

## Redband Trout Sub-Sp. (*Oncorhynchus mykiss* sub-species)

**Data:** Trout and Salmon of North America, Behnke, 2002; Various state and federal documents

**Partners:** CA, OR, WA, NV, ID, MT, FS, FWS, BLM, Tribes

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**Status of the Redband Trout:** Various forms of the Redband trout (RBT) were petitioned to be listed as Threatened or Endangered in the late 1990's, but the U.S. Fish and Wildlife Service determined that the sub-species, in the various drainages, did not need the protection of the Endangered Species Act. The various forms of Redband trout in California, Oregon, Washington, Nevada, Idaho and Montana are considered to be sensitive species or species of concern in all the states. The BLM also considers several populations of Redband Trout to be a "sensitive Species".

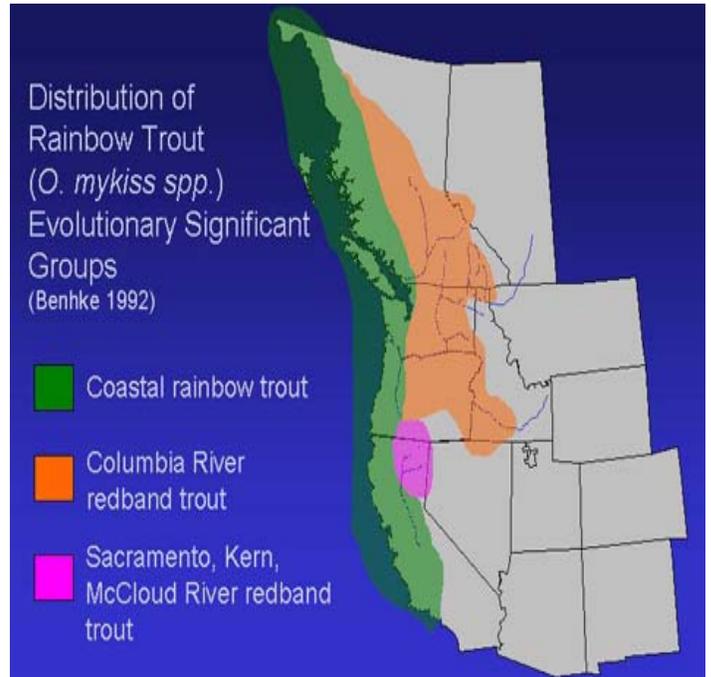
### Sportfishing Status of Redband trout:

Native populations of redband trout provide diverse and popular recreational angling opportunities. Their willingness to take a variety of fishing gear, impressive fighting ability when hooked, spectacular appearance and potential to reach large size all contribute to their popularity. Special regulations for waters possessing redband trout population are used to balance angling opportunities with conservation needs. For example, in Nevada, recreational angling is allowed for redband trout with harvest and possession limits ranging from five to ten trout. Angler use on these redband trout streams and rivers has averaged approximately 7,000 angler use days per year since 1993.

**Distribution of Redband Trout:** The historic range of the redband trout (RBT) extended from the eastern slope of the Cascade Range south to the Sacramento-San Joaquin basin, east into northwestern Montana, and north into upper north British Columbia, Canada. As with many of the native trout species, geographic distribution has been reduced over time due to human-induced activities. Due to a lack of specific Redband trout population surveys, the current distribution cannot be totally described.

### Historic Distribution of Redband Trout (modified from Behnke, 1996)

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Although the current distribution is not accurately described, regionally located surveys do give some good information. For the purposes of this status assessment, distribution in four geographic population groups is described. They include 1) the upper Sacramento River Basin; 2) The upper interior Great Basin in Oregon and Nevada; 3) the upper Snake River Basin in Idaho, Oregon and Nevada; and 4) the upper Columbia River Basin in Washington and Idaho, primarily in the Spokane River Drainage.

Currently, distribution of Redband trout is estimated to include only 54.7% of its historic range, with only 5.3% being occupied by strong populations. Small remnant populations are found throughout the Pacific Northwest in the U.S. and British Columbia. Little is known about exact locations of existing resident interior redband populations.

