

## Threatened fishes of the world: *Amblyopsis spelaea* DeKay, 1842 (Amblyopsidae)

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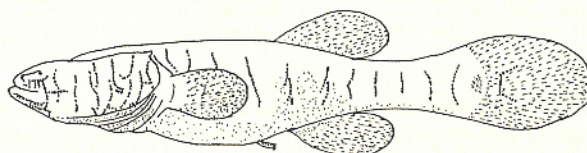
**Common name:** Northern cavefish (E).

**Conservation status:** Vulnerable (World Conservation Monitoring Centre), State endangered species (Indiana Department of Natural Resources), species of special concern (Kentucky Nature Preserves Commission).

**Identification:** This is one of the four species of troglotic (cave, blind, and depigmented) fishes of the family Amblyopsidae. It is

small, on average 84 mm SL, and range between 19 and 105 mm. Body depigmented with nonfunctional pigment cells. Looks pinkish due to the superficial blood vessels. Head length: 0.139–0.399; head width: 0.193–0.267; head depth: 0.150–0.236, D 9–11, A 8–11, P 9–11. Elongated body and head; head also depressed. Rudimentary eyes, hidden under the skin. Projecting jaw. Intermaxillaries and jaw covered by folds of skins or lips. Minute, slender, and slightly recurved teeth. Small cycloid scales, irregularly placed, and more or less embedded, so that the body appears naked. Lateral line present with external and internal neuromasts. Large branchial aperture with six branchiostegous rays on each side. Total gill rakers: 7. Total vertebrae: 29–30. Differs from *Amblyopsis rosae* in the number of dorsal, anal, and caudal rays, the presence of pelvic fin and other meristic characteristics.

**Distribution:** In about 2 500 caves in Kentucky and about 1 800 caves in southern Indiana. Its distribution may be limited by competition with another amblyopsid cavefish, *Typhlichthys subterraneus*. **Abundance:** unknown for its entire range. **Habitat and ecology:** Found only in caves and subterranean passages of well-developed karst terrain whose water comes from the precipitation diverted underground through sinkholes and sinking streams. It is most often found in caves with uniform silt-sand substrates. It is a top predator. **Reproduction:** It has a well-defined year cycle. Breeding occurs during high water from February to April. The females carry the eggs in their gill cavities until hatching and carry the young until they lose their yolk sacs, a total period of 4–5 months. Free swimming young appear in late summer and early fall. Low reproduction rate. **Threats:** This species occupies a highly restricted habitat. Vulnerable to any disturbance in the water such as ground water pollution, sedimentation, runoff, impoundments, quarrying, and overcollecting. **Conservation action:** It is not protected by U.S. federal law, but Indiana and Kentucky state agencies have taken some measures for its conservation. **Conservation recommendations:** Eliminate or reduce destructive land use practices, additional sediment and runoff control for construction projects, eliminate use of agrochemicals in critical watersheds, eliminate mineral development activities, eliminate water impoundment projects, limit access to sites. **Remarks:** It was first described from the streams of Mammoth cave by DeKay in 1842. Despite the lack of eyes it does respond to light by moving away from it (scotophilia).



Bergstrom, D.E., D.B. Noltie & T.P. Holtsford. 1995. Ozark cavefish genetics: the phylogeny of Missouri's Ozark cavefish (*Amblyopsis rosae*) and southern cavefish (*Typhlichthys subterraneus*). Missouri Department of Conservation, St. Louis. 42 pp.

DeKay, J.E. 1842. Zoology of New York or the New-York fauna. Part IV. Fishes. Albany: W. & A. White & J. Visscher (footnote on page 187).

Green, S.M. & A. Romero. 1997. Responses to light in two blind cave fishes (*Amblyopsis spelaea* and *Typhlichthys subterraneus*) (Pisces: Amblyopsidae). *Env. Biol. Fish.* 50: 167–174.

Keith, J.H. 1988. Distribution of northern cavefish, *Amblyopsis spelaea* DeKay, in Indiana and Kentucky and recommendations for its protection. *Natural Areas J.* 8: 69–79.

Poulson, T.L. 1963. Cave adaptations in amblyopsid fishes. *Amer. Midl. Natur.* 70: 257–290.

Woods, L.P. & R.F. Inger. 1957. The cave, spring, and swamp fishes of the family Amblyopsidae of central and eastern United States. *Amer. Midl. Natur.* 58: 232–256.

Wyman, J. 1843. Description of a 'Blind Fish' from a cave in Kentucky. *Ann. Mag. Natur. Hist.* 12: 298–299.

consistent for water velocity and the position relative to the substrate. Our results indicate that microhabitat variables associated with behavior, such as positioning relative to the substrate, can be important in habitat partitioning among stream fishes.

