

## John Day Bull Trout

### *Existing Populations*

The John Day Bull Trout SMU is comprised of 20 populations, seven of which are located in the North Fork John Day basin, nine in the Middle Fork John Day basin, and four in the Upper Mainstem John Day basin (Table 1). Six populations in the Middle Fork John Day basin and two populations in the Mainstem John Day basin are classified as extinct. Knowledge of historical distributions and populations is incomplete. Historically the populations structure may have been much different than represented in this review. Current and extinct populations are defined based on those identified in the John Day River Chapter of the Bull Trout Draft Recovery Plan (USFWS 2004) and Ratliff and Howell (1992). This review identifies Big Creek as an additional population in the North Fork John Day Basin. USFS biologists have observed bull trout and bull trout x brook trout hybrids in streams of this watershed (T. Unterwegner, ODFW John Day Fish District, personal communication).

**Table 1. Populations, existence status, and life history of the John Day Bull Trout SMU.**

Exist	Population	Description	Life History
<b>North Fork</b>			
Yes	Upper North Fork	Upper NF John Day River and tributaries upstream of Granite Creek, incl. Crawfish, Baldy, Cunningham, Trail, Onion and Crane creeks.	Resident /Migratory
Yes	Upper Granite	Upper Granite Creek and tributaries incl. Boulder, Boundary, Deep, and Bull Run creeks.	Resident /Migratory
Yes	Big	Big and Winom creeks.	Resident/Migratory?
Yes	Clear	Clear Creek below Pete Mann ditch.	Resident/Migratory?
Yes	Clear/Lightning	Clear, Lightning, and Salmon creeks above Pete Mann Ditch.	Resident
Yes	Desolation	Desolation, NF and SF up to falls.	Resident /Migratory
Yes	SF Desolation	SF Desolation above falls.	Resident
<b>Middle Fork</b>			
Yes	Clear	Clear Creek.	Resident
Yes	Granite Boulder	Granite Boulder Creek.	Resident /Migratory
Yes	Big	Big and Deadwood creeks.	Resident /Migratory
No	Upper Middle Fork	Upper Middle Fork John Day River and tributaries.	
No	Big Boulder	Big Boulder Creek.	
No	Davis	Davis Creek.	
No	Vinegar	Vinegar Creek.	
No	Butte	Butte Creek.	
No	Indian	Indian Creek.	
<b>Mainstem</b>			
Yes	Upper John Day	Upper Mainstem John Day River and tributaries, incl. Deardorff, Reynolds, Rail, Roberts and Call creeks.	Resident /Migratory
Yes	Indian	Indian Creek and tributaries.	Resident
No	Pine	Pine Creek and tributaries.	
No	Canyon	Canyon Creek and tributaries.	

**Distribution**

Spawning and rearing distribution of bull trout in the John Day basin is highly fragmented and limited to headwater streams of the North Fork, Middle Fork, and Upper Mainstem John Day rivers. Adult and sub-adult bull trout seasonally utilize the entire North Fork John Day River for rearing and foraging, and in the Upper Mainstem John Day River they are suspected to forage down to the vicinity of the town of John Day. Migratory bull trout have been captured in the Mainstem John Day River near the town of Spray; however use of the lower reaches is sporadic due to warm water temperatures and low flows during the summer months (USFWS 2004, Buchanan et al. 1997).

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 represents the most restricted distribution. A population fails the criterion if spawning and resident distribution is: 1) less than ten km, 2) not connected to other populations, or 3) occupies less than 50% of the historical distribution when historical distribution data are denoted in GIS. In basins where the GIS hydrography does not depict historical distribution, the results show populations occupy 100% of their historical range. These results should be interpreted with caution, given that historical data are not always available. Five of the 12 existing populations pass the distribution criterion (Table 2).

**Table 2. Distribution data used to evaluate John Day bull trout populations.**

Population	Distribution (km)	% of Historical	Connected to Other Pops.	Pass/Fail
<b>North Fork</b>				
Upper North Fork	75.1	100	Yes	Pass
Upper Granite	1.08	11	Yes	Fail
Big	<i>undocumented</i>	<i>undocumented</i>	Yes	Fail
Clear	13.5	100	Yes	Pass
Clear/Lightning	<i>undocumented</i>	<i>undocumented</i>	No	Fail
Desolation	33.3	70.2	Yes	Pass
SF Desolation	5.8	100	No	Fail
<b>Middle Fork</b>				
Clear	6.6		Yes	Fail
Granite Boulder	6.5		Yes	Fail
Big	17.5		Yes	Pass
Upper Middle Fork		<i>Extinct population</i>		
Big Boulder		<i>Extinct population</i>		
Davis		<i>Extinct population</i>		
Vinegar		<i>Extinct population</i>		
Butte		<i>Extinct population</i>		
Indian		<i>Extinct population</i>		
<b>Mainstem</b>				
Upper John Day	68.4		Yes	Pass
Indian	3.6		No	Fail
Pine		<i>Extinct population</i>		
Canyon		<i>Extinct population</i>		

Spawning and rearing distribution of bull trout in the Upper Granite population is limited to an extremely short portion of Boulder Creek. Historically, spawning distribution included reaches of Granite Creek (Hanson 2001, Buchanan et al. 1997). The Upper Granite population fails the

distribution criterion because current spawning distribution is limited to one km, only 11% of the historical distribution.

