

# **Status and Distribution of Three Rare Illinois Fishes: Blacktail Shiner (*Cyprinella venusta*), Northern Starhead Topminnow (*Fundulus dispar*), and Cypress Darter (*Etheostoma proeliare*)**

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## **ABSTRACT**

The blacktail shiner (*Cyprinella venusta*), northern starhead topminnow (*Fundulus dispar*), and cypress darter (*Etheostoma proeliare*) are all species of special concern in Illinois. By compiling historical records from museums and sampling nearly all historical sites using standard collecting techniques, we conducted status surveys for these three species. Although the distribution of *E. proeliare* appears static, *F. dispar* has experienced a reduction in range due to human activities. The distribution of *C. venusta* is broader than previously documented; however, our sampling efforts and observations indicate low population levels.

## **INTRODUCTION**

The blacktail shiner, *Cyprinella venusta* (Cyprinidae), northern starhead topminnow, *Fundulus dispar* (Fundulidae), and cypress darter, *Etheostoma proeliare* (Percidae), are small teleosts found in Illinois waters. Although not currently listed as threatened or endangered, all three species have been placed on the Watch List by the Illinois Endangered Species Technical Advisory Committee on Fishes (Burr 1991). While common in central portions of their North American ranges, these species receive special status at the state level along their range boundaries. We summarize the findings of status surveys conducted from April - August 1992 of these three rare Illinois species. We also provide explanations for their current distributional patterns.

## **METHODS**

We visited and sampled virtually all known historical localities for *Cyprinella venusta*, *Fundulus dispar*, and *Etheostoma proeliare* within the state of Illinois during the spring

and summer of 1992. We compiled historical records by accessing museum records from the Southern Illinois University at Carbondale Ichthyological Collection (SIUC), the Illinois Natural History Survey Fish Collection (INHS), and the University of Michigan Museum of Zoology Fish Division (UMMZ). In addition to historical localities we sampled several new locations in an effort to document the presence of these species at new sites. We deposited all voucher specimens at SIUC. All sites were sampled using a standard 3.1 m minnow seine and/or 9.3 m bag seine with 4.8 mm mesh. A minimum of 0.75 hrs of collecting effort was expended at each site. Physical characteristics such as stream width, depth, current, substrate, and water clarity were recorded at each site along with the condition of the terrestrial habitat surrounding the site. Appendix 1 lists all sites at which we collected the three species.

## RESULTS AND DISCUSSION

### **BLACKTAIL SHINER, *Cyprinella venusta***

*Cyprinella venusta* is one of 27 described species in the genus *Cyprinella* (Mayden 1989), four of which occur in Illinois. The species generally occupies sand-bottomed pools and runs of small to medium sized streams, with upland populations occurring over substrates with more gravel and rubble in pools and runs (Page and Burr 1991).

*Cyprinella venusta* occurs from the Rio Grande drainage of Texas, east to the Suwannee River drainage, Georgia and Florida, and in the Mississippi River drainage (mostly in the Mississippi Embayment) from southern Illinois to Louisiana (Gilbert and Burgess 1980, Page and Burr 1991). In Illinois, Smith (1979) reported the species only from the Clear Creek drainage of extreme southwestern Illinois and from two locations on the Ohio River. Records at the UMMZ from the late 1930s to early 1940s indicate that *C. venusta* also was found in the lower Big Muddy River and the Cache River near its mouth.

We collected and verified *C. venusta* from four of 10 historical locations (Fig. 1). This suggests that *C. venusta* has probably disappeared from the Big Muddy River drainage but continues to persist in the Cache River, Orchard Creek, and Clear Creek drainages of southern Illinois. The collection of a few individuals from four sites in three separate drainages demonstrates that the species is somewhat more widespread than previously thought (Smith 1979). However, low numbers of individuals collected may reflect small population sizes.

A single historical record is known from the Big Muddy River at Rattlesnake Ferry (Fig. 1). This and several other sites on the lower Big Muddy have been sampled intensively over the past 30 years; all failed to produce *C. venusta*. In addition, this is the northernmost record for the species, and the individual captured in 1940 may represent a waif. Although suitable habitat exists at this site, it seems doubtful that a sizable population of this species has existed here in the past 30 years.

The two Ohio River records for *C. venusta* are represented by single specimens and also are probable waifs. The habitat at these sites is of marginal quality for the species. Most records come from much smaller streams where nearly all reproduction probably takes place. The extensive electrofishing and seining surveys of the lower Ohio River by the Ohio River Valley Water Sanitation Commission, the SIUC Fisheries Research

Laboratory, and several consulting firms have not revealed any recent records of *C. venusta*.

