Scientific Name: *Oncorhynchus gilae*
Common Name: Gila trout
BISON No.: 010600

Legal Status:

- Arizona, Species of Special Concern
- ESA, Endangered
- ESA, Proposed Endangered
- ESA, Proposed Threatened
- ESA, Threatened
- New Mexico-WCA, Endangered
- New Mexico-WCA, Threatened
- USFS-Region 3, Sensitive
- None

Distribution:

- Endemic to Arizona
- Endemic to Arizona and New Mexico
- Endemic to New Mexico
- Not Restricted to Arizona or New Mexico
- Northern Limit of Range
- Southern Limit of Range
- Western Limit of Range
- Eastern Limit of Range
- Very Local

Major River Drainages:

- Dry Cimmaron River
- Canadian River
- Southern High Plains
- Pecos River
- Estancia Basin
- Tularosa Basin
- Salt Basin
- Rio Grande
- Rio Mimbres
- Zuni River
- Gila River
- Rio Yaqui Basin
- Wilcox Playa
- Rio Magdalena Basin
- Rio Sonoita Basin
- Little Colorado River
- Mainstream Colorado River
- Virgin River Basin
- Hualapai Lake
- Bill Williams Basin

Status/Trends/Threats (narrative):

Federal (USDI): Endangered, State NM: Threatened, State AZ: Endangered
The presently known distribution of the Gila trout definitely includes only 3 or 4 high-elevation creeks in NM (**Regan 1966**). Native populations of Gila trout occur in Main Diamond, South Diamond, McKenna, and Iron creeks and Spruce Creek, all located in New Mexico (Behnke 1992). Currently, nonnative rainbow trout and brown trout inhabit most streams within the historic range of Gila trout (Propst 1999).
The decline of Gila trout in New Mexico has been the result of habitat degradation, hybridization with rainbow trout and cutthroat trout, and competition with brown and other trout species (Minckley 1973, Behnke and Zahn 1976, Sublette et. al. 1990, Minckley 1991). Threats to habitat include overgrazing, fires, timber harvest, and mining (Sublette et. al. 1990, Minckley 1991).

Extensive montane logging in the US and Mexico, has opened stream channels to direct sunlight, altered patterns of organic input, and increased erosion and sedimentation (Minckley 1991). Extensive stocking of rainbow trout throughout the upper Gila basin has resulted in very few populations of pure Gila trout existing today (Minckley 1973, Behnke and Zahn 1976). The remaining populations of pure Gila trout are isolated by barriers in small headwater streams (Behnke and Zahn 1976). In Main and South Diamond creeks only normally dry reaches of stream separate Gila trout from nonnative salmonids, which both hybridize and compete with Gila trout for food and space (Rinne 1980). A policy of not stocking nonnative salmonids into stream reaches supporting Gila trout has been followed by the New Mexico Dept. of Game and Fish since 1923 (**Miller 1950**).

Distribution (narrative)**:**

The distribution of Gila trout before European colonization of the region is not known with certainty (Behnke 1992). Gila trout formerly occurred in suitable habitat in much of the Gila River drainage, New Mexico and Arizona, but when described in 1950, it was restricted to a few remote headwater streams (Propst et. al. 1992). Koster (1957) reported that Gila trout were found in a few smaller headwaters of the Gila and San Francisco rivers, and it is believed that they occupied a much greater area in the Gila basin in former times. The Gila trout apparently were originally present in the tributaries of the Verde River and probably the Agua Fria drainages, both are tributaries to the Salt River segment of the Gila River basin in central Arizona, and otherwise occurred in the headwaters of the upper Gila River in New Mexico (Minckley 1973, Behnke and Zahn 1976, Minckley 1991). Until recent years, Gila trout population centers were disjunct, one in western New Mexico, and the other in central Arizona (Behnke 1992). Behnke and Zahn (1976) cited the occurrence of trout similar to Gila trout from the Rio Yaqui of Mexico, as basin contiguous with the Gila River system.

Key Distribution/Abundance/Management Areas:

Panel key distribution/abundance/management areas:

Breeding (narrative)**:**

Spawning typically occurs in April when water temperatures are 10-12^{o} C (Propst and Stefferud 1997) but may extend into May or June (Rinne 1980, Sublette et. al.1990, Minckley 1991). Rinne (1980) reported that stream flow and water temperature interact to induce spawning activity; however, temperature appears to be more critical. Substrate composition of materials in redds of Gila trout are most commonly small pebbles and gravel material (Rinne 1980). Redd construction and spawning occurs as early as March in lower elevation streams and incubation and emergence can occur in less than eight weeks in warmer water temperatures (Sublette et. al.1990). Most spawning activity (>50%) activity occurs between 1300 and 1600 hours in McKnight and Main Diamond creeks (Rinne 1980). Numbers of eggs produced by female Gila trout are small, and fewer than 200 and average 150 eggs per female (Minckley 1973). After fertilization and

deposition, the eggs develop among the pebbles and gravel of redd, and the young Gila trout fry emerge within several weeks (Propst 1999). Gila trout live only 3-5 years, but few individuals may live 6-8 years (Propst 1999).

Habitat (narrative)**:**

The Gila trout currently is restricted to small headwater streams (Propst 1999). Gila trout inhabit clear runs in mountain streams that are typically narrow and shallow, however, during prolonged drought; Gila trout may be confined to pools (Sublette et. al. 1990). Large Gila trout live in pools, while smaller individuals remain near obstructions or other cover such as overhanging trees or brush in runs and riffles (Minckley 1991). Pools serve as refugia during periods of low flow in winter and summer (Propst and Stefferud 1997). Cover has been demonstrated to be generally important to trout populations (Rinne 1980).

