

Summary

Conservation Status

Distribution

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Comprehensive Report: Record 1 of 3 selected.

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Rainbow Trout or Steelhead

Other Related Names: *Parasalmo mykiss*; *Salmo gairdneri*

Unique Identifier: AFCHA02090

Informal Taxonomy: Animals, Vertebrates - Fishes

- Bony Fishes - Salmon and Trouts



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Kingdom	Phylum	Class	Order	Family	Genus
Animalia	Craniata	Actinopterygii	Salmoniformes	Salmonidae	Oncorhynchus

Genus Size: C - Small genus (6-20 species)**Concept Reference:** Robins, C. R., et al. 1991. Common and scientific names of fishes from the United States and Canada. American Fisheries Society, Special Publishing 20. 183 pp.**Concept Reference Code:** B91ROB01NAUS**Name Used in Concept Reference:** *Oncorhynchus mykiss***Taxonomic Comments:** A highly variable species. Formerly known as SALMO GAIRDNERI, but this taxon is closely related to Pacific salmon and is conspecific with Asiatic steelhead (ONCORHYNCHUS MYKISS) (see Smith and Stearley 1989 and Robins et al. 1991).

"Redband" trout has been used as the name for nonanadromous populations adapted to harsh arid environments (Wishard et al. 1984); however, the term "redband" should not be used to imply a taxonomic relationship among all groups of rainbow trout in interior basins of Oregon and adjacent areas of Idaho, Nevada, and California (Wishard et al. 1984, Currens et al. 1990). Currens et al. (1990) found no evidence that all isolated groups of rainbow trout with plesiomorphic characteristics in the White River, Oregon desert basins, and northern California represent a monophyletic group.

Behnke (1992) included in *O. MYKISS* three major groups: (1) the redband trout of the Columbia River basin east of the Cascade Mountains, and in upper Fraser River basin and the Athabasca headwaters of the Mackenzie River basin (subspecies *GAIRDNERI*); (2) the redband trout of the Sacramento River basin, which he regarded as comprising two Kern River drainage subspecies (*AGUABONITA* and *GILBERTI*), plus the McCloud River subspecies (provisionally denoted as subspecies *STONEI*); and (3) the coastal rainbow trout (nominal subspecies *IRIDEUS* of North America and *MYKISS* of eastern Asia, though no known taxonomic characters separate *MYKISS* from *IRIDEUS*). Behnke concluded that other forms, such as the redband trout native to Oregon desert basins, Upper Klamath Lake, the Pit River drainage, and Eagle Lake, California, cannot be consistently distinguished from the three groups listed above. He noted that their classification is a matter of personal preference and professional judgment. However, in the same publication, he stated that "the trout specialized for lacustrine conditions in Klamath Lake...is well differentiated from other groups of both redband and coastal rainbow trout and could be recognized as a subspecies, *O. M. NEWBERRII*."

Hatchery rainbow trout derived mainly from coastal steelhead are widely stocked throughout the ranges of western trout (Behnke 1992). These hatchery fishes have led to hybridization with most populations of resident redband trout in the upper Sacramento River basin, the Oregon desert basins, and much of the Columbia River basin (Behnke 1992).

ONCORHYNCHUS MYKISS freely interbreeds with cutthroat trout (*O. CLARKI*) and Gila trout (*O. GILAE*), producing fertile offspring (Sublette et al. 1990).