In the Cache River drainage, we found the species at one of two known historic sites. The lower Cache River has suffered historically from excessive erosion and high siltation rates. Much of the mainstem has been channelized and some of the flow has been shunted artificially back to the Ohio River through the Post-Creek Cutoff. Recent surveys of 25 Cache River stations by Illinois Department of Conservation stream biologists and at 19 stations by SIUC biologists (Phillippi et al. 1986) did not reveal *C. venusta*. We presume that the species is rare in the drainage and only occurs in the extreme lower reaches.

*Cyprinella venusta* has been collected twice (1982 and 1992) from Orchard Creek, a small, direct tributary of the Mississippi River. Habitat quality is marginal as judged from the soft mud substrate and lack of obvious spawning sites (e.g., crevices under bark on logs, between large rocks, etc. [Heins 1990]). Because of the lack of spawning substrate it seems unlikely that a breeding population exists here.

The Clear Creek system has historically been a consistently productive stream for *C. venusta* in Illinois. Records from the drainage date from 1881 to present, indicating that breeding populations almost certainly occur within this drainage. Permanent flow, firm gravel substrates, and available spawning sites are habitat qualities that have undoubtedly contributed to the success of the species in the drainage.

*Cyprinella venusta* is known to frequently hybridize with the red shiner, *C. lutrensis*, in both the laboratory and in nature (Hubbs and Strawn 1956). Both Clear Creek collections made during our 1992 survey contained individuals intermediate between *C. venusta* and *C. lutrensis*. Alteration of stream conditions has been considered a major factor in the breakdown of reproductive isolating mechanisms and the subsequent production of introgressive hybrids (Hubbs and Strawn 1956). The various habitat changes in Clear Creek (e.g., stream channelization, excessive gravel removal and concomitant removal of instream cover, denuding of banks resulting in high summer stream temperatures, and siltation) have produced conditions favorable for the ecologically labile *C. lutrensis* (Matthews and Hill 1977) and may have elevated rates of hybridization between the two species.

#### **NORTHERN STARHEAD TOPMINNOW, *Fundulus dispar***

The northern starhead topminnow is one of 27 recognized species in the genus *Fundulus* (Fundulidae), five of which occur in Illinois. Primarily a surface dweller, this species is found in lowland lakes, swamps, sloughs, and quiet backwaters of streams and rivers. *Fundulus dispar* occurs in the central Mississippi River drainage from the Ouachita River drainage, Louisiana, north to the Wisconsin River drainage, Wisconsin, and east to the headwaters of the Kankakee River drainage, Indiana (Wiley 1980, Page and Burr 1991). Within Illinois, Smith (1979) described the distribution of *F. dispar* as extremely sporadic, with records from the Fox River Chain of Lakes, Pecatonica, Kankakee, central and lower Illinois, and lower Wabash river drainages and the LaRue-Pine Hills Ecological Area/Big Muddy River drainage.

We collected and verified *Fundulus dispar* from only four of 23 historical locations, and at one site not known previously to harbor the species (Fig. 2). We therefore conclude that the species' range has been significantly reduced since the time of Smith's (1979) statewide survey, conducted from 1950-1978.

We collected *F. dispar* at two of seven lakes in the Fox River Chain of Lakes where the species was known to occur, and observed large numbers of individuals at both sites. Since this species inhabits quiet, sheltered areas and spawns in aquatic vegetation (Taylor 1993), extensive residential development of shorelines and removal of aquatic vegetation has had the greatest negative effect on *F. dispar* in this area. If present urbanization trends continue, this species will likely experience additional declines in population size and distribution.

In the Pecatonica River drainage in Illinois, one historical record exists for *F. dispar* from the Sugar River, Winnebago County. We did not find *Fundulus dispar* at this site, but collected two individuals in nearby Racoon Creek, a new record for the species in the Pecatonica River drainage. These two collections presumably represent remnants of a once larger population. Extensive agricultural land use, resulting in high sediment loads in streams, have reduced the amount and quality of habitat available for *F. dispar* in this drainage.

No *F. dispar* were collected in the Kankakee River drainage during our survey. Five historical locations in this drainage were sampled. In addition to our efforts, the U. S. Geological Survey sampled nine other sites in the Kankakee River drainage during their 1990 survey of the upper Illinois River Basin, but failed to collect *F. dispar* (Warren 1991). A single specimen collected in 1989 from the Kankakee River mainstem in Will County suggests that small populations still exist within the drainage. Continued residential development along shorelines and high nutrient and siltation loads (IEPA 1990) have likely contributed to loss of habitat for this species.

