

**ARIZONA GAME AND FISH DEPARTMENT  
HERITAGE DATA MANAGEMENT SYSTEM**

**Animal Abstract**

**Element Code:** AFCNC05021

**Data Sensitivity:** No

**CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE**

**NAME:** *Poeciliopsis occidentalis occidentalis*

**COMMON NAME:** Gila Topminnow

**SYNONYMS:** *Heterandria occidentalis*, *Girardinus occidentalis*, *Girardinus sonoriensis*, *Poecilia occidentalis*, *Mollienisia occidentalis*, *Arizonichthys psammophilus*

**FAMILY:** Poeciliidae

**AUTHOR, PLACE OF PUBLICATION:** Baird, S.F. and C. Girard. 1853. Descriptions of new species of fishes collected by Mr. John H. Clark, on the U.S. and Mexican Boundary Survey, under Lt. Col. Jas. D. Graham. *Proceedures of the Academy of Natural Sciences*, Philadelphia, 6:387-390.

**TYPE LOCALITY:** Santa Cruz River, near Tucson, Arizona.

**TYPE SPECIMEN:**

**TAXONOMIC UNIQUENESS:** Two species in the genus in North America, only species in genus in Arizona, two subspecies in genus in Arizona, *P.o. occidentalis* and *P.o. sonoriensis*.

**DESCRIPTION:** Dorsal profile slightly curved, body somewhat elongated. Caudal fin rounded to almost square. Gonopodium of male elongated, reaching past snout when in copulatory position. Males small, rarely more than 25.0 mm (0.98 in.) standard length; females larger, sometimes 50.0 mm (1.97 in.) or more, usually 30.0 to 45.0 mm (1.18 to 1.77 in.), standard length (Minckley 1973).

Body tan to olivaceous, darker above, and often white on belly. Scales on dorsum darkly outlined, extending as black speckles to upper belly and pre-pectoral area; lateral band dark and continuous along sides. Fins with rays outlined with melanophores, but lacking dark spots. Breeding males blackened, with some golden in midline of predorsum, and orange at base of gonopodium and sometimes at base of dorsal fin. Females in breeding condition with darkened peritroct (Minckley 1973).

**AIDS TO IDENTIFICATION:** The two subspecies of topminnows can be distinguished by several morphological characteristics. In *P.o. occidentalis* the snout is short, the mouth subsuperior and the dark lateral band of the female extends from the opercle to the base of the caudal fin. In *P.o. sonoriensis* the snout is longer, the mouth superior and the lateral band of

the female rarely begins before the base of the pelvic fins (Minckley 1973, in Stefferud 1982). In addition, *P.o. sonoriensis* is found at the headwaters of the Yaqui River, whereas *P.o. occidentalis* is found below the headwaters (AGFD Native Fish Diversity Review 1995).

Female topminnow may be distinguished from mosquitofish (*Gambusia affinis*) by lack of dark spots on caudal fin and lack of dark sub-orbital teardrop-shaped mark; origin of dorsal and anal fin vertically in line, perpendicular to horizontal axis of fish, in mosquitofish origin of dorsal fin posterior to origin of anal fin. Male topminnow in breeding condition may or may not become dark black, male mosquitofish never do; male topminnow gonopodium, when extended forward in copulatory position, extends very near to or past snout, male mosquitofish does not. Topminnow have weak, spatulate teeth whereas mosquitofish have strong conically shaped teeth, distinguishable only with a microscope. Female topminnow are generally larger than males.

**ILLUSTRATIONS:** B&W photo (Minckley 1973:199)  
Color photos (Rinne and Minckley 1991:26)  
Color line drawing (Page and Burr 1991:239)  
B&W photo (Wildlife Habitat Management Staff Group 1975:31)

**TOTAL RANGE:** Once occupied aquatic habitats in the Gila River drainage in New Mexico, Arizona and Mexico below 1,524 m (5,000 ft.) in elevation. Present existence of the species in known ranges of Mexico, have been impacted by mosquitofish. Presently in Arizona, they are known to occupy several localities in the Gila River drainage, and one locality in the Bill Williams River drainage. Some of these localities contain re-introduced populations.