Conservation Status**NatureServe Status****Global Status:** G5**Global Status Last Reviewed:** 12Sep1996

Global Status Last Changed: 12Sep1996**Rounded Global Status:** G5**Nation:** United States**National Status:**

N5

Nation: Canada**National Status:**

N5

U.S. & Canada State/Province Status

United States	Alabama (SNA), Alaska (S4), Arizona (SNA), Arkansas (SNA), California (SNR), Colorado (SNA), Connecticut (SNA), Delaware (SNA), Georgia (SNA), Hawaii (SNA), Idaho (S4), Illinois (SNA), Indiana (SNA), Iowa (SNA), Kansas (SNA), Kentucky (SNA), Maine (SNA), Maryland (SNA), Massachusetts (SNA), Michigan (SNA), Minnesota (SNA), Mississippi (SNA), Missouri (SNA), Montana (S5), Navajo Nation (SNA), Nebraska (SNA), Nevada (SNR), New Hampshire (SNA), New Jersey (SNA), New Mexico (SNA), New York (SNA), North Carolina (SNA), North Dakota (SNA), Ohio (SNA), Oklahoma (SNA), Oregon (S5), Pennsylvania (SNA), Rhode Island (SNA), South Dakota (SNA), Tennessee (SNA), Texas (SNA), Utah (SNA), Vermont (SNA), Virginia (SNA), Washington (S5), West Virginia (SNA), Wisconsin (SNA), Wyoming (SNA)
Canada	Alberta (S5), British Columbia (S5), Manitoba (SNA), New Brunswick (SNA), Newfoundland Island (SNA), Nova Scotia (SNA), Ontario (SNA), Prince Edward Island (SNA), Quebec (SNA), Saskatchewan (SNA)

Other Statuses**Implied Status under the U.S. Endangered Species Act:** PS**Comments on official statuses:** Subspecies WHITEI is listed by the USFWS as Threatened (as O. AGUABONITA WHITEI).

The following steelhead populations (ESUs) are listed under the U.S. Endangered Species Act: Endangered: Southern California, Upper Columbia River; Threatened: Central California Coast, South-Central California Coast, Snake River Basin, Lower Columbia River, California Central Valley, Upper Willamette River (winter run), Middle Columbia River. The Northern California steelhead ESU has been proposed as Threatened (NMFS 2000). ESUs proposed for listing under the U.S. Endangered Species Act (candidates): Oregon coast, Klamath Mountains Province.

McCloud River redband trout and Middle Columbia River Steelhead are Candidates for listing as under the U.S. Endangered Species Act.

NMFS (Federal Register, 14 May 1999) determined that listing of summer steelhead in the Middle Fork of the Eel River, California, is not warranted.

USFWS (1998) found that petitioned listing of redband trout as threatened or endangered in the Great Basin may be warranted; a status review was initiated. Part of the status review is the consideration of whether one or multiple ESUs would be recognized and listed. USFWS (Federal Register, 20 March 2000) determined that listing of Great Basin redband trout in southeastern Oregon, northeastern California, and northwestern Nevada is not warranted.

USFWS (2002) found that a petition to list *O. mykiss aguabonita* under the U.S. Endangered Species Act presented substantial information indicating that listing may be warranted; a status review was initiated.

NatureServe Conservation Status Factors**Estimated Number of Element Occurrences:**

Estimated Number of Element Occurrences Comments: In a survey of populations in the contiguous U.S., Huntington et al. (1996) identified 28 healthy native stocks of winter steelhead (20 in Washington, 7 in Oregon, 1 in California) and 6 healthy native stocks of summer steelhead, all in Oregon.

