Bull trout (Salvelinus confluentus)

Data: Draft Recovery Plan, USFWS, 2002; FR Final Critical Habitat Rule - 2005

Partners: ID, MT, OR, WA, NV, FWS, FS, BLM, NPS, Tribes, AK, Canada

Species Status review: The bull trout (*Salvelinus confluentus*) is currently listed as Threatened under the Endangered Species Act of 1973. The original listing rule in 1998, described distinct population segments in the Columbia, Klamath, and Jarbidge River basins (63 FR 31647, 63 FR 42757, 64 FR 17110). A November 1, 1999 updated rule listed the species as "Threatened" throughout the coterminous United States, which included additional distinct population segments in Washington's Coastal-Puget Sound area and Montana's St. Mary-Belly River basins (64 FR 58910). Effective October 26, 2005 the FWS designated critical habitat for the Klamath River, Columbia River, Jarbidge River, Coastal-Puget Sound, and Saint Mary-Belly River populations of bull trout in the coterminous United States pursuant to the Endangered Species Act of 1973, as amended (Act). This final designation totals approximately 3,828 miles (mi) (6,161 kilometers (km)) of streams, 143,218 acres (ac) (57,958 hectares (ha) of lakes in Idaho, Montana, Oregon, and Washington, and 985 mi (1,585 km) of shoreline paralleling marine habitat in Washington.

In 2004, the USFWS (Service) initiated a five-year review of the bull trout listing status. The review process solicited status assessment information from cooperators in the states within which bull trout reside (Montana, Idaho, Nevada, Oregon and Washington), but a final review determination has not been completed by the Service. The FWS is expected to determine final population management descriptions in concert with the state management agencies.

Sportfishing Status of Bull Trout: The bull trout has considerable sportfishing importance and interest in the Northwest. Although listed as a threatened species in the lower 48, there are areas with robust populations that support limited bull trout sport fishing opportunities. In areas with vulnerable bull trout populations, the States of Idaho, Montana, Nevada, Oregon, and Washington have largely controlled angling impacts through fishing closures and special angling regulations. Bull trout may occur in the same waters as other popular game fish species, and due to their aggressive nature bull trout can be caught incidental to other targeted sport fish. Regulations for handling and the immediate release of bull trout minimize the impacts on these fish. However, given the large sizes of adult bull trout and their tendency to spawn in small streams, there can be high incidence of illegal take in some areas. Maintaining the sportfish status can create angler support for bull trout protective and recovery actions.

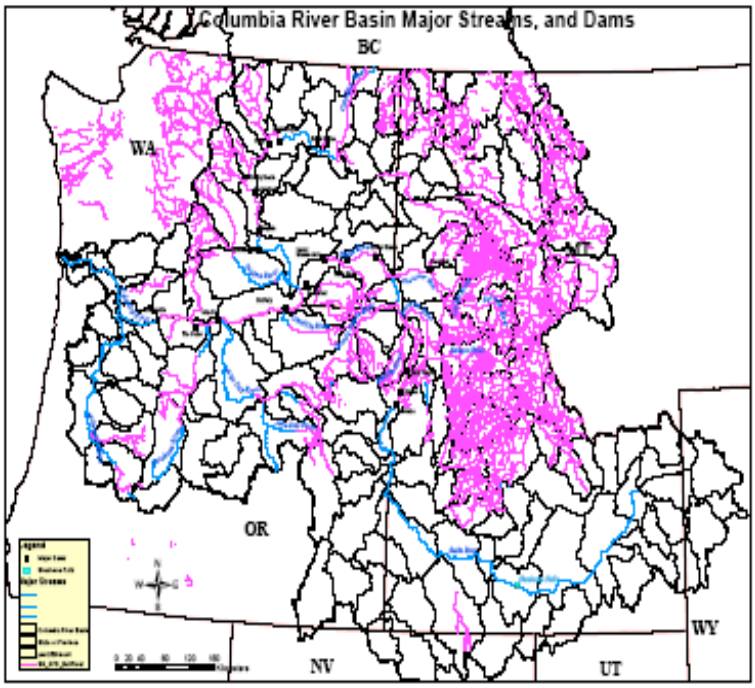
Historic Distribution of Bull Trout: Bull trout are native to the Pacific Northwest and western Canada. The historical range of bull trout in the lower 48 States includes most major river basins in the Pacific Northwest. Bull trout historically occurred from the southern limits in the McCloud River in northern California and the Jarbidge River in Nevada to the headwaters of the Yukon River in the Northwest Territories. In Alaska, a few bull trout have been identified in the Taku River.

