

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

Animal Abstract

Element Code: AFCJB13080

Data Sensitivity: No

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Gila cypha*
COMMON NAME: Humpback Chub
SYNONYMS:
FAMILY: Cyprinidae

AUTHOR, PLACE OF PUBLICATION: Miller, Journal of the Washington Academy of Sciences 36(12): 409-415, fig. 1. 1946.

TYPE LOCALITY: Arizona, Coconino Co., near Phantom Ranch, w. end of Grand Canyon (presumably from Colorado R., at mouth of Bright Angel Cr.).

TYPE SPECIMEN: USNM - 131839, collected by N.N. Dodge, date of collection not reported in Miller (1946).

TAXONOMIC UNIQUENESS: 15 (?) species in genus; 15 (?) species in North America; 6 species in Arizona; 0 described subspecies of *G. cypha*.

DESCRIPTION: "Body streamlined; skull concave on dorsum. Nape abruptly produced at occiput into a truncate, prominent hump, which often projects forward to overhang occiput in large adults. Caudal peduncle thin, somewhat pencil-like but not greatly elongated, its length divided by length of head is less than 1.0; head length divided by caudal peduncle less than 5.0. Squamation often incomplete, or scales embedded deeply (especially on hump). Fins large, falcate. Origin of dorsal fin about equidistant between snout and caudal-fin base. Dorsal fin-rays usually 9, and anal fin rays 10 or more. Mouth inferior, overhung by snout. Pharyngeal arch small, its lower ramus short, teeth usually 2, 5-4, 2" (Minckley 1973).

AIDS TO IDENTIFICATION: "The small eye, the inferior, nearly horizontal mouth and the combination of several other characters in addition to the hump..." (Suttkus and Clemmer 1977).

ILLUSTRATIONS: Line drawing (Miller 1946:412)
B&W photo (Minckley 1973:98)
Color drawing (Page and Burr 1991)
Color photo (Rinne and Minckley 1991:29)
Photos (Suttkus and Clemmer 1977:17-30)

TOTAL RANGE: Historically ranged from below present-day Hoover Dam in the Colorado River upstream into Colorado, and in the larger portions of Colorado River tributaries in Arizona, Utah, Colorado, and Wyoming. Presently the species is restricted to six population

centers in: 1) the Colorado and Little Colorado rivers in Grand Canyon, Arizona; 2) the Colorado River in Cataract Canyon, Utah; 3) the Colorado River in Black Rocks, Colorado, and Westwater Canyon, Utah; 4) the Green River in Desolation and Gray canyons, Utah; 5) the Green River in Dinosaur National Monument, Colorado and Utah; 6) and the Yampa River in Dinosaur National Monument, Colorado.

RANGE WITHIN ARIZONA: Coconino County, Colorado and Little Colorado rivers in Grand Canyon.

SPECIES BIOLOGY AND POPULATION TRENDS

BIOLOGY: Population in Grand Canyon infested with the parasitic copepod *Lernaea cyprinacea* (Carothers and Minckley 1981, Kaeding and Zimmermann 1983), and Asian tapeworm, *Bothriocephalus acheilognathi* (Angradi et al. 1992, Clarkson and Robinson 1993). Kaeding and Zimmermann (1983) also reported 13 species of bacteria, six protozoans, and the fungus *Saprolegnia* to infect humpback chub.

REPRODUCTION: Reproduction typically occurs in April-July at water temperatures ranging from 16-23EC (Colorado River Fishes Recovery Team 1990). Larvae were also captured in December from the Little Colorado River following a period of extended base flow (AGFD data). In Grand Canyon, some Colorado River chub "stage" at the mouth of the Little Colorado River in March, and move variable distances upstream during April-June, ostensibly to spawn (Valdez et al. 1992). Little, if any, detectable movements have been reported associated with spawning in other populations. Both sexes in breeding condition may exhibit orange-red coloration at the fin bases and along the lateral-ventrum; small tubercles may be present on the fins, head, and body of males and females, but more extensively on males (Suttkus and Clemmer 1977). Spawning in the wild has not been observed, but humpback chub spawned over cobble-boulder substrates in hatchery raceways (Hamman 1982). Nine females produced approximately 30,000 eggs total when injected with carp pituitary at Dexter National Fish Hatchery (Hamman 1982). Nine females from the Black Rocks area on the Colorado River produced 0-5,445 eggs (Hamman 1982), and approximately 2,800 eggs were taken from 10 hormone-injected fish in the Little Colorado River (Lupher and Clarkson 1993). Spawning success has been variable in the Little Colorado River between 1991 and 1993; flooding during May and June of 1992 decimated the 1992 year class (Clarkson and Robinson 1993). Low water temperatures in the Colorado River in Grand Canyon resulting from hypolimnial releases from Glen Canyon Dam generally preclude successful reproduction there, and mortality of larvae drifting from the Little Colorado River to the Colorado River is presumed high (Clarkson et al. 1994).