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## Range of the Redband Trout in the upper Sacramento River Basin

Need map

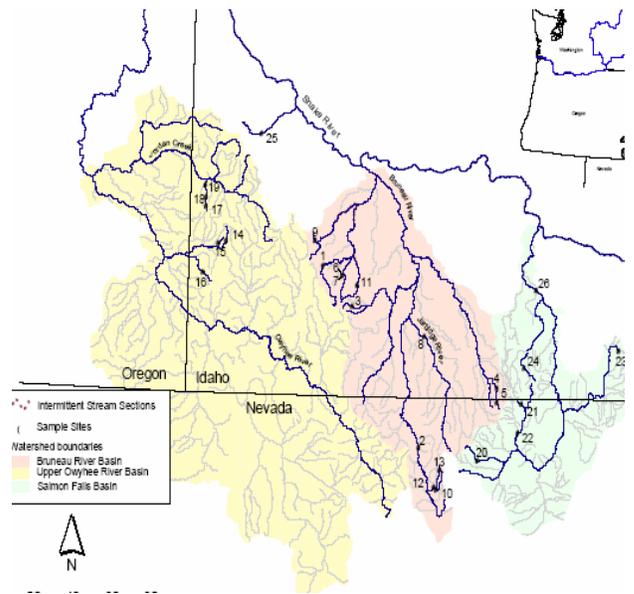
(reference map, Figure 1).

Based on survey work by CDFG, USFS, John Hancock Life Insurance Co., and Sierra Pacific Industries (SPI) from 1978 through 1995, streams which currently contain putative McCloud redband include Trout, Swamp, Edson, Sheepeaven, Blue Heron, Tate, Bull, Moosehead, Dry, Shady Gulch and Raccoon creeks and the main stem McCloud River above Middle Falls For the purposes of this document, these streams should be considered the current range of the McCloud redband

## Range of the Redband Trout: in the Upper Great Basin



## Range of the Redband trout in the Upper Snake River basin

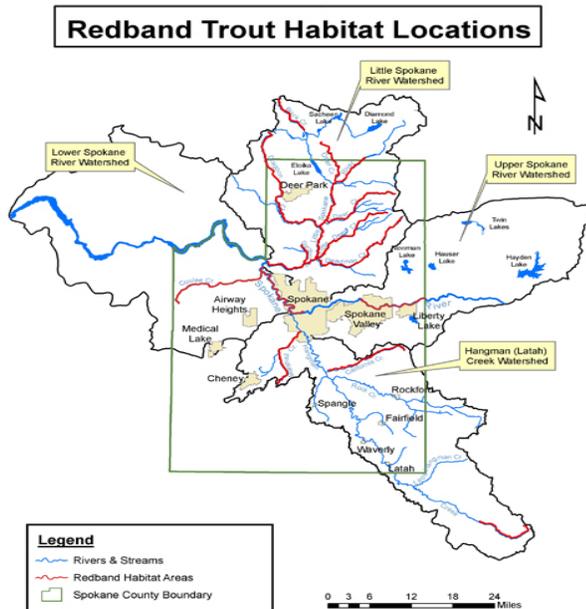


Redband trout populations within Nevada are estimated to occupy from 18 to 100 percent of their historical distribution, with nearly 650 miles of occupied habitat being found within

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the Owyhee, Bruneau and Salmon Falls River Basins.

### Range of the Redband Trout in the Upper Columbia River Basin –Spokane River Drainage



Currently, distribution of Redband trout is estimated to include only 54.7% of its historic range, with only 5.3% being occupied with strong populations. Small remnant populations are found throughout the Pacific Northwest and Great Basin in the U.S. and in British Columbia. Little is known about exact locations of existing resident interior redband populations.

The sub-species considered in this status review will include the following:

- McCloud River Redband and Sheepeaven Creek Redband (*O.M. ?*)
- Northern Great Basin Redband (*O.M. newberrii*)
- Upper Snake River Redband trout (*O.m.g*)
- Upper Columbia River Redband trout

Coastal Rainbow trout and/or anadromous steelhead trout are not considered in this status review and assessment.

### Habitat Requirements for the Redband trout:

Redband trout have evolved in a variety of habitats from montane forests to high desert stream environments that are characterized by unpredictable and intermittent flows, high summer water temperatures, high alkalinity, drought, and fire. As a result, they have historically been subject to naturally high levels of population fluctuation, and have evolved traits that allow them to survive in conditions inhospitable to other types of trout. Populations of redband trout in the Great Basin have been isolated for thousands of years and therefore have evolved distinct genetic lineages. Within the greater Redband range, two life history patterns have been identified for Redband trout: (1) stream resident (fluvial) and (2) lake resident (adfluvial). Stream resident (fluvial) populations of Redband spend their entire life cycles in flowing waters—they return to the headwaters of the streams they inhabit to spawn. The abilities of individuals to express all these life histories is often tied to climatic regimes, with fluvial life histories expressed during wet cycles and a reversion to resident life history during dry cycles. Spawning is often in the spring (Mar.-June), though they may reproduce at most any time of the year except summer. In the fall, Redband migrate to over-wintering areas within their streams. They eat mainly streamside and benthic macro-invertebrates in smaller stream habitat but also consume other fish when they occupy larger streams, rivers or lakes. When lacustrine habitat such as lakes and marshes is available, and migratory corridors connect it with surrounding streams, adfluvial populations of Great Basin redband trout flourish. These populations consist of trout that spend most of their life cycles in lakes and reservoirs, before returning to stream headwaters and tributaries within their native basin to spawn. This adfluvial form is much larger and more fecund than the fluvial form. Migratory juveniles of this life