Current Distribution of Bull Trout

The current distribution of bull trout populations in the lower 48 states outside of SE Alaska and Canada is highly fragmented, occupying only portions of the historically occupied watersheds. In non-coastal areas, they typically remain only in the coldest tributaries. Like most native salmonids in the west, bull trout distribution, abundance, and habitat quality have declined range-wide. For example, in Idaho, Nevada and Montana,

about one-third of the currently occupied habitat supports populations at or near habitat capacity, while two-thirds support populations significantly below potential.

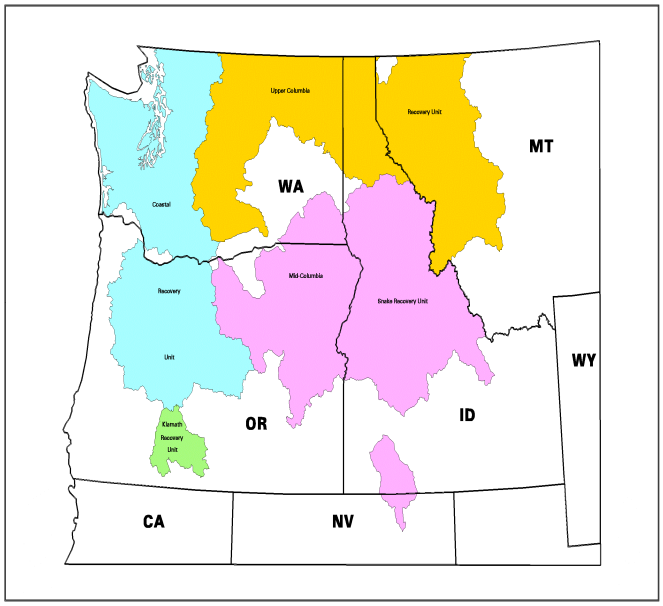
Figure 1. Current distribution of Bull Trout



Range-wide, population strongholds exist in limited areas.

For the purposes of conservation and recovery, bull trout populations in the coterminous United States have been partitioned into a hierarchical classification system. At the smallest scale, "Local Populations" have been defined (Draft Bull Trout Recovery Plan, 2002) as a group of spawning fish with high fidelity to a specific stream or reach, and characterized by amount of interbreeding. A basin or basins where one or more Local Populations may share common foraging, spawning, migrating, or over-wintering habitat and function as a meta-population are termed "Core Areas". Core Areas can be further aggregated into Recovery Units. There are over 600 Local Populations, 119 Core Areas, and 27 Recovery Units currently described in the coterminous United States. Finally, by incorporating information of separate evolutionary lineages (available only in recent years through range-wide genetic surveys), bull trout from the 27 Recovery Units in the lower 48 States can be logically aggregated into four major population (genetic) groupings (Whitesel et al. 2004). These four lineage groups, representing the Klamath, Coastal, Mid-Columbia/Snake, and Upper Columbia could logically be considered Genetic Management Units (GMU's), although they have not been formally designated.