FOOD HABITS: Chironomidae larvae and adults, and Thysanoptera adults were the most frequently-occurring items in guts of larvae through juvenile humpback chub in the Little Colorado River (Clarkson and Robinson 1993). Dipteran larvae also dominated stomach contents of chub (lengths not reported) examined by Kaeding and Zimmermann (1983) from the Colorado and Little Colorado rivers in Grand Canyon, and some piscivory was noted. Kubly (1990) reported that filamentous algae, *Cladophora glomerata*, was the most voluminous food category in stomachs of 12 adult chub from the confluence zone of the Little

Colorado River. Chironomid larvae and Hymenoptera adults also contributed to food volumes (10%) in stomachs reported by Kubly (1990). Chub stomachs from the Colorado River in Grand Canyon examined by pumping (n=43) were dominated by dipterans (Simuliidae and Chironomidae) and the amphipod *Gammarus lacustris* (Valdez and Hugentobler 1993). Larvae and young-of-year juveniles feed from the bottom, water column, and surface (Clarkson and Robinson 1993), as do adults (C.O. Minckley, cited in Colorado River Fishes Recovery Team 1990).

HABITAT: In general, the species persists only in turbulent, high gradient, canyon-bound reaches of large rivers in the Colorado River Basin. Larvae prefer shallow, low-velocity nearshore pools in the Little Colorado River, and progressively move to deeper, faster areas with increasing size and age (AGFD data, Gorman 1994). In the Colorado River in Grand Canyon, young-of-year are found in backwater and other nearshore, slow-velocity sites (Maddux et al. 1987, Angradi et al. 1992), with similar ontogenetic tendencies (Valdez et al. 1992). Adults in the Colorado River in Grand Canyon and in the Upper Basin are associated with large eddy complexes (Valdez et al. 1982, 1992, Valdez and Hugentobler 1993). Humpback chub appear to be more active at night (Kaeding and Zimmermann 1983, Gorman 1994).

ELEVATION: Arizona records include elevations from 1,530 - 4,400 ft. (467 - 1,342 m).

PLANT COMMUNITY:

POPULATION TRENDS: Historic status uncertain, but distribution presumably more continuous than present. Possible population(s) in and below Flaming Gorge likely destroyed by Green River poisoning associated with construction of Flaming Gorge Reservoir (Holden 1991). Distribution in Grand Canyon has contracted since construction of Glen Canyon Dam (Angradi et al. 1992).

SPECIES PROTECTION AND CONSERVATION

ENDANGERED SPECIES ACT STATUS: LE (USDI, FWS 1967)
Critical Habitat Designation (USDI, FWS 1994)

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

OTHER STATUS: No Forest Service Status (USDA, FS Region 3 1999)
[Forest Service Sensitive, USDA, FS Region 3 1988]
Group 2 (NNDFW, NESL 1994, 2000, 2008)

MANAGEMENT FACTORS: **Threats:** altered hydrology and cold tailwater releases from reservoirs; Predation by and competition with nonnative fishes; and, parasitism.

Management needs: ameliorate effects of reservoirs; ameliorate effects of nonnative fish and parasite sources in chub waters; monitor status of all populations. Also need to be concerned about genetic isolation of populations by emplacement of dams.

PROTECTIVE MEASURES TAKEN: Effective April 20, 1994, seven reaches of the Colorado River System (totaling 379 miles) were designated as Critical Habitat for *Gila cypha*. Grand Canyon Protection Act of 1992 reduced stage fluctuation of water releases from Glen Canyon Dam. Glen Canyon Environmental Studies Phase I (1984-1987) and Phase II (1990-1995) research data used in development of Glen Canyon Dam Environmental Impact Statement and Biological Opinion. Upper Colorado River Basin Recovery and Implementation Plan guides recovery efforts for the species in the Upper Basin.

SUGGESTED PROJECTS: Continued study of effects of water temperature on ecology and life history; determine effects of fluctuating flows on movements and fate of early life stages in the Colorado River below Glen Canyon Dam; determine food web relationships in the Little Colorado and Colorado rivers using stable isotope analysis.

LAND MANAGEMENT/OWNERSHIP: BIA - Hualapai Reservation and Navajo Nation; NPS - Grand Canyon National Park and Glen Canyon National Recreation Area; State; Private.

SOURCES OF FURTHER INFORMATION

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ADDITIONAL INFORMATION:

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