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history type typically migrate downstream after one to three years to mature in lakes. Like other species of trout, redband trout abundance has been strongly correlated with riparian cover components, including undercut banks, large woody debris, and overhanging vegetation. Good Redband habitat is associated with higher gradient channels, often in riffles or with substrates dominated by boulders, cobbles, and pocket water. Redband trout also occupy lower gradient streams. Pools, which provide important holding and rearing habitat, resting places, over-wintering areas, and refuges from floods, drought, and extreme temperatures for juvenile and adult salmonids, should be available, and requirements for spawning include loose gravelly substrates to provide for oxygenation of stream water.

### **Concerns, Issues, or Obstacles relative to the Conservation and Improvement of the status of Redband Trout:**

#### **Population Viability Concerns:**

Although redband trout are widely distributed over a large geographic area, the effects of human activities over the past century have reduced their overall distribution, life history diversity 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. Decreased connectivity and increased isolation among populations is a concern from a genetic standpoint. Fish passage along migration routes that connect foraging, migrating, and over-wintering habitat with spawning tributaries are crucial to their life history and maintaining sufficient genetic variability. Fragmentation, isolation, and the resulting inability for populations to exchange individuals remains a potential obstacle to population viability.

#### **Habitat Concerns**

Redband trout habitat quality has suffered from the combined effects of agricultural practices, mining, livestock grazing, forest management, road construction, floodplain development, dams, diversions, and other human activities.

Major habitat concerns typically relate to:

- Modification and fragmentation of habitat, barriers to fish passage, entrainment, and thermal and chemical barriers due to dams and diversions
- Habitat degradation and alteration from land use practices
- Flow depletion and water manipulation due to drought, hydropower, and municipal and agricultural withdrawal
- Reduction in amount of suitable habitat resulting from climate change
- Sediment loading due to runoff from road construction and related land use activities
- Inadequate water quality (temperature, sediment, toxins)
- Secondary impacts of dams and reservoir pools in large river systems (i.e. hydropower entrainment, gas supersaturation, modification of flow patterns, creation of nonnative fish habitat).

#### **Nonnative or Introduced Species Concerns**

Introductions of nonnative species by the Federal government, State and Tribal fish and wildlife agencies, and private parties have occurred across the range of redband trout. These introductions have contributed to declines in abundance, local extirpations, and hybridization of redband trout. Among these, the non-native species causing the greatest concern are the rainbow trout that are widely used for supplementing and providing recreational fisheries. In addition, the use of hatchery fish to supplement anadromous fisheries has complicated the issue as well.

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Due to a lack of specific distribution and genetic information on the isolated redband populations, it is problematic to try to describe the extent of the hybridization or displacement of redband trout by introduced salmonids.

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

### **Opportunities for Improving Redband Trout status:**

The objective of redband 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 redband 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 redband trout can be grouped into several major categories, including:

- Protect, restore, and maintain suitable passage and habitat conditions for redband.
- Prevent and reduce negative effects of nonnative fishes and other nonnative taxa on redband trout.
- Establish fisheries management goals and objectives compatible with redband trout conservation and implement practices to achieve those goals.
- Characterize, conserve, and monitor genetic diversity and gene flow among local populations of redband 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 redband trout and their habitats.

### **Development of Watershed-based Redband Trout Restoration, Conservation, and Fishery Management Plans**

Redband trout conservation has generally followed a site-specific and opportunity-based approach, rather than a watershed-based approach, with varied results and accomplishments. With two nations, six States, multiple federal agencies, and numerous Tribes involved, it has been difficult to discern the “big picture” for redband trout population status and habitat condition without a concise status assessment or conservation agreement.

The basic premise of future efforts for Redband trout as listed below is to protect existing populations, and ensure the long-term persistence of RT within their historic range. In order to protect existing populations and help them persist over time, it will be necessary to increase numbers in some, and expand others.

### **Population Surveys, genetic analyses, and fish population manipulation**

At present, the current distribution and status of RT is lacking in some areas, and well-defined in others. There remains a need for additional assessment of redband trout status. Ideally, to the degree possible, status assessments should employ standardized methodologies to provide consistent and comparable results.