Map of Bull Trout Genetic Lineage Groups in the lower 48 States



Habitat Requirements of Bull Trout: Bull trout have narrower habitat requirements than most other salmonids and exhibit a number of life history strategies. Most bull trout are highly migratory, spawning in tributary streams where juvenile fish usually rear from 1 to 4 years before migrating to either a larger river (fluvial), lake (adfluvial), or ocean (anadromous) where they spend their adult life, typically returning to the natal tributary stream to spawn. Resident bull trout may complete

their entire life cycle in the tributary streams where they spawn and rear. Resident and migratory forms of bull trout may be found together, and it is generally believed the life-history form of individuals is more a product of the environment than of any specific genetic combination.

Habitat components that influence bull trout distribution and abundance include water temperature, cover, channel form and stability, and suitability of substrate for spawning and rearing. Bull trout are often associated with areas of groundwater infiltration, and/or the coldest streams in a watershed, with loose, clean gravel relatively free of fine sediments. Because bull trout spawn during the fall in cold water habitats, incubation and development occurs over the winter, and eggs and alevins are subjected to long developmental periods within the gravel (greater than 200 days). As a result, eggs and young bull trout are vulnerable to high mortality rates from disturbance to the substrate including fine sediment deposition, channel incisions and scouring from high flow events.

Throughout their lives, bull trout require complex forms of cover, including large woody debris, undercut banks, boulders, and pools. Alterations in channel form and reductions in channel stability result in habitat degradation and reduced survival of bull trout embryos and juveniles. Bull trout use migratory corridors to move from spawning and rearing habitats to foraging and over-wintering habitats and back. Different habitats provide bull trout with diverse resources, and migratory corridors allow local populations to connect, which may increase the potential for gene flow and support for re-founding of populations.

Concerns, Issues, or Obstacles Relative to the Conservation and Improvement of the Status of Bull Trout:

Population Viability Concerns:

Although bull trout are widely distributed over a large geographic area, the effects of human activities over the past century have reduced their overall distribution and particularly their abundance. Increased habitat fragmentation from dams, diversions, land and water management practices, and human development has reduced the amount of available connected habitat. Increased isolation of local populations and decreased connectivity between bull trout Core Areas is resulting in a loss of the migratory life forms of bull trout and is a major concern for population viability. Bull Trout tend to be more migratory than other western native trout.

Fish passage along migration routes that connect foraging, migrating, and over-wintering habitat with spawning tributaries are crucial to bull trout life history and maintaining sufficient genetic variability. Fragmentation, isolation, and the resulting inability for local populations and Core Areas to exchange individuals and genetics remains a potential obstacle to population viability.

Genetics Concerns:

Where brook trout (Salvelinus fontinalis) and bull trout co-exist, interbreeding can occur, often resulting in sterile hybrids that reduce the reproductive output of bull trout The genetics distributions in the four Genetic Management Units indicate that the various groups have not been compromised by cross basin and hatchery stocking.

Habitat Concerns

Loss of habitat quality has been recognized as one of the two major human influences in the loss of bull trout populations across the west.

Major habitat concerns typically relate to:

- Modification and fragmentation of habitat from barriers to fish passage, entrainment, and thermal barriers due to dams and water diversions
- Aquatic habitat degradation and alteration from mining, forestry and agricultural land use practices that result in sediment loading, loss of instream habitat complexity and changes in water quality.
- Flow depletion and water quality degradation due to water uses for hydropower, and municipal and agricultural diversions.
- Secondary impacts of dams from reservoir pools in large river systems (i.e. hydropower entrainment, gas supersaturation, modification of flow patterns, creation of nonnative fish habitat, and changes in release water temperatures).
- Conversion of forested to residential land in core bull trout population areas results in loss of riparian habitat alteration of in-channel habitat, changes to instream flows and diminished water quality.
- Increased pressure on bull trout habitats from energy exploration in the near future. The potential for development is most likely to occur in northwest Montana, with habitat degradation and loss of water the greatest concern.

The accumulation of these detrimental habitat influences over time has lead to isolation and fragmentation of habitat, and adversely impacts the stability of bull trout populations.