Key habitat components: Riffles, pools, cold (< 20C) water, clean substrates.

Breeding Season:

- January
- February
- March
- April
- May
- June
- July
- August
- September
- October
- November
- December

Panel breeding season comments:

Aquatic Habitats:

Large Scale:

- Rivers
- Streams
- Springs
- Spring runs
- Lakes
- Ponds
- Sinkholes
- Cienegas
- Unknown
- Variable

Small Scale:

- Runs
- Riffles
- Pools
- Open Water
- Shorelines

Panel comments on aquatic habitats:

Important Habitat Features (Water characteristics):

Current
- Fast (> 75 cm/sec)
- Intermediate (10-75 cm/sec)
- Slow (< 10 cm/sec)
- None
- Unknown
- Variable

Gradient
- High gradient (>1%)
- Intermediate Gradient (0.25-1%)
- Low Gradient (<0.25%)
- None
- Unknown
- Variable

Water Depth
- Very Deep (> 1 m)
- Deep (0.25-1 m)
- Intermediate (0.1-0.25 m)
- Shallow (< 0.1 m)
- Unknown
- Variable

Panel comments on water characteristics:

Important Habitat Features (Water Chemistry)

Temperature (general)
- Cold Water (4-15°C)
- Cool Water (10-21°C)
- Warm Water (15-27°C)
- Unknown
- Variable

Turbidity
- High
- Intermediate
- Low
- Unknown
- Variable

Conductivity
- Very High (> 2000 µS/cm)
- High (750-2000 µS/cm)
- Intermediate (250-750 µS/cm)
- Low (< 250 µS/cm)
- Unknown
- Variable

Panel comments on water chemistry:

Important Habitat Features (Structural elements):

Substrate
- Bedrock
- Silt/Clay
- Detritus
- Sand
- Gravel
- Cobble
- Boulders
- Unknown
- Variable

Cover
- Rocks, boulders
- Undercut banks
- Woody debris
- Aquatic vegetation
- Rootwads
- Not important
- Overhanging vegetation
- Unknown
- Variable

Panel comments on structural elements:

Diet (narrative)**:**

Gila trout is piscivorous and cannibalism may occur in nature when food is scarce (Rinne 1980). The major foods taken by Gila trout are aquatic insects, with occurrences and abundances of the various kinds in stomachs well correlated with the abundances of insect groups in the stream (Minckley 1973). Caddisflies, mayflies, true flies, and beetles are the most important food items (Minckley 1973, Sublette et. al. 1990), but larger individuals may also consume other fish species or young Gila trout (**Van Eimeren 1988**).

Diet category (list):

- Planktivore
- Herbivore
- Insectivore
- Piscivore (Fish)
- Omnivore
- Detritivore

Grazing Effects (narrative):

No specific studies of the effects of grazing on Gila trout have been conducted, however, excessive grazing in time and space within riparian areas potentially could result in stream bank alteration and loss of associated cover. Equally, any grazing strategy that excessively removes vegetation from the watershed could result in increased fine input to stream gravels used as spawning substrates and rearing areas for aquatic macroinvertebrates that serve as food for Gila trout with the terrestrial-aquatic interface.

Panel limiting habitat component relative to grazing and comments:
Panel assessment: Is this species a priority for selecting a grazing strategy? Throughout the species' distribution in New Mexico and Arizona YES NO UNKNOWN In key management area(s) YES NO UNKNOWN

Principle Mechanisms Through Which Grazing Impacts This Species (list):

May be Revised

- Alteration of bank structures
- Alteration of substrate
- Alteration of water regimes
- Altered stream channel characteristics
- Altered aquatic vegetation composition
- Altered bank vegetation structure
- Change in food availability
- Change in water temperature
- Change in water quality
- Habitat fragmentation
- Increased turbidity
- Other biotic factors
- Parasites or pathogens
- Population genetic structure loss
- Range improvements
- Trampling, scratching
- Unknown

Panel causal mechanisms comments:

Authors

- **Draft:** Rinne, J.N and Magaña, H.A.
- **GP 2001:**
- **GP 2002:**
- **Revision:**

Bibliography:

Behnke, R.J. 1992. Native trout of Western North America. American Fisheries Society. Bethesda, MD. 275 pp.

Behnke, R.J. and Zahn, M. 1976. Biology and management of threatened and endangered western trouts. USDAFS General technical report RM-28. pp 36-41.

Koster, W.J. 1957. Guide to the fishes of New Mexico. The University of New Mexico Press. Albuquerque, New Mexico.

Minckley, W. L. 1973. Fishes of Arizona. Arizona Game and Fish Department. Phoenix, Arizona. 293 pp.

Propst, D.L., Stefferud, J.A., and Turner, P.R. 1992. Conservation and status of Gila trout, *Oncorhynchus gilae*. The Southwestern Naturalist 37 (2):117-125.

Propst, D. L. 1999. Threatened and endangered fishes of New Mexico. New Mexico Game and Fish Technical Report 1. Santa Fe, New Mexico. 84 pp.

Rinne, J. N. 1980. Spawning habitat and behavior of Gila trout a rare salmonid of the southwestern United States. Trans. Amer. Fish. Soc. 109:83-91.

Sublette, J. E., M. D. Hatch, and M. Sublette. 1990. The fishes of New Mexico. The University of New Mexico Press, Albuquerque.