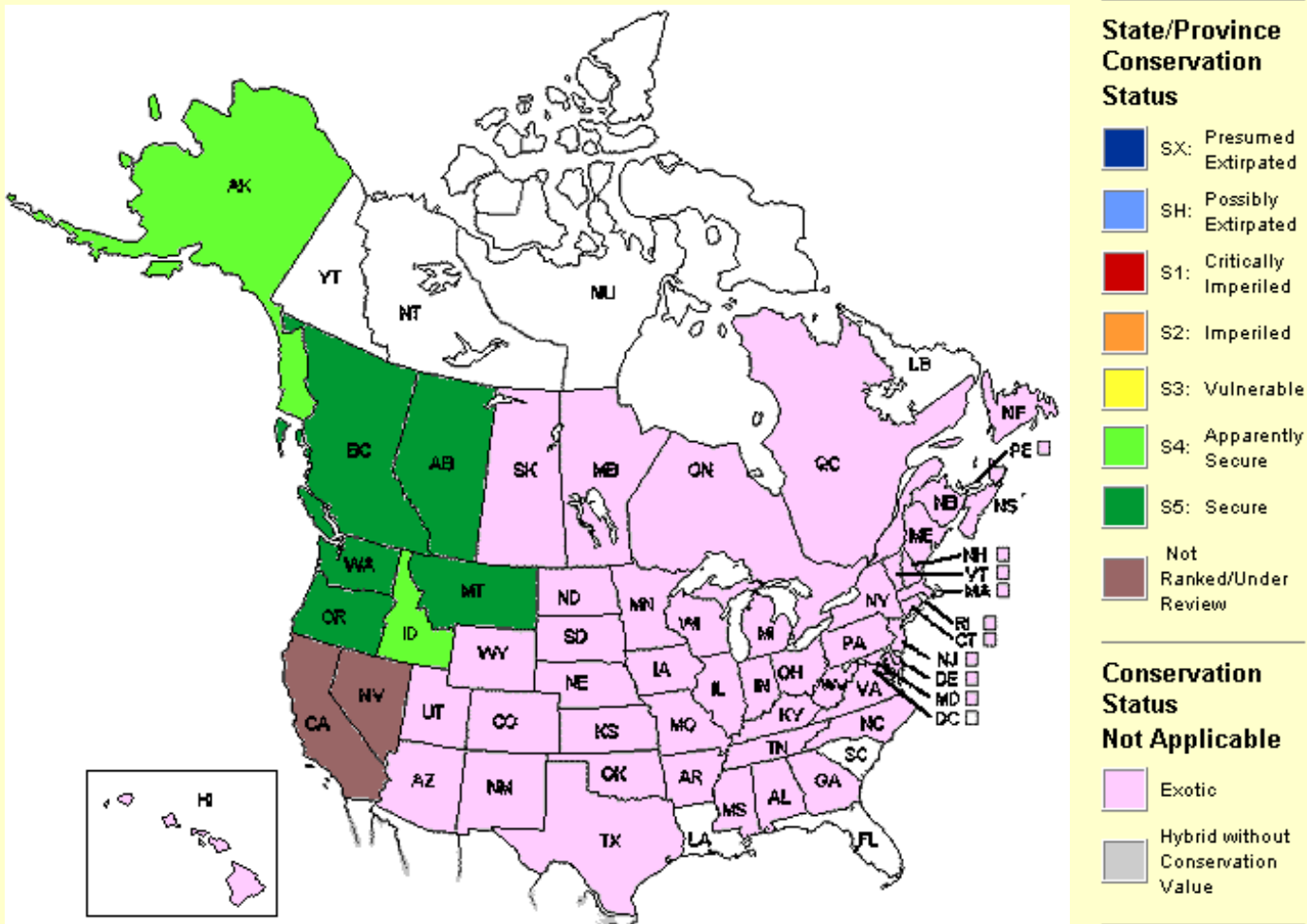
Global Short Term Trend:

Global Short Term Trend Comments: Of 867 steelhead stocks in British Columbia and Yukon, Slaney et al. (1996) categorized 9 as extirpated, 8 as high risk, 10 as moderate risk, 143 as special concern, 282 as unthreatened, and 415 as unknown status. Many winter steelhead populations are at very low levels; populations have declined in nearly all streams in central and southern California (see Nehlsen et al. 1991 for further details). On the Oregon coast, winter steelhead stocks from Siuslaw River north to Tillamook Bay appeared to be declining as of around 1990 (Nehlsen et al. 1991). In the Illinois River (tributary to the Rogue river), winter steelhead catches have declined since the mid-1970s (Nehlsen et al. 1991). Several winter steelhead populations in the Puget sound area of Washington have declined (Nehlsen et al. 1991).