Nonnative or Introduced Species Concerns

Introductions of nonnative species have occurred across the range of bull trout. These introductions have contributed to declines in abundance, local extirpations, and hybridization of bull trout. Among these, the non-native species causing the greatest concern are the two introduced char in the same genus as bull trout: 1) brook trout ,and 2) lake trout (*Salvelinus namaycush*).

It is well documented that introduced populations of brook trout and lake trout often become established and threaten bull trout, likely through the primary mechanisms of competition and predation. In the case of brook trout, hybridization is also an added factor. Hybridization between brook trout and bull trout results in offspring that are frequently sterile (Leary *et al.* 1993), although in some populations second generation and later hybrids have been detected (Kanda et al 2002). Brook trout mature at an earlier age and have a higher reproductive rate than bull trout. Lake trout have high longevity (up to 40 years), high fecundity, and their in-lake life cycle may provide a competitive advantage over adfluvial bull trout, particularly in situations where instream spawning and rearing habitat is compromised. These life history differences typically favor brook trout and lake trout over bull trout when they occur together, often leading to replacement of bull trout with the other introduced *Salvelinus spp*.

Other introduced predaceous sport fish species such as brown trout, northern pike, largemouth and smallmouth bass, and walleye may also be problematic. They have been known to compete for food, space, and reproductive habitats, as well as preying on bull trout.

Opportunities for Improving Bull Trout Status:

The objective of bull trout conservation and restoration is to ensure the long-term persistence of self-sustaining populations across the species' native range. To meet this objective, managers will need to maintain

multiple inter-connected populations of bull trout across the diverse habitats of their native range, and preserve the diversity of their life-history strategies (*e.g.*, resident and migratory forms). Specific conservation measures to improve the status of bull trout can be grouped into several major categories, including:

- Protect, restore, and maintain suitable passage and habitat conditions for bull trout.
- Prevent and reduce negative effects of nonnative fishes and other nonnative taxa on bull trout.
- Establish fisheries management goals and objectives compatible with bull trout conservation and implement practices to achieve those goals.
- Characterize, conserve, and monitor genetic diversity and gene flow among local populations of bull trout.
- Conduct research and monitoring to implement and evaluate restoration activities, consistent with an adaptive management approach.
- Use all available conservation programs and regulations to protect and conserve bull trout and bull trout habitats.

Development of Watershed-based Bull Trout Restoration, Conservation, and Fishery Management Plans

At present, there are multiple State, Federal, Tribal, private, and Canadian programs and conservation efforts to improve the status of bull trout in the northwestern United States and Canada. Project implementation has generally followed a site-specific and opportunity-based approach, rather than a watershed-based approach, with varied results and accomplishments. With two nations, five States, multiple federal agencies, and numerous Tribal nations involved, it has been difficult to discern a coordinated or prioritized basis for bull trout restoration and habitat status.

Based on the 2002 Draft Recovery Plan, recovery activities were to be coordinated at the level of the 27 Recovery Units. Participation in the recovery planning process was generally extended to any and all experts with expertise in fisheries or related disciplines from local, State, Tribal and Federal entities, stakeholder, interest and user groups. Recent Federal emphasis has been on designating Critical Habitat and completion of the Five-Year Review. Each of the states, and some tribes have bull trout conservation planning documents that reflect and are complimentary to the draft federal recovery plan

Key Actions Will Include:

States and federal agencies should finalize and complete appropriate bull trout planning documents that specify implementation strategies

Implementation of State, Federal, and Tribal Recovery and Conservation Strategies based on an agreed-upon watershed or basin basis.

Bull Trout Population Surveys, genetic analyses, and fish population manipulation:

Changing climatic conditions and current levels of drought and forest fire impacts on localized habitats point to a need to maintain assessment of the status of bull trout populations. Competition and impacts of non-native fish on bull trout also need to be monitored.