In the central and lower Illinois River drainage, *F. dispar* was collected at one of 10 historical locations. Several recent collections at this site (Fig. 2) indicate that this a stable population. Since all Illinois River mainstem locations predate 1900, we believe these populations have been extirpated as a result of excessive channelization, loss of vegetation, siltation, and water level manipulation (Mills et al. 1966). Two records dating 1967 and 1972 from sloughs along the lower Illinois River (Calhoun and Jersey Cos.) suggest that populations may still occur in this portion of the drainage.

The LaRue-Pine Hills Ecological Area supports the largest and most stable population known in Illinois, as evidenced by numerous historical records and observations made during our survey. The Ecological Area, a 808 hectare section of the Shawnee National Forest, is comprised mostly of bottomland swamp occupying an old channel of the Big Muddy River. Because this area is under the protection of the U. S. Forest Service as a Research Natural Area, the continued existence of this population seems assured.

Forbes and Richardson (1908) reported *F. dispar* from five localities along the lower Wabash River drainage below the mouth of the Embarras River. Since all records predate 1900 and a recent and extensive survey of the wetlands of the lower Wabash and Ohio

Rivers (Burr and Warren 1987) failed to reveal the presence of *F. dispar*, we omitted this area from our field work. Smith (1979) also failed to find the species in these drainages during his statewide survey and listed oil pollution and drainage of floodplain swamp habitats as reasons for its disappearance. We presume the species has been extirpated in this portion of its range.

**CYPRESS DARTER, *Etheostoma proeliare***

The cypress darter, *Etheostoma proeliare*, one of 20 species of *Etheostoma* in Illinois, is one of the smallest species of darters. It has an affinity for protective cover such as leaves, vegetation, sticks, and exposed tree roots along undercut banks of small to large streams and the margins of lowland creeks, swamps, and sloughs (Burr 1978).

Primarily a Coastal Plain species, this fish occurs east to the Choctawhatchee River, Florida, southwest to the San Jacinto River, Texas, and north through lowland areas to the Big Muddy River, Illinois (Burr 1978). In Illinois, *E. proeliare* is known from only a few localities in the extreme southern part of the state (Burr 1978, Smith 1979).

Our field work resulted in the collection and verification of *E. proeliare* from eight of 15 known historical locations, and two sites not known previously to harbor the species (Fig 3). In addition, Illinois Department of Conservation stream biologists collected *E. proeliare* at two previously unrecorded sites in the Cache River drainage during the spring of 1992. Our results suggest that *E. proeliare* has probably disappeared from the Big Muddy and Wabash River drainages, but continues to persist, sometimes commonly, in both the Cache River and Bay Creek drainages of southern Illinois. Collection of individuals from 12 sites demonstrates that the species is nearly as common as it was during the time of Smith's (1979) surveys (Fig. 3). Since we did not voucher all individuals encountered, numbers of individuals reported do not necessarily reflect population levels for this species.

Within the Big Muddy River drainage three historical records are known from Kincaid Creek prior to its impoundment in 1970 to create Kincaid Lake. Kincaid Creek is now greatly altered below the dam and consists of a narrow, deep, meandering channel subject to over-flow from the dam. Steep banks and deep water make the creek difficult to sample and a lack of sufficient instream cover provides little suitable habitat for *E. proeliare*. Two of the historical locations (from 1937 and 1939) are now part of the Kincaid Lake impoundment, and it is unlikely that the species survives in the lake. Our sampling at the remaining site below the dam failed to reveal *E. proeliare*.

Of six historical locations known from the Bay Creek-Ohio River drainage we found *E. proeliare* at five sites and at one site previously unreported. Stream channelization, impoundment, and siltation pose the greatest threats to *E. proeliare* in this area. Shaded streams in this drainage with riparian buffer zones, spring seeps, and accumulated instream cover seem to provide optimum habitat and offer the best sites for continued existence of the species in Illinois.

Of six historical locations within the Cache River drainage, we found the species at three sites and three additional sites previously unreported. The new sites were all geographically close to historical sites and do not result in a dramatic range extension for

the species. The threats to *E. proeliare* habitat in this drainage mirror those from the Bay Creek drainage. As previously mentioned, the lower Cache River appears to have suffered historically from excessive erosion and consequently has greater siltation rates. In addition, more of the Cache watershed where *E. proeliare* is known to occur has been developed as crop or pastureland than that of Bay Creek.

