ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM

Animal Abstract **Element Code:** AFCJB13140
Data Sensitivity: Yes

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Gila purpurea*
COMMON NAME: Yaqui chub
SYNONYMS: *Tigoma purpurea, Squalius purpureus, Leucicus purpureus, Richarsonius purpureus*
FAMILY: Cyprinidae

AUTHOR, PLACE OF PUBLICATION: Girard 1857. Proc. Acad. Nat. Sci. Phila. [1856] 8:165-213.

TYPE LOCALITY: Mexico, Sonora, Rio de San Bernardino, at United States Mexican Boundary, about 29 km east of Douglas, Arizona. Taylor (1967) noted however that collections made during United States and Mexican Boundary Survey were undoubtedly on both sides of present border.

TYPE SPECIMEN:

TAXONOMIC UNIQUENESS: There are 19 species in the genus, all of which occur in Western North America. 9 species of *Gila* occur in Arizona. Placed in subgenus *Temeculina* with the closely related *G. orcuttii* and *G. eremica*, which was formerly included in *G. purpurea* (DeMarias 1991).

DESCRIPTION: A medium-sized minnow, seldom more than 17.8 cm (7.0 in.) long, usually less than 13.0 cm (5.1 in.) (Rinne and Minckley 1991). Head and anterior part of body thickened, thinner posteriorly. Scales large, broadly imbricated, with radii strongly developed on all fields. Scales in lateral line fewer than 59. Dorsal, anal, and pelvic fin-rays eight (rarely seven). Origin of dorsal fin behind insertion of pelvic fins. Pharyngeal teeth 2, 5-4, 2 (Minckley 1973). Deep body, deep caudal peduncle. Small, slightly subterminal mouth, short rounded snout, large eye (Page and Burr 2011).

Color dark, over-all, but usually lighter below. During the breeding season males develop "steely-blue color, females are yellow-brown. Lateral bands not developed. Vertically-elongated, diffuse, triangle-shaped caudal spot usually present (Minckley 1991).

AIDS TO IDENTIFICATION: Distinguished from similar species by caudal fin base with black wedge and anal fin with 8 rays (Page and Burr 2011).

ILLUSTRATIONS:
B&W photo (Minckley 1973:107)
Color photo (Rinne and Minckley 1991:23)
B&W photo (Wildlife Habitat Management Staff Group 1975:146)

TOTAL RANGE: For many years, the Desert Chub was confused with the similar Yaqui Chub. Therefore, the range of Yaqui chub was thought to include a large portion of the Rio Yaqui watershed, with 98% of the range believed to be in Mexico. However, genetic work was conducted, and demonstrated the range of the Yaqui Chub to be restricted to the Rio San Bernardino system in the upper Rio Yaqui drainage of Arizona and Sonora. It was historically and remains known in Mexico only from a <3.0 km perennial reach of the Rio San Bernardino immediately south of the international border (Varela-Romero et al. 1992, USFWS 2018). Records from Morse Canyon, northern Chiricahua Mountains, Arizona, are not supported by specimens (Willcox Playa basin; McNatt 1974).

RANGE WITHIN ARIZONA: Rio San Bernardino system in Cochise County. Approximately 35 managed populations occur across known range. These populations occur in nearly all wetlands on San Bernardino National Wildlife Refuge, in Leslie Creek on Leslie Canyon National Wildlife Refuge, in West Turkey Creek on the Coronado National Fest, in several ponds on four private ranches (Slaughter Ranch, 99-Bar Ranch, Bar-Boot Ranch, and El Coronado Ranch) and one pond at Douglas High School (USFWS 2018).

SPECIES BIOLOGY AND POPULATION TRENDS

BIOLOGY: Yaqui Chub are a boom or bust species, with large populations able to quickly develop from only a few individuals when environmental conditions are favorable (Kline and Bonar 2009). Yaqui Chub are heavily dependent on artesian wells and spring flows on SBNWR.

REPRODUCTION: Spawns mostly during spring through early summer, but spawning has been recorded in all but midwinter months (DeMarais and Minckley 1993) Young grow to 40.0-50.0 mm (1.6-2.0 in.) by following year. Males steely blue during reproductive season, contrasting with drab, yellow-brown of females (McNatt 1974).

FOOD HABITS: Forage primarily on algae, aquatic micro and macroinvertebrates, and detritus, though terrestrial invertebrates and small fish will be fed upon when available.

HABITAT: Live in springs, spring-fed ditches, creeks and (introduced to) ponds over substrates of silt, clay, and gravel. Water clear to muddy, with no to moderate flow, and depths of capture vary to >1.5 m (Minckley and Marsh 2009; Stewart et al. 2017; Stewart et al. 2019) Tends to inhabit deep pools with steep banks or debris and often in association with dense aquatic vegetation. Also found in swifter areas with clean, gravel bottoms and abundant growths of algae. Historically found in springs, cienegas, creeks, and moderately-sized rivers, which typically had alternating riffles and pools.

ELEVATION: Low to intermediate elevations. Arizona records range from elevations of 3,730 – 5,840 ft. (1138 - 1780 m) (AGFD, unpublished data accessed 2020).

PLANT COMMUNITY: Low, emergent, aquatic plants such as watercress, cattail, and sedges, and hydric-adapted trees such as willows.

