

## Threatened fishes of the world: *Amblyopsis rosae* (Eigenmann, 1898) (Amblyopsidae)

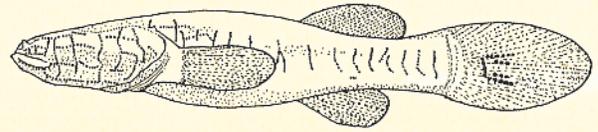
Aldemaro Romero

Department of Biology, University of Miami, P.O. Box 249118, Coral Gables, FL 33124, U.S.A.  
(e-mail: aromo@umiami.ir.miami.edu)

**Common name:** Ozark cavefish (E).

**Conservation status:** Vulnerable (World Conservation Monitoring Centre); Threatened (U.S. Fish & Wildlife Service and the American Fisheries Society, U.S.A.).

**Identification:** This is one of the four species of troglobitic (cave blind, depigmented) fishes of the family Amblyopsidae. It is small, on average 38 mm SL, and range between 24.0 and 42.5 mm. Body elongated, head depressed; lower jaw slightly projecting; snout rounded; gill membranes joined to isthmus; mouth oblique; pelvic fins absent. Rudimentary eyes, hidden under the skin. Sensory papillae on caudal fin in 4–6 rows. Lateral line present with external and internal neuromasts on the head and sides. Head length: 0.320–0.406; head width: 0.214–0.263; depth: 0.175–0.224; anal-ventral: 0.175–0.224, D 7 (7–8), A 8 (8–9), P 10 (10–12); branched caudals 9–11; 28 vertebrae. The dorsal and anal fins are located far back on the body; the caudal fin is rounded, the pectoral fins are elongated, and the pelvic fins are absent. (see Romero & Bennis 1998 for other details). Drawing by Loubna Bennis.



**Distribution:** It is presently known from 21 caves distributed over seven counties in three states: northwestern Arkansas; northeastern Oklahoma; and in the southern corner of Missouri. The verified historic range was slightly larger. **Abundance:** Total population numbers are unknown and would be impossible to determine because of the inaccessibility of some habitat. **Habitat and ecology:** Found mostly in small cave streams with chert or rubble bottom. Also occasionally found in pools over silt and sand bottom. The water source is almost always an upwelling from the groundwater table. Caves that depend entirely upon surface water sources rarely have this species. Suitable caves are usually found in the vicinity of large permanent streams. There have also been sightings of this species in wells and in a new sinkhole. Depending upon its size, the Ozark cavefish is a carnivore and top predator. **Reproduction:** It reaches maturity at 4 or more years of age and has a life span 7 to 10 years. Females produce 20 to 25 eggs per clutch with about 20% of the population breeding each year. **Threats:** Overcollecting, pollution, and habitat fragmentation. Its low reproductive abilities, confined habitat, and inability to elude captors. They are sometimes available in the pet trade, and there are several documented instances of scientific collectors taking large numbers of individuals of this species. Another factor which may have contributed to the species' current status is the decline of the endangered gray bat. The food supply in a cave is dependent upon an outside energy source. The largest Ozark cavefish populations occur in caves used by the gray bat, where the bat guano forms the cave's primary energy source. **Conservation action:** It was listed as protected species by U.S. Fish and Wildlife Service (USFWS) in 1984 and a recovery plan was written for this species also by the USFWS in 1989. **Conservation recommendations:** Protection of the remaining populations from further habitat degradation, especially from groundwater pollution; strict law enforcement to avoid illegal takings. Eliminate and/or reduce destructive land use practices, sediment and runoff control for construction projects, eliminate use of agrochemicals in critical watersheds. **Remarks:** It is a very old and highly genetically distinct clade of amblyopsid fishes. It has been proposed that there are two subspecies of this fish: *A. rosae whitae* for the White River drainage and *A. rosae arkansasus* for the Middle Arkansas River drainage.

- Brown, A.V. & C.S. Todd. 1987. Status review of the threatened Ozark cavefish (*Amblyopsis rosae*). Proc. Arkansas Acad. Sci. 41: 99–100.
- Eigenmann, C.H. 1898. A new blind fish. Proc. Indiana Acad. Sci. 1897: 231.
- Means, M.L. & J.E. Johnson. 1995. Movement of threatened Ozark cavefish in Logan Cave National Wildlife Refuge, Arkansas. Southw. Natur. 40: 308–313.
- Ono, R.D., J.D. Williams & A. Wagner. 1983. Vanishing fishes of North America. Stone Wall Press, Washington, D.C. 257 pp.
- Romero, A. & L. Bennis. 1998. Threatened fishes of the world: *Amblyopsis spelaea* DeKay, 1842 (Amblyopsidae). Env. Biol. Fish. 51: 420 (other references cited here).
- U.S. Fish and Wildlife Service. 1989. A recovery plan for the Ozark cavefish (*Amblyopsis rosae*). Prepared by L.D. Willis, Jr. and revised by James H. Stewart. U.S. Fish and Wildlife Service, Atlanta. 21 pp.
- Willis, L.D. & A.V. Brown. 1985. Distribution and habitat requirements of the Ozark cavefish, *Amblyopsis rosae*. Amer. Midl. Natur. 114: 311–317.

and Fish Department with special thanks to Glen Doster, the Bureau of Land Management with special thanks to Mike Salamacha, Bio/West, Inc., and the United States Geological Survey offices in both Tucson and Flagstaff who provided unpublished data. Technician support was provided by R. Bellsey, J. Brod, B. Dorr, K. Hilwig, Z. Hogan, R. Lim, M. Martinez, P. Murphy, C. Schleusner and S. Walker. We are indebted to Harold Tyus, Timothy Modde, and two anonymous reviewers for their insightful comments on earlier drafts of this manuscript.

