

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

**Animal Abstract**

**Element Code:** AFCJB13160

**Data Sensitivity:** Yes

**CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE**

**NAME:** *Gila intermedia*

**COMMON NAME:** Gila Chub

**SYNONYMS:** *Gila gibbosa*, *Tigoma intermedia*, *Tigoma gibbosa*, *Gila nigra*, *Squalius intermedius*, *Squalius niger*, *Squalius lemmoni*, *Leuciscus intermedius*, *Leuciscus niger*, *Richardsonius gibbosus*, *Gila robusta intermedia*

**FAMILY:** Cyprinidae

**AUTHOR, PLACE OF PUBLICATION:** Baird, S.F. and C. Girard. 1854. Descriptions of new species of fishes collected in Texas, New Mexico and Sonora, by Mr. John H. Clark, on the U.S. and Mexican Boundary Survey, and in Texas by Capt. Stewart van Vliet, U.S.A. *Proceedures of the Society of Natural Sciences*, Philadelphia, 7:24-29.

**TYPE LOCALITY:** Unknown

**TYPE SPECIMEN:** Unknown

**TAXONOMIC UNIQUENESS:** There are 19 species in the genus, all of which occur in Western North America. 9 species of *Gila* occur in Arizona. *G. intermedia* was formerly considered a subspecies of *G. robusta*. Rinne (1976) and DeMarais (1986) provided evidence that the Gila Chub is a distinct species based upon morphological differences and contiguous, distinct populations. Most authors now recognize *G. intermedia* as a species (Douglas et al. 1989, Sublette et al. 1990, Robins et al. 1991)

Taxonomy remains controversial. In 2016 the Joint Committee on the Names of Fishes, declared *G. intermedia*, *G. nigra*, and *G. robusta* as one species, *G. robusta*, based on a lack of genetic markings and subtle morphological differences (Page et al. 2017). This determination is not recognized, but has been suggested by other authors (Gerber et al. 2001).

**DESCRIPTION:** Female Gila Chubs may grow to 25.0 cm (9.8 in.) while males seldom exceed 15.0 cm (5.9 in.) in total length (Rinne and Minckley 1991). This is a thick-bodied, chunky chub species. Scales are large, thick, broadly overlapped, with strong basal radii. The lateral line typically consists of 62 to 74 scales, though extremes range from 51 to 83 scales. Head length divided by the caudal peduncle depth is 3.0 mm (0.1 in) or less. Gill rakers number 6 to 13, usually 9 or fewer. Dorsal and anal fin rays typically number 8 (rarely 7 or 9). Fins are small in size and darkly pigmented with rounded, square, or rarely convex edges (Minckley 1973).

Color dark overall, sometimes black or with diffuse, longitudinal stripes. Lateral scales often appear to be lighter in the center with a dark outline at the edges. Lighter belly speckled with

grey. No basicaudal spot. Breeding males, and to a lesser extent females, develop red or orange on lower cheek, posterior parts of lips, paired fin bases, and on ventro-lateral surfaces (including caudal peduncle). Small tubercles may develop on breeding males, and anterior dorsal regions of females, though degree of tuberculation may be extremely variable between populations and sexes (Bestgen 1985)

**AIDS TO IDENTIFICATION:** May be distinguished from Roundtail Chub, *Gila robusta*, by chunkier body type. Length of head measured from terminus to posterior edge of operculum divided by the minimum depth of caudal peduncle is usually less than 3.0.

**ILLUSTRATIONS:** B&W photo (Minckley 1973:104)  
Color photo (Rinne and Minckley 1991:24)

**TOTAL RANGE:** Historically found in nearly 50 higher-order streams in Arizona, New Mexico and Sonora, Mexico. It has recently been rediscovered in the San Pedro drainage in Sonora Mexico, where it had been absent in collections since 1857. The species now occupies an estimated 10 to 15 percent of its historical range (USFWS 2015).

**RANGE WITHIN ARIZONA:** Currently known from the following drainages; Santa Cruz River (Cienega Creek, Romero Canyon, Sabino Canyon, Sheehy Spring), Middle Gila River (Eagle, Dix, Bonita and Harden Cienega Creeks and San Carlos and Blue Rivers), San Pedro River (Bass, O'Donnell and Redfield Canyons, and Turkey Creek), Agua Fria River (Lousy Canyon and Indian, Larry, Silver, and Sycamore Creeks), Verde River (Spring and Walker Creeks, Red Tank Draw, and Williamson Valley Wash). Extirpated from Monkey Spring (Santa Cruz River), and Fish and Cave Creeks (Salt River).

### **SPECIES BIOLOGY AND POPULATION TRENDS**

**BIOLOGY:** Gila Chub were commonly found in association with Gila topminnow, desert and Sonora sucker and longfin and speckled dace. Females achieve lengths of 10 in (25 cm), whereas males rarely grow longer than 6 in (15 cm). It is highly secretive, seeking out deeper waters near cover.

