ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM

Animal Abstract **Element Code:** AFCNB02140
Data Sensitivity: Yes

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Cyprinodon eremus* Miller and Fuiman
COMMON NAME: Quitobaquito Pupfish, Sonoyta Pupfish, Quitobaquito Springs Pupfish, Desert Pupfish
SYNONYMS: *Cyprinodon macularius eremus* Miller and Fuiman, 1987
FAMILY: Cyprinodontiformes, Cyprinodontidae

AUTHOR, PLACE OF PUBLICATION: Miller and Fuiman, 1987. Description and conservation status of *Cyprinodon macularius eremus*.

TYPE LOCALITY:

TYPE SPECIMEN:

TAXONOMIC UNIQUENESS: 41 extant species of *Cyprinodon* distributed across North, Central, and South America. 12 species of *Cyprinodon* in North America, two existing species in Arizona, *C. macularius* and *C. eremus,* and one extinct species, *C. arcuatus*. *C. macularius* and *C. eremus* are collectively referred to as the Desert Pupfish complex (Loftis et al. 2009).

Cyprinodon eremus, described as a new subspecies of *C. macularius* by Miller and Fuiman (1987), was elevated to species status by Echelle et al. (2000).

DESCRIPTION: Small fish, less than 3 in (7.6 cm) long. Per Minckley; (1973), "Body thickened, chubby, or markedly compressed, laterally, in adult males. Mouth superior, highly protractile, armed with tricuspid teeth. Circuli of scales with marked, spine-like projections. Dorsal profile smoothly rounded, not markedly concave posterior to origin of dorsal fin.

Body color of females and juveniles with silvery background, with narrow, vertical, dark bars on sides, generally interrupted laterally to give the impression of a disjunct, lateral band. Fins generally colorless, with the exception of an ocellate spot in dorsal, and rarely a dark spot in anal fin. Mature, breeding male with caudal fin and posterior part of caudal peduncle yellow or olive-yellow; other fins generally dark. Body iridescent light- to sky-blue, especially on dorsum of head and predorsal region."

AIDS TO IDENTIFICATION: *C. eremus* differs from the desert pupfish, *C. macularius*, by having a broader head, body, and mouth, shorter fins, and a shorter caudal peduncle. Male Quitobaquito Pupfish may be distinguished from male desert pupfish by breeding coloration. Male desert pupfish exhibit “bright yellow to brilliant yellow orange” on the caudal peduncle and caudal fin, while Quitobaquito Pupfish exhibit, at most, “yellow-to olive-yellow” coloration of the caudal fins with yellow coloration either absent on the body or extending just

onto the posterior third of the caudal peduncle (Echelle et al. 2000). The head of *C. eremus* tends to be deeper and the jaw longer than other populations of pupfish (Miller and Fuiman 1987).

ILLUSTRATIONS:
B&W photos (Minckley 1973:189)
Color drawing (Page and Burr 1991)
Color photos (Rinne and Minckley 1991:25)

TOTAL RANGE: Persists in only two populations, one at Quitobaquito Springs in Organ Pipe Cactus National Monument in Arizona, and the other at Rio Sonoyta in Sonora, Mexico.

RANGE WITHIN ARIZONA: Only in Organ Pipe Cactus National Monument at Quitobaquito Spring.

SPECIES BIOLOGY AND POPULATION TRENDS

BIOLOGY: Species of the Desert Pupfish complex have tolerances for higher temperatures, higher salinities, and lower dissolved oxygen concentrations which exceed the tolerances of other freshwater fishes (USFWS 1993). The species appear to go through cycles of population expansion and contraction in response to precipitation patterns (Weedman and Young 1997). In very wet years, populations can rapidly expand into new habitats (Hendrickson and Varela-Romero 1989). Varela-Romero (2002) and Martin and Saiki (2005) reported abundance to be highly variable over time; positively correlated with salinity, cover, and pH; negatively correlated with dissolved oxygen.