W.F. Clear, Salmon, and Lightning creeks are bisected by the Pete Mann Ditch which diverts water from these creeks to the Burnt River basin for irrigation and mining purposes. Diversions associated with the ditch prevent upstream movement of bull trout into the upper reaches of streams in the Clear/Lightning population (USFWS 2004). Due to isolation from other populations in the North Fork John Day, the Clear/Lightning population fails the distribution criterion.

Irrigation withdrawal on Indian Creek (Upper Mainstem John Day) dewateres the stream channel each summer, seasonally isolating the small bull trout population in the headwaters (USFWS 2004). The Indian population fails the distribution criterion because of the short spawning distribution and seasonal isolation from migratory corridors and other populations.

Clear (MFJD), Granite Boulder, Big (NFJD), and SF Desolation all fail the distribution criterion because spawning and resident distribution is less than ten km. SF Desolation is also isolated above a natural barrier falls. Definitive spawning and rearing distribution of the Big (NFJD) population is undocumented; field observations indicate it is restricted to less than ten km (T. Unterwegner, ODFW John Day Fish District, personal communication).

***Abundance***

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.

Few datasets describe the abundance of individual populations in the John Day SMU. In 1999 ODFW conducted population surveys of the three Middle Fork populations. Results estimated 1,950 individuals in Big Creek, 640 individuals in Clear Creek (MFJD), and 368 individuals in Granite Boulder Creek (Hemmingsen 1999b). These estimates of abundance primarily represent juvenile and sub-adult fish. Based on these data and the professional opinion of the John Day Bull Trout Recovery Team, none of the populations in the John Day SMU exceed 100 adults (USFWS 2004), therefore all populations in the SMU are at risk of inbreeding and fail the abundance criterion.

The John Day Bull Trout SMU likely contains fewer than 1,000 adults and is considered at risk of genetic drift. Basin-wide probabilistic sampling of bull trout using redd surveys between 2002 and 2004 produced an estimate of the total number of redds in the SMU (Table 3) (Sankovich et al. 2003, 2004, Starcevich et al. 2005). Measures of adult abundance based on these redd estimates and an expansion factor of 2.3 adults per redd (Ratliff 1996, Dunham et al. 1999) does not consistently exceed 1,000 adults.

**Table 3. Estimates of total number of bull trout redds in the John Day SMU based on probabilistic sampling (Sankovich et al. 2003, 2004, Starcevich et al. 2005).**

Year	n	Redds	95% CI
2002	42	540	± 38%
2003	48	193	± 31%
2004	49	235	± 36%

**Productivity**

Data are not available to quantitatively assess productivity and the intrinsic rate of population increase for bull trout in the John Day SMU. In the absence of these data the 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 passes the criterion if it is widely distributed and relatively abundant or if there are indications of an increasing or stable trend in abundance. These qualities suggest populations are minimally able to sustain current abundance. The expression of a migratory life history and connectivity between populations and high quality habitat also increases the probability of a population sustaining itself. The presence of non-native species or significant habitat degradation may negatively affect productivity and cause a population to fail the criterion if it is limited in other factors.

Only the North Fork John Day, Upper John Day, and Big (MFJD) populations pass the productivity criterion (Table 4). All other populations fail the criterion due to limited distribution, low abundance, and, in some instances, the presence of brook trout.

**Table 4. Factors considered in the assessment of the productivity criterion of John Day bull trout.**

Population	Factors	Pass/Fail
<b>North Fork</b>		
Upper North Fork	Likely highest total abundance in SMU; wide distribution and adequate connectivity to support a migratory life history; abundant brook trout.	Pass
Upper Granite	Extremely limited distribution and low abundance; migratory life history.	Fail
Big	Limited distribution and abundance; brook trout abundant; resident life history.	Fail
Clear	Limited distribution and low abundance; resident life history, though recent sighting of two sub-adult bull trout in lower reaches may indicate otherwise.	Fail
Clear/Lightning	Limited distribution, isolated above Pete Mann Ditch; resident life history.	Fail
Desolation	Low abundance; migratory life history.	Fail
SF Desolation	Isolated above barrier falls; limited distribution; brook trout present.	Fail
Middle Fork		
Clear	Limited distribution; resident life history; potentially degraded habitat.	Fail
Granite Boulder	Limited distribution and abundance; migratory life history.	Fail
Big	Extensive spawning habitat; highest abundance in Middle Fork; migratory life history.	Pass
Upper Middle Fork	<i>Extinct population</i>	
Big Boulder	<i>Extinct population</i>	
Davis	<i>Extinct population</i>	
Vinegar	<i>Extinct population</i>	
Butte	<i>Extinct population</i>	
Indian	<i>Extinct population</i>	
<b>Mainstem</b>		
Upper John Day	Highest concentration of spawning activity in the John Day Basin (ODFW, Native Fish Investigations Project, unpublished data); wide distribution; migratory life history; brook trout present but not abundant.	Pass
Indian	Very limited spawning distribution; seasonally isolated; resident life history.	Fail
Pine	<i>Extinct population</i>	
Canyon	<i>Extinct population</i>	