Threats: On the Oregon coast, winter steelhead stocks from Siuslaw River north to Tillamook Bay appeared to be declining as of around 1990, possibly due to adverse ocean feeding conditions, widespread use of hatchery stock, predation by marine mammals, and ocean drift-net fishing (Nehlsen et al. 1991). In the Illinois River (tributary to the Rogue river), winter steelhead catches have declined since the mid-1970s, due to water withdrawals for irrigation (Nehlsen et al. 1991). In the Columbia River basin, all winter steelhead stocks were regarded by Nehlsen et al. (1991) as "at risk" or special concern; threatened by habitat damage, mainstem passage problems, and interactions with hatchery fish. Several winter steelhead populations in the Puget sound area of Washington have declined primarily as a result of habitat damage (water quality problems, siltation, and sedimentation); predation by sea lions has been reported as a problem for the Lake Washington population (Nehlsen et al. 1991). Whirling disease has caused population declines in some areas. The disease is caused by a protozoan pathogen (inadvertently introduced from Europe) and involves tubifex worms as one of the hosts. Brown trout are unaffected by the protozoan and serve as a reservoir.

Distribution

U.S. States and Canadian Provinces



Endemism: occurs (regularly, as a native taxon) in multiple nations

U.S. & Canada State/Province Distribution

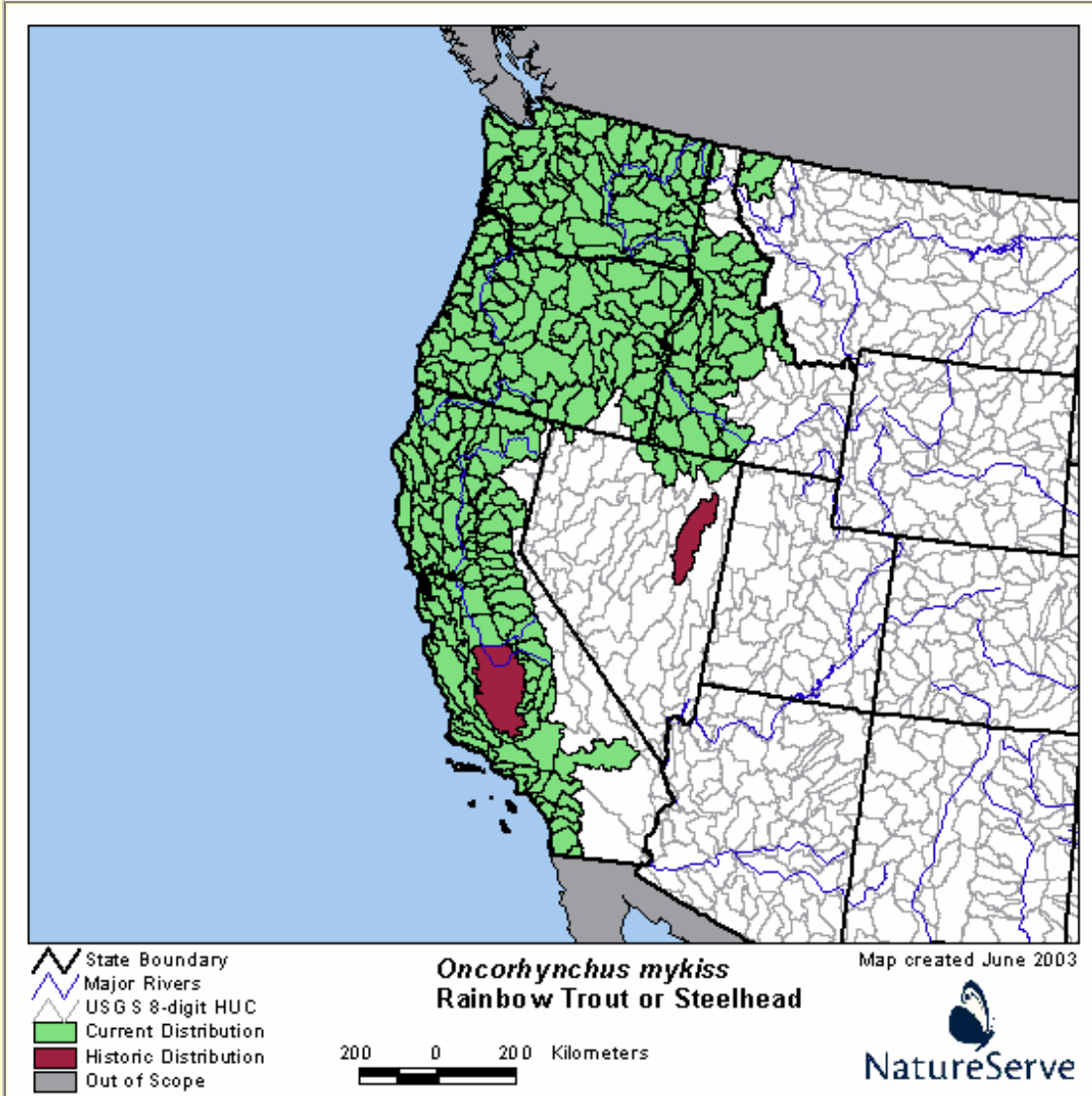
United States	AK, AL, AR, AZ, CA, CO, CT, DE, GA, HI, IA, ID, IL, IN, KS, KY, MA, MD, ME, MI, MN, MO, MS, MT, NC, ND, NE, NH, NJ, NM, NN, NV, NY, OH, OK, OR, PA, RI, SD, TN, TX, UT, VA, VT, WA, WI, WV, WY
Canada	AB, BC, MB, NB, NF, NS, ON, PE, QC, SK