**RANGE WITHIN ARIZONA:** Historically found in most perennial springs, streams and vegetated margins of rivers in the Gila River drainage in Yavapai, Gila, Pinal, Maricopa, Graham, Greenlee, Cochise, Pima, Santa Cruz and Yuma Counties. Currently, disjunct populations exist in 9-11 natural locations and 22-24 re-introduced locations within the Gila River drainage and one location in the Bill Williams River drainage (Yerba Mansa). Of these localities, 15 are springs while the remaining localities are creeks and washes.

## **SPECIES BIOLOGY AND POPULATION TRENDS**

**BIOLOGY:** At one time this was the most common fish found in the Gila River Basin. Competitive and predatory interactions with introduced fish species, especially mosquitofish, have greatly reduced the range and abundance of the Gila topminnow. The rapid replacement of topminnow by introduced mosquitofish has been impressively documented at many localities; however, in some diverse habitats the two fishes have been able to co-exist for many years. In most instances, replacement occurs through direct predation by mosquitofish on young and small Gila topminnow, including shredding of the fins of larger topminnow which leads to increased risk of infection. Populations of Gila topminnow historically expanded into intermittent waters during wet years and then retreated to headwater springs and perennial reaches of streams during drier years. Their high fecundity and long reproductive season allow them to rapidly expand into new habitat. The life span of this

species is approximately 1 year, but it appears to be linked to sexual maturation which is dependent upon time of year in which they were born.

**REPRODUCTION:** The Gila topminnow is fertilized internally, where the young develop. Females may carry two broods simultaneously, one far more advanced than the other. Females also have the ability to store sperm packets for later fertilization of eggs. The reproductive season normally lasts from April through November, but young may be produced year-round in some thermally stable springs. During breeding, some males become dark black and exhibit aggressive breeding behavior, while others will not become black but still attempt to mate inconspicuously with females. The typical brood size ranges from 10-15 young, with larger broods produced during the summer. Young produced early in the breeding season may reach sexual maturity in a few weeks to several months.

**FOOD HABITS:** Gila topminnow are omnivorous. They likely utilize a broad spectrum of foods such as detritus and amphipod crustaceans; but feed voraciously on aquatic insect larvae, especially mosquitos, when abundant.

**HABITAT:** Gila topminnow occupied headwater springs and vegetated margins and backwater areas of intermittent and perennial streams and rivers. This species prefers shallow warm water in a moderate current with dense aquatic vegetation and algae mats. Topminnows can withstand water temperatures from near freezing to 90-100 degrees F. They also can live in a fairly wide range of water chemistries, with pH's ranging from 6.6 to 8.9, dissolved oxygen readings from 2.2 to 11 mg/l (Meffe et al. 1983, in Stefferud 1982), and salinities from tap water to sea water (Schoenherr 1974, in Stefferud 1982).

**ELEVATION:** Attempted re-introductions indicate the species prefers elevations below 5000 ft. (1525 m). Based on records in the Heritage Data Management System (HDMS), elevation ranges from 1,320 - 7,510 ft. (403 - 2291 m), with most below 5,000 ft. (AGFD, unpublished data accessed 2001).

**PLANT COMMUNITY:** Cottonwood/willow or burrobrush/seep willow terrestrial riparian communities, in association with aquatic plants such as green algae, *Nasturtium*, *Chara*, and *Potamogeton* spp.

**POPULATION TRENDS:** Gila topminnow were once the most common fish in southern Arizona. They have declined to only 9 isolated populations. Several of these populations are threatened by the existence of exotic predatory fish (Sharp Spring, Bylas Spring, Sonoita Creek, Redrock Canyon, Santa Cruz River, Fresno Canyon). Three populations remain relatively stable and secure (Cottonwood Spring, Monkey Spring, Cienega Creek). Attempts to re-introduce Gila topminnow (over 300 stockings) have resulted in only 15 established populations located in the wild.

