of Chinook salmon outplanted above Trail Bridge Dam (USFWS 2004). Even though this population passes the criterion, productivity of the population should be carefully monitored.

The trend in redd counts for the McKenzie population appears stable. Local and agency biologists believe this population is near spawning capacity due to the high density of the redds and frequent redd superimposition (Taylor and Reasoner 2000, Taylor and Ziller 2000). This population passes the productivity criterion.

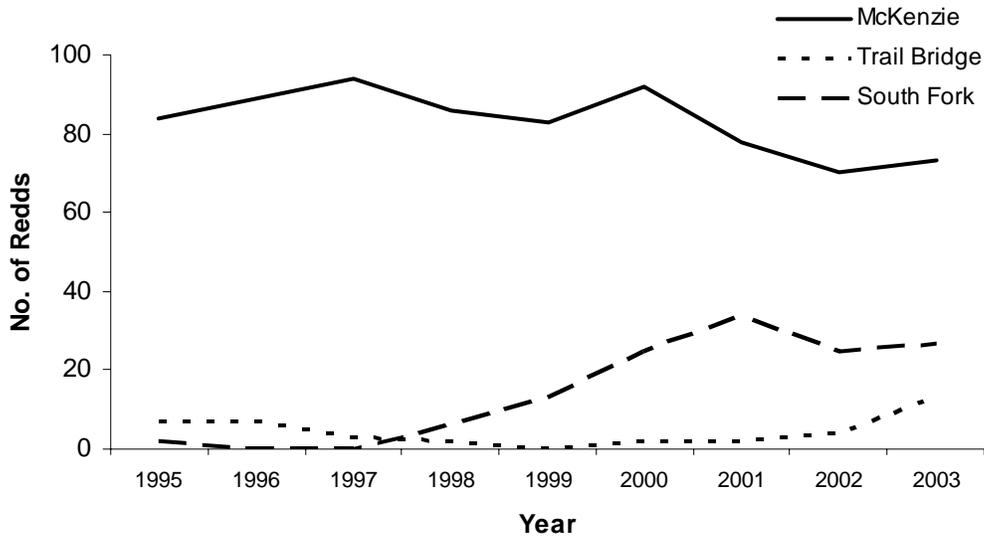


Figure 1. Trends in total redd counts for McKenzie, SF McKenzie, and Trail Bridge populations (USFWS 2004, Seals and Reis 2002).

The productivity of the Middle Fork Willamette population is dependant on the introduction of bull trout from the McKenzie River. Spawning is not yet documented and there is no indication of natural production. The MF Willamette population fails the productivity criterion.

Reproductive Independence

All populations in the McKenzie basin are native fish sustained by natural production and pass the reproductive independence criterion.

Bull trout fry from the McKenzie population are transfered into the Middle Fork Willamette in an effort to restore bull trout to the basin. Although the McKenzie bull trout are not native to the Middle Fork Willamette, they likely originated from the same initial population. Likewise, the introduction of bull trout from the McKenzie population may be the only method to maintain and conserve genetic traits unique to the Middle Fork Willamette population (ODFW and USFS 1998). The Middle Fork Willamette population passes 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 all populations in the Willamette SMU, 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 bull trout and brook trout are sympatric, this review assumes hybrids are common.

Brook trout were stocked into many high lakes in the Cascade Mountains prior to the 1960s, and some of these releases resulted in self-sustaining populations (USFWS 2004). Brook trout currently occur in all basins of the Willamette SMU. Trail Bridge Reservoir contains a population of brook trout and hybridization is a significant concern. This population fails the hybridization criterion. Hybridization in the remaining three populations is rare or non-existent. Brook trout are sympatric with bull trout in portions of the McKenzie population, but not present in the primary spawning tributaries, Anderson and Ollalie creeks. Bull trout x brook trout hybrids have not been observed during routine monitoring activities (J. Ziller, ODFW Upper

Willamette Fish District, personal communication). Brook trout are present in the headwaters of the SF McKenzie population, but their range does not overlap the range of bull trout (USFWS 2004). Similarly, brook trout are present in the Middle Fork Willamette, but upstream of bull trout distribution. The McKenzie, SF McKenzie, and MF Willamette populations pass the hybridization criterion (Table 4).

Table 4. Presence of brook trout in populations of the Willamette Bull Trout SMU.

Population	Brook Trout	Pass/Fail
Clackamas	<i>Extinct population</i>	
North Santiam	<i>Extinct population</i>	
South Santiam	<i>Extinct population</i>	
Trail Bridge	Yes	Fail
McKenzie	Yes	Pass*
SF McKenzie	No	Pass
MF Willamette	No	Pass

* Brook trout are present but hybridization is uncommon.

Assessment Conclusions

The Willamette bull trout SMU is comprised of seven populations, three of which are classified as extinct. Sightings of bull trout were last documented before 1960 in Clackamas, North Santiam, and South Santiam basins. All four existing populations have an extremely limited spawning distribution, and three populations are isolated above dams lacking upstream passage. Bull trout abundance in the Middle Fork Willamette population has dropped to precariously low numbers. ODFW and USFS biologists are attempting to restore this population with bull trout from the McKenzie population. The SMU meets only the reproductive independence criterion and is classified as ‘at risk’ (Figure 2). Limited datasets and inferences from other populations in this SMU provide a qualified level of confidence in the assessment of the interim criteria.

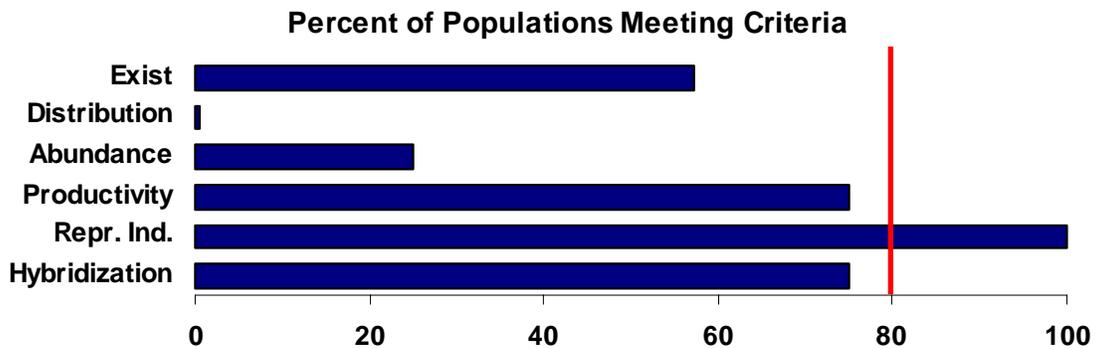


Figure 2. Assessment outcome for each of the six interim criteria with respect to the 80% threshold identified by the NFCP.