Range Map

No map available.

Global Range Comments: Native to Pacific coast streams from Kuskokwim River, Alaska, south to northern Baja California; upper Mackenzie River drainage (Arctic basin), Alberta and British Columbia; endorheic basins of southern Oregon (Page and Burr 1991). Widely introduced and established in suitable habitats all over the world (Lee et al. 1980).

U.S. Distribution by Watershed (based on multiple information sources) ?



Economic Attributes

Economic Comments: Important game fish. Various populations have been cultured and introduced due to unique qualities (e.g., large lake form Kamloops; Eagle Lake rainbow, adapted to alkaline waters and usually piscivorous; Arlee strain, noted for fast growth, disease resistance, and high catchability (Sublette et al. 1990). Used in carcinogen testing (Metcalfe 1989).

Management Summary

Species Impacts: Smolt-to-adult survival of spring/summer run chinook salmon is negatively associated with releases of hatchery-reared steelhead in the Snake River (Levin and Williams 2002).

Management Requirements: A management concern in the West: keeping rainbow trout out of waters inhabited by native salmonids such as cutthroat trout and Gila trout so that the native species maintain their genetic integrity.

Allendorf et al. (1997) proposed criteria for prioritizing Pacific salmon stocks for conservation; data limitations introduce subjectivity into the process, so expert judgment and peer review should be incorporated into the process.

Ecology & Life History

Diagnostic Characteristics: Montana: both pure and moderately hybridized populations of westslope cutthroat trout have a high incidence of basibranchial teeth, whereas pure rainbow trout lack these teeth; presence of basibranchial teeth in some individuals of a rainbow trout population indicates hybridization with westslope cutthroat trout (Leary et al. 1996).

Reproduction Comments: Spawns usually in spring (February-June), or later depending on water temperature and location. Lays 200-9000 eggs (Wydoski and Whitney 1979), which hatch in 3-4 weeks at 10-15 C. Fry emerge from gravel 2-3 weeks after hatching. Many are sexually mature in 2-3 years. See Stearley (1992) for a discussion of the historical ecology and life history evolution of Pacific salmon and trouts (ONCORHYNCHUS).

Ecology Comments

Normal life span 5-6 years (Simpson and Wallace 1982). Predation by Caspian terns and double-crested cormorants causes significant mortality of juvenile steelhead in the Columbia River estuary (Ryan et al. 2003). Aggressively defends feeding territories in streams. Has caused contraction of range of native brook trout in southern Appalachian Mountains region (Larson and Moore 1985).