**REPRODUCTION:** Reproduction occurs primarily from late spring into summer in streams, but can extend into late winter in constant temperature springs. Spawning occurs over beds of submerged aquatic vegetation (Minckley 1973). Actively breeding fish become fire-red along ventro-lateral surfaces and the eyes become yellow to yellow-orange (Minckley 1973). Spawning behavior includes several males chasing lone females (Schultz and Bonar 2006). Some Gila Chub reach sexual maturity by the end of their first year, but most do not mature until their second or third year (Bestgen 1985, Griffith and Tiersch 1989). Eggs hatch in about 6 days, though time to hatch and larval growth is correlated with temperature (Schultz and Bonar 2006).

Temperature is believed to be the most important environmental factor in triggering spawning in Gila Chub. Spawning has been observed at temperatures between 15 and 29°C (59 and 80°F), but spawning is unlikely to occur above 24°C (75°F) or below 15°C (59°F) (Schultz and Bonar 2006).

**FOOD HABITS:** Gila Chub are omnivorous, preferring terrestrial and aquatic invertebrates. At larger sizes they become piscivorous and have been found to consume speckled dace, *Rhinichthys osculus*, and probably other small cyprinids as available. Larger adults feed during evening and early morning hours. Juveniles will feed throughout the day on insects and algae, filamentous and diatomaceous. Benthic feeding may occur, as small gravel particles in digestive tracts have been observed (USFWS 2015).

**HABITAT:** Considered a habitat generalist (Schultz and Bonar 2006), commonly inhabits pools in smaller streams and cienegas. Remain near cover such as undercut banks, terrestrial and aquatic vegetation, boulders, root wads, and fallen logs (Minckley and Rinne 1991, Weedman et al. 1996). Gila Chub can survive in larger stream habitats such as the San Carlos River, and artificial habitats such as canals, at least in the short term (Stout et al. 1970, Rinne 1976).

In canyon-bound streams, adult chub use habitats roughly in proportion to their availability, and occupy runs, pools, and riffles. Juveniles avoid riffles and select for habitats with an abundance of cover. In more wetland like habitats, Gila Chub mostly use pool habitats (Griffith and Tiersch 1989, Dudley and Matter 2000, Schultz and Bonar 2006).

**ELEVATION:** 2,000 to 5,500 ft (609 – 1,676 m) Weedman et al. 2006).

**PLANT COMMUNITY:** Common riparian plants associated with these habitats include willows (*Salix* spp.), tamarisk (*Tamarix* spp.), cottonwoods (*Populus* spp.), seep-willow (*Baccharis glutinosa*), American sycamore (*Platanus wrightii*), and ash (*Fraxinus* spp.). Typical aquatic vegetation includes watercress (*Nasturtium officinale*), horsetail (*Equisetum* spp.), rushes (*Juncus* spp.), and speedwell (*Veronica anagallis-aquatica*) (USFWS 1983, Weedman et al. 1996).

**POPULATION TRENDS:** Populations are expected to expand and contract both seasonally and over time as climactic events affect aquatic habitat. Populations of Gila Chub have slowly been disappearing. 22 populations are assumed to remain, including 3 repatriated populations. Populations were once found in Apache Creek, Duck Creek and San Simon Cienega in New Mexico but is now considered extirpated. They are also extirpated from three waterways in Arizona (Cave Creek, Fish Creek and Monkey Spring). Little is known about distribution of populations in Mexico. Population in Williamson Valley has been extirpated due to 1992 flood event. A population was introduced into Garden Canyon in the Fort Huachuca Mountains in 1992 by Henderson (AGFD Native Fish Diversity Review 1995). The Gila Chub has been eliminated from 85 to 90 percent of formerly occupied habitat, and 9- percent of currently occupied habitat is degraded by presence of nonnative species and land management actions (USFWS 2015).

**SPECIES PROTECTION AND CONSERVATION**

**ENDANGERED SPECIES ACT STATUS:** LE (USDI, FWS 2005a) with Critical Habitat  
 [PE (USDI, FWS 2002b) with Critical Habitat]  
 [C\* (USDI, FWS 1999, 2001, 2002a)]  
 [C (USDI, FWS 1997)]  
 [SC (USDI, USFWS 1996)]  
 [C2 (USDI, FWS 1985, 1989, 1991, 1994)]  
 [C1 (USDI, FWS 1982)]

**STATE STATUS:** 1 (AZGFD, AWCS 2022)  
 [1A (AGFD SWAP 2012)]  
 [WSC (AGFD, WSCA 1996 in prep)]  
 [Threatened (AGFD, TNW 1988)]

**OTHER STATUS:** State Endangered, Group 1 (NMGFD 1975)  
 Bureau of Land Management Sensitive (USDI, BLM Arizona 2017)  
 Not Forest Service Sensitive (USDA, FS Region 3 2013)  
 [Forest Service Sensitive (USDA, FS Region 3 1988, 1999)]  
 P, Listed Endangered (Secretaría de Desarrollo Social 1994, and Secretaría de Medio Ambiente 2000, 2010)

**MANAGEMENT FACTORS:** The establishment of nonnative fishes within the Gila River basin is the primary threat to the species. Historically the species experienced little or no predation from other native fishes. Land management activities that affect watersheds, alter stream flow characteristics, fragment habitat, or affect the amount of perennial water in streams may affect populations of Gila chub, especially management activities that increase erosion and destroy stream banks (USFWS 2015).