POPULATION TRENDS: Since the development of the 1995 Recovery Plan, conservation efforts and intensive management has resulted in the establishment of large and viable populations in diverse habitats. Approximately 35 populations currently occur across the known range, where they have been self-sustaining for 10-36 years. The Yaqui Chub will be considered for delisting when viable populations are established in a total of 35 or more unconnected wetland metapopulations in the U.S., and Sonora populations are secure, reestablished, and self-sustaining in 5 or more unconnected wetland metapopulations.

SPECIES PROTECTION AND CONSERVATION

ENDANGERED SPECIES ACT STATUS: LE (USDI, FWS 1984), Critical Habitat established on San Bernardino NWR.

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

OTHER STATUS: Not Forest Service Sensitive (USD, FS Region 3 1999, 2013)
[Forest Service Sensitive (USDA, FS Region 3 1988)]
P,Listed Endangered (Secretaría de Medio Ambiente 2000, 2010)
[Listed Endangered (Secretaría de Desarollo Social 1994)]

MANAGEMENT FACTORS:

Threats: aquifer pumping; reduction in stream flows; water diversion; drought; predation by nonnative fishes, parasitism by Asian tapeworm. In addition, overgrazing and subsequent erosion has also been identified as a threat.

Management needs: protect San Bernardino aquifers, and Leslie and San Bernardino watersheds to ensure adequate perennial flow; ameliorate effects of nonnative fishes within chub management streams; establishment of additional populations in the United States and Mexico.

PROTECTIVE MEASURES TAKEN: To protect the Yaqui Chub from extinction, The Nature Conservancy purchased the San Bernardino Ranch in 1980, and Leslie Canyon in 1988. These parcels were sold to the U.S. Fish & Wildlife Service in 1982 and 1988 respectively, to establish them as National Wildlife Refuges. The "Fishes of the Rio Yaqui Recovery Plan" was approved in 1995, and a draft amendment addressing Yaqui Chub recovery criteria has been prepared by the U.S. Fish and Wildlife Service and is awaiting approval. Critical habitat is formally designated to include all aquatic habitat on San Bernardino NWR (USFWS 1995). The El Coronado Ranch Habitat Conservation Plan helps protect populations within the West Turkey Creek watershed (Minckley and Duncan 1997). The Malpai Borderlands multi-species

Habitat Conservation Plan helps protect populations in the San Bernardino watershed (Lehman et al. 2008).

Catchment area, recharge and flow rates, storage volumes and other attributes of the underground aquifers have been delineated for portions of the watershed that include San Bernardino NWR and Leslie Canyon NWR. The aquifer has demonstrated a pattern of natural recharge (Earman et al. 2003). Non indigenous fishes have been eradicated on San Bernardino NWR, Leslie Canyon NWR, Slaughter Ranch, and ponds supporting Yaqui Chub on El Coronado Ranch. Green Sunfish (*Lepomis cyanella*) still exist in West Turkey Creek, though USFWS personnel have removed hundreds and continue to suppress populations. Asian tapeworm occur through much of the habitat occupied by Yaqui Chub. Infestations can cause intestinal blockage and reduced growth rate in Yaqui Chub, but do not kill or threaten fecundity of the chub (Kline et al. 2007). American Bullfrog (*Lithobates catesbeiana)* occur throughout the range, but do not appear to pose a threat to the persistence of Yaqui Chub (Liu et al. 2017, USFWS 2018). In Mexico, Western Mosquitofish (*Gambusia affinis)* co-occur with the chub in some areas. Habitats occupied by Yaqui Chub in the United States are protected from human disturbances such as excessive grazing, irrigated agriculture, introductions of non-indigenous species, and water diversion or removal through partnerships and planning documents. Water diversion is not an immediate threat to Yaqui Chub habitat in the U.S. or in Mexico, but the future consequences of groundwater withdrawal are unknown.

SUGGESTED PROJECTS: Continued long-term monitoring of populations; implementation of monitoring protocols to account for effects of decreased capture efficiency; improving the objectivity and accuracy of monitoring estimates; research on habitat requirements, inter-specific interactions, and potential effects of groundwater withdrawal.

LAND MANAGEMENT/OWNERSHIP: FWS - San Bernardino National Wildlife Refuge; Leslie Canyon National Wildlife Refuge. USDA Forest Service – Coronado National Forest. Private Land – Slaughter Ranch, Bar-Boot Ranch, El Coronado Ranch, Douglas High School.

SOURCES OF FURTHER INFORMATION

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ADDITIONAL INFORMATION: The historic distribution of the Yaqui Chub was thought to range from the upper Rio Yaqui, west in Sonora to the Rios Sonora and Matape. However, in 1991, it was concluded that all chubs but those from the Rio San Bernardino (Black Draw) represented a new species, *Gila eremica* (DeMarais 1991). Yaqui Chub were almost extirpated in 1969 when a drought dried up Astin spring in Cochise County, Arizona. Two hundred chub were removed from Astin Spring and were placed into Leslie Creek (Minckley 1973). Stock from these fish were moved into DNFHTC in 1976 and raised at the hatchery. Hatchery produced fish from Dexter were put into the newly established SBNWR in 1980 to supplement stock which were thought to have survived in the well pipe and outflow of an artesian well on the ranch (Draft Recovery Plan).

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