Habitat Type: Freshwater

Non-Migrant: Y

Locally Migrant: Y

Long Distance Migrant: Y

Mobility and Migration Comments: Anadromous forms migrate up to at least hundreds of miles between spawning streams and nonspawning marine waters. Stream-dwelling trout may spend an entire life in few hundred meters of stream (Moyle 1976). Lake-dwelling trout typically migrate to tributaries to spawn.

Marine Habitat(s): Near shore, Pelagic

Estuarine Habitat(s): Bay/sound, Lagoon, River mouth/tidal river

Riverine Habitat(s): BIG RIVER, CREEK, High gradient, Low gradient, MEDIUM RIVER, Moderate gradient, Pool, Riffle

Lacustrine Habitat(s): Deep water, Shallow water

Special Habitat Factors: Benthic

Habitat Comments: Capable of surviving in a wide range of temperature conditions. Does best where dissolved oxygen concentration is at least 7 ppm. Anadromous populations occur in coastal rivers. Resident populations now inhabit small headwater streams, large rivers, lakes, or reservoirs; often in cool clear lakes and cool swift streams with silt-free substrate. In streams, deep low velocity pools are important wintering habitats (Sublette et al. 1990).

Usually requires a gravel stream riffle for successful spawning. Lake populations move to tributaries to spawn. Eggs are laid in gravel in a depression made by the female. Salinity of 8 ppt is the upper limit for normal development of eggs and alevins (Morgan et al. 1992).

Adult Food Habits: Invertivore, Piscivore

Immature Food Habits: Invertivore, Piscivore

Food Comments: In lakes, feeds mostly on bottom-dwelling invertebrates (e.g., aquatic insects, amphipods, worms, fish eggs, sometimes small fish) and plankton. In streams, feeds primarily on drift organisms. May ingest aquatic vegetation (probably for attached invertebrates). Diet changes seasonally. In the ocean, the diet consists of fishes and crustaceans.

Phenology Comments: May feed at any time throughout a 24-hour period, but usually feeds most actively around dusk.

Length: 100 centimeters

Population/Occurrence Delineation

Group Name: FISHES WITH ANADROMOUS POPULATIONS

Use Class: Freshwater

Subtype(s): Spawning & Rearing Area, Rearing & Migration Area

Minimum Criteria for an Occurrence: Occurrences are based on evidence of historical presence, or current and likely recurring presence, at a given location. Such evidence minimally includes collection or reliable observation and documentation of one or more individuals (including eggs and larvae) in appropriate habitat. For anadromous populations, occurrences are based on collection or reliable observation and documentation of one or more spawning adults, redds, other evidence of spawning, or larvae or juveniles in appropriate spawning/rearing habitat.

Mapping Guidance: Conceptually, the occurrence includes the entire freshwater area used by the population, including spawning, rearing, and migration areas. For anadromous populations, an occurrence should extend from the most upstream spawning areas downstream to the ocean. However, it is desirable (and practical) to subdivide this sometimes very large occurrence, sometimes overlapping with many other spaghetti-like occurrences extending down from the upstream spawning areas to the ocean, into separate source features or sub-occurrences, labeled with a feature label that reflects the life history stage in that area. Moreover, it may make practical sense to treat the areas downstream of spawning and/or rearing areas as a mixed element animal assemblage: Freshwater Salmon Migration Corridor. This negates the need to separately map each occurrence down to the ocean from its upstream spawning location. Information about areas with different life-history uses can be generated by using best professional judgment by district or regional fish biologists and may or may not incorporate specific locational information from spawning surveys or other surveys.

Separation Barriers: Dam lacking a suitable fishway; high waterfall; upland habitat.