#### **Key actions include:**

Continue to locate and assess RT populations
Conduct standardized surveys to assess status and trend and genetic analyses to define population structure and identify introgression from hatchery fish.

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Expand RT populations through habitat restoration reintroductions, and non-native fish control in priority watersheds
Implement actions to protect core RT populations
Manage use of stocked fish to maintain genetic integrity of native populations
Develop interconnected populations that have open connectivity up and down stream segments and sub-basins where appropriate.

### RT Habitat Manipulations:

Habitat loss and fragmentation of current habitat, as well as isolation of existing populations, are the principal habitat issues facing Redband trout. Effective restoration of Redband trout habitat needs to not only include improvements in currently occupies areas but extend to the entire watershed . Current efforts to improve RT habitat have been directed toward improving in-stream conditions and restoring limited stream fragments, putting in place protective barriers to isolate key populations, and developing BMPs for use on land management areas in association with other native species.

### **Key actions include:**

Restore and improve altered channel and riparian zone habitats
Restore and enhance water flow , quality and sediment regimes and physical integrity of channels where feasible
Protection includes expansion of small, isolated populations where possible and maintaining or developing high quality habitats to prevent extirpation due to small population size or stochastic events
Provide passage at flow diversions and screen diversions to minimize entrainment.
Monitor and evaluate natural catastrophe impacts like fire and drought
Implement BMPs on FS, BLM, and private lands to benefit RT habitats

### Regulatory and Administrative Actions to enhance RT status:

Maintaining the sportfish status of the RT and utilizing regulations to control over-utilization will be an important component of maintaining the health of RT populations. In addition, working with others to maintain appropriate regulations for prevention of disease, water quality impairment, and habitat disturbance are important considerations.

### **Key Actions to be addressed:**

Provide technical information, administrative assistance, and financial resources to assure compliance with the listed objectives and encourage conservation of RT on private lands
Maintain and protect RT habitat from degradation by achieving compliance with existing habitat protection laws, policies, and guidelines
Enforce regulatory mechanisms that prevent impacts associated with recreational angling
Enhance and maintain regulatory mechanisms that prevent diseases or illegal introduction of nuisance species
Work through the FERC re-licensing process to require impoundment operators to operate dams minimize impacts where necessary to meet cooperative agreement objectives.

### Recommended Actions to improve the status of the Redband Trout:

**Upper Great Basin GMU - Highest Priority Watersheds and projects include:**

1) Develop and apply a monitoring and assessment program for Great Basin redband trout. Derived data will be used to assess status relative to state and federal management goals.

2) Develop a GIS-based sampling frame to provide statistically rigorous estimates of distribution, abundance, biological traits and

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stream habitat conditions at the population and species management level.

3) Develop habitat and population projects to improve the status of the Great Basin redband trout.

**Sacramento River Basin GMU** - Highest Priority Watersheds and projects include:

1) Conservation measures needed for the McCloud redband focus on the following objectives: (A) establish a McCloud redband refugium, (B) enhance and/or maintain habitat, and (C) maintain genetic integrity.

2) Completing the aforementioned Redband Trout Genetics Project with two major goals:

- The first goal is to determine if inland trout of northern California are genetically distinct from coastal rainbow and to delineate the most pure populations.
- The second goal is to determine if genetic differences support apparent meristic differences to a degree that warrants subspecies recognition.

The Animal Genomic Variation Laboratory at the University of California at Davis is currently (as of 2006) under contract to complete the genetic analysis and prepare scientific papers describing results.

**Upper Snake GMU** - Highest Priority Watersheds and projects include:

Limiting factors include riparian and aquatic habitat conditions, culvert barriers (connectivity) and competition/hybridization with non-native salmonids. Priorities for management will include improving connectivity of streams through culvert barrier removal and improvements in riparian and aquatic habitat, conducting non-native trout

removal projects, assessing redband trout genetics and monitoring angler use trends.

**Upper Columbia River GMU** - Highest Priority Watersheds and projects include:

**WNTI Completed projects:**

1. WNTI Redband Trout Status Workshop, and May 2009 Final Report – September 2009 - \$28,500.
2. Redband Trout Status and Protocol Evaluation in Washington State - \$75,132.
3. Crooked Creek - Klamath Basin Habitat Improvement - \$19,550
4. Honey Creek Diversion 2: Redband Trout Restoration and Warner Sucker Recovery - \$97,000.
5. Trout Creek CA Habitat Restoration - \$30,000.

### **References:**

1. Population Studies of Redband Trout: Genetic Investigation of Population Structure- FY2004 Progress Report. Idaho. 2004
2. Draft McCloud Redband Trout Conservation Agreement. 2007 California
3. Oregon native Fish Report. 2006. Oregon



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