## **SPECIES PROTECTION AND CONSERVATION**

**ENDANGERED SPECIES ACT STATUS:** LE (USDI, FWS 1967)

**STATE STATUS:**

WC (AGFD, WSCA in prep)  
[State Threatened AGFD, TNW 1988]

**OTHER STATUS:**

No Forest Service Status (USDA, FS Region 3  
1999)  
[Forest Service Sensitive, USDA, FS Region 3  
1988]  
Full Species Listed Threatened (Secretaría de  
Medio Ambiente 2000)  
[Full Species Listed Threatened Secretaría de  
Desarrollo Social 1994]

**MANAGEMENT FACTORS:** Recent genetic investigations into the evolutionary history indicate that there are genetic differences between the remaining isolated populations of Gila topminnow. Refugia populations from each natural population should be established to guard against catastrophic destruction of any natural population. Re-introduction into available historic habitat without introduced fishes should be continued. Land Management activities such as mining, grazing, fuel-wood cutting, logging etc., should be evaluated in relation to site-specific characteristics, as these activities can have either a positive or negative effect on Gila topminnow populations due to timing, intensity or other activity related factors.

**Threats:** spring habitat development; aquifer pumping; habitat destruction; drought; predation by and competition with nonnative fishes. **Management needs:** protect existing natural populations; identify sites for reintroduction; re-establish populations; monitor and manage reintroductions to maintain minimum of 55 sites in Arizona.

**PROTECTIVE MEASURES TAKEN:** Listed as endangered under the Endangered Species Act. At Cottonwood Spring, a Conservation Agreement signed between U.S. Fish and Wildlife Service, The Nature Conservancy, and the private land owner established a cattle enclosure at the spring. Portions of Cienega Creek have been acquired and established as a Natural Area by the Bureau of Land Management. A Memorandum of Understanding was signed in 1981 between the U.S. Fish and Wildlife Service, AGFD and U.S. Forest Service allowing coordination for the re-introduction of Gila topminnow on Forest Service administered lands.

Gila topminnow from Sharp Spring are currently being held and bred at Dexter National Fish Hatchery and Technology Center at Dexter, New Mexico for re-introduction to wild habitats. Populations are also located at Boyce Thompson Arboretum (Monkey Spring, Bylas Spring and Cocio Wash mixed stock), Roper Lake State Park (Middle Spring) and Hassayampa River Preserve (Middle Spring).

**SUGGESTED PROJECTS:** Continue re-introduction onto public lands in Arizona. Continue research into biology, ecology and genetics of the Gila topminnow.

**LAND MANAGEMENT/OWNERSHIP:** BIA - Salt River Pima and San Carlos Reservations; BLM - Kingman, Phoenix, Safford and Tucson Field Offices; NPS - Saguaro National Park; USFS - Coconino, Coronado, Prescott and Tonto National Forests; State Land Department;

Roper Lake State Park; Sonoita Creek State Natural Area; TNC - Cottonwood Spring and Hassayampa River Preserves, and Patagonia - Sonoita Creek, Boyce Thompson Southwestern Arboretum; Private.

## **SOURCES OF FURTHER INFORMATION**

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**MAJOR KNOWLEDGEABLE INDIVIDUALS:**

- Jeff Simms - Bureau of Land Management, Safford District, Safford, Arizona
- Jerry Stefferud - Tonto National Forest, Phoenix, Arizona
- Sally Stefferud - USDI, Fish and Wildlife Service, Ecological Services, Phoenix, Arizona
- David A. Weedman - Arizona Game and Fish Department, Nongame Branch, Phoenix

**ADDITIONAL INFORMATION:**

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