Alternate Separation Procedure: For anadromous populations and migratory populations that have distinct and separate spawning and nonspawning areas, the area used by each population whose spawning area is separated by a gap of at least 10 stream-km from other spawning areas within a stream system is potentially mappable as a distinct occurrence that extends down to the ocean (but see mapping guidance), regardless of whether the spawning areas are in the same or different tributaries.

For other (e.g., nonanadromous) populations in streams, separation distance is 10 stream-km for both suitable and unsuitable habitat. However, if it is known that the same population occupies sites separated by more than 10 km (e.g., this may be common for migratory, nonanadromous populations), those sites should be included within the same occurrence. In lakes, occurrences include all suitable habitat that is presumed to be occupied (based on expert judgment), even if documented collection/observation points are more than 10 km apart. Separate sub-occurrences or source features may usefully document locations of critical spawning areas within a lake.

Separation Justification: The separation distance is arbitrary but was selected to ensure that occurrences are of

manageable size but not too small. Because of the difficulty in defining suitable versus unsuitable habitat, especially with respect to dispersal, and to simplify the delineation of occurrences, a single separation distance is used regardless of habitat quality.

"Restricted movement is the norm in populations of stream salmonids during nonmigratory periods," but there is considerable variation in movements within and among species (Rodriguez 2002). Redband trout in Montana had October-December home ranges of 5-377 m, consistent with small movements observed for radio-tagged brook trout and cutthroat trout during fall and winter (Muhlfeld et al. 2001). For nonanadromous populations, little is known about juvenile dispersal (e.g., how far fishes may move between their embryonic developmental habitat and eventual spawning site).

In summer and fall, radio-tagged cutthroat trout in Strawberry Reservoir in Utah had single-month home ranges that were usually about 3-4 km in maximum length (Baldwin et al. 2002). In the Blackfoot River drainage, Montana, radio-tagged westslope cutthroat trout moved 3-72 km (mean 31 km) to access spawning tributaries (Schmetterling 2001). This indicates that migratory but nonanadromous populations may use extensive areas and that one should not invoke the 10-km separation distance without considering the full extent of the population.

Date: 11Mar2003

Author: Hammerson, G., and L. Master

Notes: This Specs Group comprises fish species that include anadromous populations (may also include nonanadromous populations), such as lampreys, sturgeons, herrings, shads, salmonids, and smelts.

Criteria for marine occurrences (Location Use Class: Marine) have not yet been established. These may not be needed for marine occurrences of species that likely will be dealt with as mixed element assemblages (e.g., Salmonid Marine Concentration Area).

Feature Descriptor Definitions:

Spawning Area: area used for spawning but not for rearing or migration.

Rearing Area: area used for larval/juvenile development but not for spawning or migration.

Migration Corridor: area used for migration but not for rearing or spawning.

Population/Occurrence Viability

Authors/Contributors

Management Information Edition Date: 12Dec2002

Element Ecology & Life History Edition Date: 05Jan2004

Element Ecology & Life History Author(s): Hammerson, G.

Zoological data developed by NatureServe and its network of natural heritage programs (see [Local Programs](#)) and other contributors and cooperators (see [Sources](#)).

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NatureServe. 2005. NatureServe Explorer: An online encyclopedia of life [web application]. Version 4.4. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: May 18, 2005).

Citation for Bird Range Maps of North America:

Ridgely, R.S., T.F. Allnutt, T. Brooks, D.K. McNicol, D.W. Mehlman, B.E. Young, and J.R. Zook. 2003. Digital Distribution Maps of the Birds of the Western Hemisphere, version 1.0. NatureServe, Arlington, Virginia, USA.

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Citation for Mammal Range Maps of North America:

Patterson, B.D., G. Ceballos, W. Sechrest, M.F. Tognelli, T. Brooks, L. Luna, P. Ortega, I. Salazar, and B. E. Young. 2003. Digital Distribution Maps of the Mammals of the Western Hemisphere, version 1.0. NatureServe, Arlington, Virginia, USA.

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NOTE: Full metadata for the Bird Range Maps of North America is available at:

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