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### References cited

- Bain, M.B. 1985. Quantifying stream substrate for habitat analysis studies. *N. Amer. J. Fish. Manag.* 5: 499–506.
- Chipps, S.R., W.B. Perry & S.A. Perry. 1994. Patterns of microhabitat use among four species of darters in three Appalachian streams. *Amer. Midl. Nat.* 131: 175–180.
- Fisher, W.L. & W.D. Pearson. 1987. Patterns of resource utilization among four species of darters in three central Kentucky streams, pp 69–76. *In: W.J. Matthews & D.C. Heins (ed.) Community and Evolutionary Ecology of North American Stream Fishes*, University of Oklahoma Press, Norman.
- Greenberg, L.A. 1991. Habitat use and feeding behavior of thirteen species of benthic stream fishes. *Env. Biol. Fish.* 31: 389–401.
- Hlohowskyj, I. & A.M. White. 1983. Food resource partitioning and selectivity by the greenside, rainbow, and fantail darters (Pisces: Percidae). *Ohio J. Sci.* 83: 201–208.
- Hlohowskyj, I. & T.E. Wissing. 1986. Substrate selection by fantail (*Etheostoma flabellare*), greenside (*E. blennioides*) and rainbow (*E. caeruleum*) darters. *Ohio J. Sci.* 86: 124–129.
- Ingersoll, C.G. & D.L. Claussen. 1984. Temperature selection and critical thermal maxima of the fantail darter, *Etheostoma flabellare*, and the johnny darter, *E. nigrum*, related to habitat and season. *Env. Biol. Fish.* 11: 131–138.
- Kessler, R.K., A.F. Casper & G.K. Weddle. 1995. Temporal variation in microhabitat use and spatial relations in the benthic fish community of a stream. *Amer. Midl. Nat.* 134: 361–370.
- Kessler, R.K. & J.H. Thorp. 1993. Microhabitat segregation of the threatened spotted darter (*Etheostoma maculatum*) and closely related orangefin darter (*Ebellum*) *Can. J. Fish. Aquat. Sci.* 50: 1084–1091.
- Martin, F.D. 1984. Diets of four sympatric species of *Etheostoma* (Pisces: Percidae) from southern Indiana: interspecific and intraspecific multiple comparisons. *Env. Biol. Fish.* 11: 113–120.
- Matthews, W.J. 1985. Critical current speeds and microhabitats of the benthic fishes *Percina roanoka* and *Etheostoma flabellare*. *Env. Biol. Fish.* 12: 303–308.
- Page, L.M. 1978. Redescription, distribution, variation, and life history notes on *Percina macrocephala* (Percidae). *Copeia* 1978: 655–664.
- Page, L.M. & D.L. Swofford. 1984. Morphological correlates of ecological specialization in darters. *Env. Biol. Fish.* 11: 139–159.
- Paine, M.D., J.J. Dodson & G. Power. 1982. Habitat and food resource partitioning among four species of darters (Percidae: *Etheostoma*) in a southern Ontario stream. *Can. J. Zool.* 60: 1635–1641.
- Ross, S.T. 1986. Resource partitioning in fish assemblages: a review of field studies. *Copeia* 1986: 352–388.
- Schlosser, I.J. & L.A. Toth. 1984. Niche relationships and population ecology of rainbow (*Etheostoma caeruleum*) and fantail (*E. flabellare*) darters in a temporally variable environment. *Oikos* 42: 229–238.
- Simonson, T.D. 1993. Correspondence and relative precision of stream habitat features estimated at two spatial scales. *J. Freshw. Eco.* 8: 363–373.
- Smart, H.J. & J.H. Gee. 1979. Coexistence and resource partitioning in two species of darters (Percidae), *Etheostoma nigrum* and *Percina maculata*. *Can. J. Zool.* 57: 2061–2071.
- Stauffer, J.R., J.M. Boltz & L.R. White. 1995. The fishes of West Virginia. Academy of Natural Sciences of Philadelphia, Philadelphia. 389 pp.
- Stauffer, J.R., J.M. Boltz, K.A. Kellogg & E.S. van Snik. 1996. Microhabitat partitioning in a diverse assemblage of darters in the Allegheny River system. *Env. Biol. Fish.* 46: 37–44.
- Stiles, R.A. 1972. The comparative ecology of three species of *Nothonotus* (Percidae: *Etheostoma*) in Tennessee's Little River. Ph.D. Dissertation, University of Tennessee, Knoxville. 96 pp.
- Winn, H.E. 1958. Comparative reproductive behavior and ecology of fourteen species of darters (Pisces-Percidae). *Ecol. Monog.* 28: 155–191.