**Threats:** aquifer pumping; stream diversion; reduction in stream flows; habitat alteration and competition by nonnative crayfishes; predation by and competition with nonnative fishes.

**Management needs:** identify and priority-rank management areas; protect watershed and stream flow and restore stream habitats for chub management areas; ameliorate effects of predatory and competitive nonnative fishes and crayfishes in chub waters; prevent hybridization with other chub species and preserve genetic variation within the species.

**PROTECTIVE MEASURES TAKEN:** The Gila Chub was listed as Endangered in 2005, with Critical Habitat designated in 2006. The Arizona Game and Fish Department closed several creeks to fishing to protect Gila Chub and other native fishes, including Bonita, Cienega,

and Sycamore creeks, and Sabino and O'Donnell canyons. AGFD has implemented relations to curtail the transport and introduction of nonnative fishes, though live baitfish are still allowed for personal use in several counties (AGFD 2019). The Bureau of Reclamation has committed to constructing 12 fish barriers within the Gila River basin by 2023 to prevent or hinder upstream movements of non-native fish and other aquatic organisms into areas of high-value native fish and amphibians. As of 2018, Reclamation has constructed physical barriers in eight streams (Aravaipa Creek, Cottonwood Spring, Fossil Creek, Bonita Creek, Hot Springs Canyon, Blue River, Spring Creek, West Fork Black River), and has plans to construct barriers in Redfield Canyon, Eagle Creek, and Verde River (USBR 2019). Repatriation of historic streams and establishment of refuge populations is ongoing in Arizona and New Mexico (USFWS 2015). There have been multiple and ongoing chemical and mechanical removals of nonnative fish species in many streams, especially those with fish barriers installed.

The Pima County Multi-species Conservation plan is expected to promote conservation of Gila Chub by minimizing the impact of nonnative aquatic organisms and loss of habitat and water quality in Cienega Creek. Portions of O'Donnell Creek, Redfield Canyon and Bass Canyon are included in the Canelo Hills and Muleshoe Preserves, managed by the Nature Conservancy (TNC). A portion of Cienega Creek at the Empire Ranch is managed by the Bureau of Land Management (BLM) as a natural area. BLM Phoenix District is currently proposing translocations from Silver Creek to nearby perennial streams in the Agua Fria headwaters.

**SUGGESTED PROJECTS:** The Fish and Wildlife Service published the Gila Chub draft Recovery Plan in 2015. This plan divides Gila Chub habitat into five Recovery Units (RUs). Recovery Units are intended to protect species distribution across historical range, sustain genetic diversity, and conserve demographic, morphological, behavioral, and other life history elements of the species. Recovery Units are further divided into genetic Management Units (Mus). The stated recovery goal of the document is to “Ensure the persistence of Gila Chub within its currently occupied historical range and recover the species by protecting remnant populations, expanding the existing distribution through replication of distinct lineages, and protecting and improving habitats for existing and future populations so that the species no longer meets the definition of endangered or threatened” (USFWS 2015).

The draft Recovery Plan sets downlisting criteria based on demographic and threats-based factors. These criteria include: 1. The maintenance and protection of all available remnant populations within each Recovery Unit, with populations indices considered stable or positive over the most recent rolling 10-year period where no population augmentation occurred. 2. Each Management Unit is replicated into either two streams or one stream and one artificial refuge within the same Recovery Unit, and replicate populations are established or maintained in a protected stream and meet established recruitment and population size catch per unit effort trends over a 10-year period. 3. All available remnant populations and their replicates are protected against nonnative fish predation and competition. 4. Recruitment and survival rates will be used to determine when significant threats to populations are controlled to manageable levels.

**LAND MANAGEMENT/OWNERSHIP:** Streams containing Gila Chub are owned and managed by a diverse assemblage of organizations including: BIA - San Carlos Reservation; BLM - Phoenix, Safford and Tucson Field Offices; FWS - San Bernardino National Wildlife Refuge; USFS - Apache-Sitgreaves, Coconino, Coronado, Prescott and Tonto National Forests; State Land Department; TNC - Canelo Hills Cienega and Muleshoe Ranch Preserve; and Private.

## **SOURCES OF FURTHER INFORMATION**

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**ADDITIONAL INFORMATION:**

The U.S. Fish and Wildlife Service released an advanced notice of proposed rulemaking to remove the species from the protections of the Endangered Species Act on 5 April 2022 (USDI FWS 20222).

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