Key actions will include:

Maintain the connectivity and genetic integrity o bull trout populations
Improve the connectivity and genetic integrity of bull trout populations where needed
Maintain current distribution of bull trout

within core areas as described in recovery or conservation plans
Restore distribution of bull trout where recommended in recovery or conservation plans
Characterize, conserve, and monitor genetic diversity and gene flow among local populations of bull trout
Control or eradicate nonnative species (i.e. brook and lake trout) where feasible and appropriate
Develop and implement consistent methods for fish distribution, population status and trend analyses

Bull Trout Habitat Restoration or Enhancement:

Specific land and water management activities that continue to depress bull trout populations and degrade habitat include dams and other diversion structures, forest management practices, livestock grazing, agriculture, road construction and maintenance, mining, and urban and rural development.

Key Habitat Actions to be addressed:

Protect and maintain key functioning bull trout core habitats and populations
Enhance connectivity within and among watersheds
Enhance fish passage where barriers to migration have been identified on a watershed basis
Restore and enhance water flow and water quality
Implement Best Management Practices to prote habitat during land management activities
Restore habitat necessary for sustaining critical life history stages including spawning, rearing, and migration

Regulatory Actions to Enhance Bull Trout Status:

In a few areas, combined impacts of high angling pressure on other species and vulnerability of bull trout to most angling methods may create additional needs for more creative angling regulations and enforcement so that impacts to bull trout can be minimized or avoided.
The use of special angling regulations to protect bull trout, especially in staging and spawning areas, will be an important component of maintaining the health of bull trout populations. In addition, working with others to maintain appropriate regulations for prevention of disease, water quality impairment, habitat disturbance, and the spread of non-native species are important considerations.

Key Regulatory Actions to be addressed:

Enhance and enforce regulatory actions to prevent destruction of habitat
Enforce regulatory mechanisms that prevent impacts associated with recreational angling
Enhance and maintain regulatory mechanisms that prevent diseases or illegal introduction of nuisance species
Federal land management agencies should continue implementation of comprehensive aquatic conservation strategies (for example, PACFISH, INFISH, and NWPlan)

Recommended Actions to Improve the Status of the Bull Trout:

The following high priority actions are common to all Genetic Management Units:

A. The FWS and the States, with key Partners, need to conclude the 5-year Status review and develop a bull trout Memorandum of Agreement that describes the key components of the Recovery Plan that need to be addressed over the next 5 Years.

B. Form Management Teams for each GMU to prioritize key actions for improving the status of bull trout, and to seek funding through the various Partnerships being developed.

C. Protect and maintain key functioning Bull Trout core habitats and populations.

D. Improve the connectivity and genetic integrity of bull trout populations where needed.

The following high priority actions are specific to the Bull Trout genetic management units:

1. Coastal – Puget Sound GMU
    a. Restore and enhance water flow and water quality
    b. Develop and implement consistent methods for fish distribution, population status and trend analyses
2. Upper Klamath GMU
    a. Restore and enhance water flow and water quality
    b. Control or eradicate nonnative species
3. Mid-Columbia/Snake GMU
    a. Restore and enhance water flow and water quality
    b. Control or eradicate nonnative species
4. Upper Columbia River GMU
    a. Control or eradicate nonnative species
    b. Improve connectivity of stream corridors by removing barriers to fish passage
    c. Restore riparian and physical habitats
    d. Improve in-stream flows and water quality
    e. Protect key watershed areas from development or land management impacts through the use of conservation easements or land purchases
    f. Prevent further introduction of invasive, nuisance, and non-native species

Current or Likely Future Bull Trout Joint-Ventures:

Bonneville Power Administration (Mitigation)

Northwest Power and Conservation Council Sub-basin Planning

Canadian Species At Risk Act (SARA)

NFWF Northwestern Habitat Project

U.S. Army Corps of Engineers

U.S. Bureau of Reclamation

Tribal Partnerships

References

1. Bull Trout Recovery Plan
2. Dunham and Riemann.1999
3. Whitesel *et al.* 2004
4. Leary *et al. 1993*
5. Landa *et al. 2002*

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