Scientific Name: *Poecilliopsis occidentali*
Common Name: Gila topminnow
BISON No.: 010565

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, (USFS): Sensitive Region 3, State AZ: Wildlife of concern (threatened), State NM: Threatened.

The Gila topminnow is extinct is most of its native range (Minckley and Deacon, 1968), or greatly reduced in range and abundance (Minckley 1969, Minckley 1973). The endangered Gila topminnow has steadily declined in distribution and abundance in the past several decades, and currently survives in the United States only in several isolated localities in southern Arizona (Meffe et al 1983). The Gila topminnow is currently widespread and abundance throughout its range in Mexico (Hendrickson et al. 1981).

Habitat loss such as stream desiccation, wetland draining, and arroyo cutting contributed considerably to the decline of the Gila topminnow (Minckley, 1973). Habitats deemed to be

stable and secure from extirpation are all isolated springs, artesian wells, or stream segments protected by barriers such as falls or long (>50 km) reaches of dry streambeds (Meffe et al 1983). Most low desert streams are diverted by dams in their headwaters (Minckley 1991), and damming or diversion of rivers, groundwaters pumping with subsequent lowering or disappearance of surface water have eliminated suitable habitats (Meffe et al 1983, Propst 1999). Pumpage for irrigation and other uses has lowered water tables more than 50 m in most valleys and more than 200 m in some, and beheading of streams by impoundment in montane parts of the watersheds prevents aquifer recharge (Minckley 1991). Competition with introduced fishes, or predation by introduced fishes all have greatly reduced populations of the Gila topminnow (Meffe et al 1983, Propst 1999). Disappearance of the Gila topminnow seems most closely related to the spread of an introduced livebearer, the western mosquitofish (*Gambusia affinis*) (Minckley 1969). The introduced western mosquito fish typically replaces the Gila topminnow when they come into contact, resulting in demise of Gila topminnow populations (Lee et al 1981). Since the topminnow and mosquitofish are similar in size, shape and habits, competition for food or for living space may also be involved in the extinction of Gila topminnow whenever the western mosquitofish appears (Minckley 1969). In small waters, such as ponds, displacement or destruction of the Gila topminnow by mosquitofish may occur in a single season (Minckley 1973). Most instances appear to involve direct predation by mosquitofish on young of Gila topminnow, and some direct predation on adults including devouring of the small male topminnows by large female mosquitofish, and shredding of fins of larger topminnows, which often is followed by secondary infections and death (Minckley 1973).

Distribution (narrative)**:**

Topminnows in both the Colorado and Yaqui basins are found from near 1500 m to sea level, although high-altitude occurrences are most commonly associated with outflows of springs (Minckley 1991). In the Rio Yaqui basin, the Gila topminnows were formerly widespread in low-elevation (<1,800 m) aquatic habitats throughout much of the arid American Southwest (Minckley et al 1977). The Gila topminnow is the northernmost member of the genus *Poeciliopsis* (Meffe et al 1983). Two forms of Sonoran topminnows occur in the United States: *P. o. occidentalis* (Gila topminnow) formally occupied lowland streams in the Gila River system of Arizona and New Mexico and *P. o. sonoriensis* (Girard) (Yaqui topminnow) extends north in the Rio Yaqui basin to Arizona from its wider range in Mexico (Koster, 1957, Minckley 1969, Meffe et al 1983, Minckley 1991). Currently, in Arizona the Gila topminnow naturally occurs only as 11 scattered, isolated populations (Weedman and Young, 1997).

Key Distribution/Abundance/Management Areas:

Panel key distribution/abundance/management areas:

Breeding (narrative)**:**

Spawning by Gila topminnow in its current range occurs from January through August, but a few pregnant females are present throughout the year, and young are produced, even in winter (Minckley, 1973). During summer months when spawning activity is intense, population densities of Gila topminnow may become quite high (Weedman and Young, 1977). Gila topminnows produce young throughout the year in constant temperature habitats at northern limits of range, and presumably do so in diverse habitats at southern limits otherwise it exhibits prolonged, spring through summer reproduction (Schoenherr 1977, Lee et al 1981, Minckley 1991). Gila topminnows in Arizona have distinct seasonal reproductive cycles with cessation of births in winter only in those habitats with varying temperatures (Schoenherr 1977). Under optimum conditions in the laboratory, *Poeciliopsis* produces up to 10 broods per year at intervals of 7-14 days (Schultz 1961).

Gila topminnows practice internal fertilization and development of young, and a female can store sperm, so a single sex act can serve to fertilize eggs throughout her life (Minckley 1991). Numbers of offspring (1 to 15 per brood) carried by those live-bearing fishes varied with size of females, nature of habitat, and season of the year (Schoenherr 1977) the broods are largest in April and May (Minckley 1973, Schoenherr 1977). Females usually have two broods developing simultaneously, with one far less advanced than the other (Schoenherr 1977). In the peak of the breeding season, about 98 per cent of the females longer than 24 mm standard length are pregnant (Minckley 1973, Schoenherr 1977). Reproduction of Gila topminnows is influenced by density dependent phenomena such as resources and predation as well as density independent phenomena such as temperature and photoperiod (Schoenherr 1977). In areas with lower resources, less energy is available for the reproductive function, and individuals produce fewer offspring but each with consistently higher fitness (Constantz 1974).

Topminnows in the lowermost Rio Yaqui include one kind that differs markedly from most other fishes in its mode of reproduction in that they have developed systems where males do not exist (Minckley 1991). Females breed with another kind of topminnow male, producing all female offspring of hybrid origin (Minckley 1991).

Habitat (narrative)**:**

Typical habitat of Gila topminnow includes relatively shallow (<20 cm) warm water (generally >20°C) small streams or marginal areas of larger more permanent water sources, constantly flowing springs, marshes (cienegas), and permanent and intermittent streams (Deacon and Minckley 1972, Minckley et al 1977). Topminnows live near the surface in shallow water, and are often associated with aquatic vegetation or other cover (Minckley 1991).

Adults tend to congregate in areas of moderate current, below riffles and along the margins of flowing intermittent (Minckley 1973). In its broad historic range in the Gila River system, the Gila topminnow probably was most common in protected stream shoreline habitats where water velocity was slow, shallow depth, water temperatures warm (typically >20°C), and aquatic vascular plants common (Minckley, 1973).

Key Habitat Components: Springs, cienegas, small streams, slow current and aquatic vegetation.

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)**:**

The Gila topminnow feeds on detritus, algae, and aquatic invertebrates when available (Lee et al 1981). Foods of the Gila topminnow in their present habitats consist mostly of bottom debris, vegetable material, and amphipod crustaceans (Minckley 1973). Gila topminnows feed voraciously upon aquatic insect larvae, such as mosquito larvae, microscopic plants, and sometimes detrital materials (Minckley 1973, Minckley 1991).

Diet category (list):

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

Grazing Effects (narrative):

The Gila topminnow could be especially vulnerable to grazing impacts. Trampling and fowling of small springs and removal of vegetation and trampling in cienegas could be very detrimental to local populations.

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

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