**Reproductive Independence**

All bull trout are naturally-produced and hatchery bull trout programs do not exist in Oregon. Because issues of reproductive independence do not apply to bull trout, all populations pass this 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 and bull trout and brook trout are sympatric, this review assumes hybrids are common.

Brook trout were stocked in tributary streams of the North Fork John Day (Camas, Winom, and Rock creeks) and Upper Mainstem John Day (Canyon Creek) between 1925 and 1940 (ODFW and Oregon Fish Commission Fish Stocking records). Brook trout were also stocked in alpine lakes of both basins, most importantly Baldy, Olive, Jump-Off-Joe, and Crawfish Lakes in the North Fork and Magone, Little Strawberry, Strawberry, and Slide lakes in the Mainstem John Day (USFWS 2004). Streams and lakes in the Middle Fork John Day basin were not stocked with brook trout.

In the North Fork John Day basin, hybridization appears to be common where bull trout and brook trout co-occur. Four populations in the North Fork John Day basin; Upper North Fork, Big, Desolation, and SF Desolation, fail the hybridization criterion (Table 5). Brook trout are present in Desolation Creek, however the degree of hybridization with bull trout is unknown. This population fails the hybridization criterion until the degree of hybridization can be better assessed. In the mainstem John Day River Basin brook trout are present in the Little Meadow section of the Upper John Day population, however hybrid trout have not been observed during routine sampling activities (T. Unterwegner, ODFW John Day Fish District, personal communication, ODFW Native Fish Investigations Project, unpublished data). This population passes the hybridization criterion.

**Table 5. Occurrence of brook trout and hybridization for John Day bull trout populations.**

Population	Brook Trout	Pass/Fail
<b>North Fork</b>		
Upper North Fork	Yes	Fail
Upper Granite	No	Pass
Big	Yes	Fail
Clear	No	Pass
Clear/Lightning	No	Pass
Desolation	Yes	Fail
SF Desolation	Yes	Fail
<b>Middle Fork</b>		
Clear	No	Pass
Granite Boulder	No	Pass
Big	No	Pass
Upper Middle Fork	<i>Extinct population</i>	
Big Boulder	<i>Extinct population</i>	
Davis	<i>Extinct population</i>	
Vinegar	<i>Extinct population</i>	
Butte	<i>Extinct population</i>	

Indian	Extinct population	
	<b>Mainstem</b>	
Upper John Day	Yes	Pass*
Indian	No	Pass
Pine	<i>Extinct population</i>	
Canyon	<i>Extinct population</i>	

\* Brook trout are present in a section of the Upper John Day River, but hybrids are uncommon.

**Assessment Conclusions**

The John Day Bull Trout SMU includes 20 populations distributed among headwater streams of the North Fork, Middle Fork, and upper Mainstem John Day rivers. Five populations in the Middle Fork John Day and two in the mainstem John Day rivers are considered extinct. Overall abundance within the SMU is extremely low and spawning distribution is highly fragmented and restricted to small tributary streams. Productivity of most populations is limited by habitat quality, non-native species, and a lack of a migratory life history. The SMU only meets the reproductive independence criterion 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.

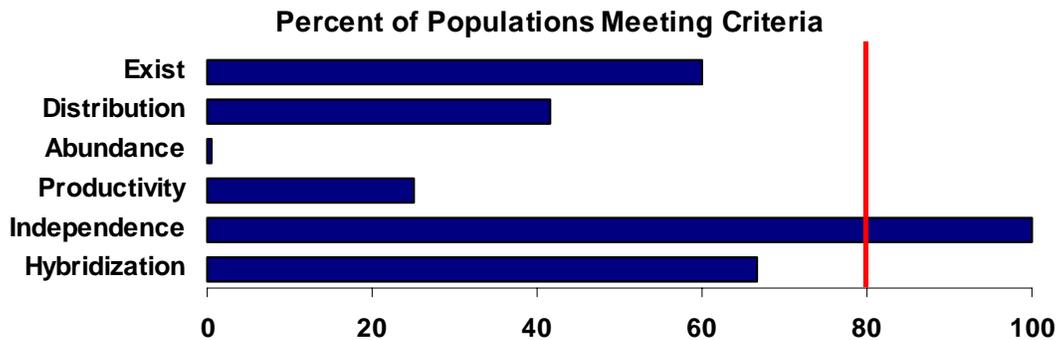


Figure 1. Assessment outcome for each of the six interim criteria with respect to the 80% threshold identified by the NFCP.