REPRODUCTION: Males are larger than females, exhibit an intensification of color during the breeding season, and exhibit territorial behavior. When a female is ready to spawn, she enters a male's territory. Spawning occurs from spring through autumn, but reproduction may occur year-round in warm constant environments (Constanz 1981). Each female may lay 50-800 eggs per season, depending on her size (Moyle 1976). Fertilized eggs are deposited randomly in a territory, and defended by the male. Hatching occurs within 7-13 days. Growth of young is rapid, sexual maturity may be reached in six weeks under favorable conditions. Reproduces at age 2-3 months in constant warm temperatures, first breeds at about a year in variable temperatures (Matthews and Moseley 1990).

FOOD HABITS: Omnivorous; small invertebrates, mosquito larvae, detritus, algae, and small bits of aquatic vegetation (Naiman 1979). In softer substrates, dig small pits in search of food and then aggressively defend the pits (Minckley 1973).

HABITAT: Now restricted to small ponds and springs; formerly occurred in range of habitats similar to those of *C. macularis* (clear, shallow waters with soft substrates). At Quitobaquito, it occurs in a large pool where it prefers shallow water; probably past occurred in spring waters

or shallow, heavily vegetated marsh. Springs, marshes, slow flowing streams and river backwaters. Tolerates a wide range of water temperatures; tenacious if habitat maintenance performed and exotic fish eliminated.

ELEVATION: Colorado basin below sea level to 1500 m (4,920 ft.) in the Upper San Pedro, Sonora, Mexico (Rinne and Minckley 1991). Population at Quitobaquito Spring occurs at 325 m (1,070 ft).

PLANT COMMUNITY: Sonoran Desert scrub.

POPULATION TRENDS: Severely reduced. Population at Quitobaquito apparently fairly stable; ranges from 3000 to 8000 seasonally, monitored regularly by Organ Pipe Cactus National Monument staff, following established protocol (Tibbitts 2009).

SPECIES PROTECTION AND CONSERVATION

ENDANGERED SPECIES ACT STATUS: LE with critical habitat (as *C. macularius*) (USDI, FWS 1986)

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

OTHER STATUS: AFS SC; IUCN E

MANAGEMENT FACTORS: Activities that are known to be detrimental to pupfish populations should be avoided i.e.: dewatering of habitats, stream impoundment, channelization, domestic livestock grazing, timber harvesting, mining, road construction, polluting, and stocking non-natives.

Threats: Water loss from groundwater extraction and drought; habitat destruction; soil erosion leading to degrading watershed health; habitat alteration; predation by and competition with nonnative fishes and ranid frogs; genetic bottleneck in isolated populations and lack of genetic diversity in refugia populations; possibly wind-drift of pesticides from Sonora (Mexico).

Management needs: protect Quitobaquito Springs and Pond habitats; manage for conservation of Quitobaquito and Rio Sonoyta genetics; monitor population health; and maintain habitats free of nonnative aquatic species.

PROTECTIVE MEASURES TAKEN: From 2005 to 2009, the surface elevation at Quitobaquito Pond fell to unprecedented levels. Fish were evacuated, the collection system and pond berm were rehabilitated, and the pond bottom and berm were relined.

Captive, breeding populations maintained at ASU, Arizona Sonora Desert Museum, La Cienega at Organ Pipe, Cordery Pond, Cabeza Prieta NWR, University of Arizona and the Arizona Historical Museum. Safe harbor agreements have been implemented in Hernbrode Pond and Onofryton Pond.

SUGGESTED PROJECTS: A specific genetic protocol should be developed for management of refuge populations, establishing one large primary refuge population and 10 or more secondary refuges. A technical correction should be published in the Federal Register to update the list to elevate the Quitobaquito pupfish to the species level. Emphasize conservation at wild sites, using Safe Harbor Agreements only where no other progress can be made. Emphasize enrollment of large sites under SHA, ensuring genetic integrity is maintained and adequate numbers are available for conservation activites. Determine additional areas where wild populations may be established (USFWS 2010).

LAND MANAGEMENT/OWNERSHIP: NPS - Organ Pipe Cactus National Monument.

SOURCES OF FURTHER INFORMATION

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MAJOR KNOWLEDGEABLE INDIVIDUALS:

ADDITIONAL INFORMATION:

Revised: 1994-07-11 (WDH)
1994-08-01 (MHH)
2001-10-10 (SMS)
2020-07-30 (KSL)
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