### References cited

- Bozek, A.L., L.J. Paulson, G.R. Wilde & J.E. Deacon. 1991. Spawning season of the razorback sucker *Xyrauchen texanus* in Lake Mohave, Arizona and Nevada. *J. Freshw. Ecol.* 6: 61–73.
- Carlson, C.A., C.G. Prewitt, D.E. Snyder & E.J. Wick. 1979. Fishes and macroinvertebrates of the White and Yampa rivers, Colorado. Final report on a baseline survey conducted for the Bureau of Land Management, Colorado State University, Fort Collins. 148 pp.
- Carothers, S.W. & B.T. Brown. 1991. The Colorado River through the Grand Canyon. University of Arizona Press, Tucson. 235 pp.
- Chart, T.E. & E.P. Bergersen. 1992. Impact of mainstream impoundments on the distribution and movements of the resident flannelmouth sucker (*Catostomus latipinnis*) population in the White River, Colorado. *Southw. Nat.* 37: 9–15.
- Dingman, L.S. 1984. Fluvial hydrology. W.H. Freeman and Company, San Francisco. 383 pp.
- Gorman, O.T. 1988. The dynamics of habitat use on a guild of Ozark minnows. *Ecol. Monogr.* 58: 1–18.
- Gorman, O.T. & J.R. Karr. 1978. Habitat structure and stream communities. *Ecology* 59: 507–515.
- Holden, P.B. & C.B. Stalnaker. 1975. Distribution and abundance of mainstream fishes of the Middle and Upper Colorado River Basins, 1967–1973. *Trans. Amer. Fish. Soc.* 104: 217–231.
- Maddux, H.R. & W.G. Kepner. 1988. Spawning of bluehead sucker in Kanab Creek, Arizona (Pisces: Catostomidae). *Southw. Nat.* 33: 364–365.
- McAda, W.C. 1977. Aspects of the life history of catostomids native to the Upper Colorado River basin. M. Sc. Thesis, Utah State University, Logan. 103 pp.
- McAda, W.C. & R.S. Wydoski. 1985. Growth and reproduction of the flannelmouth sucker, *Catostomus latipinnis*, in the Upper Colorado River Basin, 1975–76. *Southw. Nat.* 45: 281–286.
- Minckley, W.L. 1973. Fishes of Arizona. Arizona Game and Fish Department, Phoenix. 293 pp.
- Minckley, W.L. & J.E. Deacon. 1968. Southwestern fishes and the enigma of 'endangered species'. *Science* 159: 1424–1432.
- Minckley, W.L. 1991. Native fishes of the Grand Canyon region: an obituary? pp. 124–177. *In: Colorado River Ecology and Dam Management, Proceedings of a Symposium, May 24–25, 1990, Santa Fe, New Mexico, National Academy Press, Washington, D.C.* 276 pp.
- Minckley, W.L. & J.E. Deacon (ed.) 1991. Battle against extinction: native fish management in the American West. University of Arizona Press, Tucson. 517 pp.
- Olson, D.E. & W.J. Scidmore. 1963. Homing tendency of spawning white suckers in Many Point Lake, Minnesota. *Trans. Amer. Fish. Soc.* 92: 13–16.
- Otis, E.O. 1994. Distribution, abundance, and composition of fishes in Bright Angel and Kanab creeks, Grand Canyon National Park, Arizona. M. Sc. Thesis, University of Arizona, Tucson. 196 pp.
- Ott, L. 1988. An introduction to statistical methods and data analysis. PWS-Kent Publishing, Boston. 935 pp.
- Pearsons, T.N., H.W. Li & G.A. Lamberti. 1992. Influences of habitat complexity on resistance of stream fish assemblages. *Trans. Amer. Fish. Soc.* 121: 427–436.
- Scopetone, G.C. 1988. Growth and longevity of the Cui-ui and longevity of other catostomids and cyprinids in Western North America. *Trans. Amer. Fish. Soc.* 117: 301–317.
- Snyder, D.E. & R.T. Muth. 1990. Descriptions and identification of razorback, flannelmouth, white, Utah, bluehead, and mountain sucker larvae and early juveniles. Technical Publication No. 38, Colorado Division of Wildlife. 152 pp.
- Spofford, W.D., A.L. Parker & A.V. Kneese. 1980. Energy development in the southwest. Johns Hopkins University Press, Baltimore. Vol. 1, 523 pp., Vol. 2, 541 pp.
- Suttkus, R.D. & G.H. Clemmer. 1976. Fishes of the Colorado River in Grand Canyon National Park. Proceedings of the First Conference on Scientific Research in the National Parks 1: 599–604.
- Trippel, E.A. & H.H. Harvey. 1989. Missing opportunities to reproduce: an energy dependent or fecundity gaining strategy in white sucker (*Catostomus commersoni*). *Can. J. Fish. Aquat. Sci.* 67: 2180–2188.
- Tyus, H.M. 1990. Potamodromy and reproduction of Colorado squawfish in the Green River Basin, Colorado and Utah. *Trans. Amer. Fish. Soc.* 119: 1035–1047.
- Tyus, H.M. & C.A. Karp. 1990. Spawning and movement of razorback sucker, *Xyrauchen texanus*, in the Green River Basin of Colorado and Utah. *Southw. Nat.* 35: 427–433.
- Vanicek, C.D., R.H. Kramer & D.R. Franklin. 1970. Distribution of Green River fishes in Utah and Colorado following closure of Flaming Gorge Dam. *Southw. Nat.* 14: 297–315.
- Weiss, S.J. 1993. Spawning, movement and population structure of flannelmouth sucker in the Paria River. M. Sc. Thesis, University of Arizona, Tucson. 153 pp.