A literature record exists for *E. proeliare* (as *Microperca punctulata*) from the Skillet Fork (Wabash River), Wayne County (Large 1903). Voucher specimens could not be located for this collection (Burr 1978), and we did not visit the site during this survey since there have been no subsequent records for the drainage.

## CONCLUSIONS

The conservation status of *E. proeliare* throughout its Illinois range appears to be stable, with most known historical populations extant. However, stream channelization and an impoundment have contributed to the extirpation of at least one drainage population (Big Muddy River). *Fundulus dispar* has experienced a dramatic reduction in range over the past 15 years. Loss of habitat due to stream channelization, drainage of wetlands, and clearing for development are the most likely causes. Although the distribution of *C. venusta* in Illinois has remained fairly static, numbers of individuals captured were low. This may be due, in part, because Illinois populations of *C. venusta* are on the northern edge of their range and are somewhat isolated from a stable source pool, resulting in poor recruitment.

The apparent extirpation of *F. dispar* from a significant portion of its Illinois range warrants reconsideration of its conservation status. We recommend that the species be elevated from the Watch List category to endangered in Illinois. The extirpation of the Big Muddy River population of *E. proeliare* and its persistence at a number of localities restricted to southern Illinois indicate that it should remain on the Watch List for further monitoring. The small Illinois range, precariously low numbers of individuals, and evidence of continued hybridization with *C. lutrensis* suggests that *C. venusta* should be elevated from the Watch List to threatened in Illinois. A study of the extent of hybridization between *C. lutrensis* and *C. venusta* would provide for a more informed decision regarding the genetic "purity" and conservation status of the Illinois populations of *C. venusta*.

## ACKNOWLEDGMENTS

We wish to thank Kevin S. Cummings, Lawrence M. Page, and Christine A. Mayer of the Center for Biodiversity, INHS, for providing us with a list of Illinois collection records from the INHS Fish Collection. Randy A. Sauer, Illinois Department of Conservation, provided information about sites he sampled recently in the Cache River drainage. We are grateful to Randy for depositing his valuable fish collections at SIUC. Douglas W. Nelson, UMMZ, provided information on early records of *C. venusta* in Illinois. We are especially grateful to Brett J. Dunn and the SIUC Spring-Term ichthyology class for assistance in the field. Regina J. Paul assisted with sorting, cataloguing, and curating the approximately 50 fish collections made for this survey. Funding was provided by the Illinois Department of Conservation.

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Appendix 1. Sites at which *Cyprinella venusta*, *Fundulus dispar*, and *Etheostoma proeliare* were collected during 1992. Number of specimens vouchered and SIUC catalog number are indicated in parentheses. An asterisk indicates previously unpublished locality.

**Blacktail Shiner, *Cyprinella venusta***

Mississippi River drainage

- \* Site 1. Alexander Co., Orchard Creek at old R.R. overpass, 2.8 km S of Thebes, T29N, R3W, Sec. 21 (3, SIUC 19452).
- Site 2. Union Co., Clear Creek, 3.2 km E Reynoldsville, T13S, R2W, Sec. 20 (3, SIUC 19468).
- Site 3. Alexander Co., Clear Creek, 3.2 km E. McClure, T14S, R3W, Sec. 1 (2, SIUC 19954).

Ohio River drainage

- Site 4. Alexander/Pulaski Co., Cache River just E of jct. Hwy. 3 and Hwy. 127, T16S, R16E, Sec. 12 (1, SIUC 19964).

**Northern Starhead Topminnow, *Fundulus dispar***

Illinois River drainage

- Site 1. Mason Co., Crane Creek at Co. Rd. 1200N, 3.2 km W Easton, T21N, R7W, Sec. 27 (4, SIUC 19772).

Fox River Chain of Lakes

- Site 2. Lake Co., East Loon Lake 2.4 km N town of Lake Villa, T46N, R10E, Sec. 21 (3, SIUC 19777).
- Site 3. Lake Co., Little Silver Lake just E of Antioch, T46N, R10E, Sec. 16 (3, SIUC 19760).

Pecatonica River drainage

- \* Site 4. Winnebago Co., Racoon Creek at Yale Bridge Rd., 6.4 km WNW Rockton, T46N, R1E, Sec. 8 (2, SIUC 19787).

Clear Cr.-Mississippi River drainage

- Site 5. Union Co., La Rue-Pine Hills Ecological Area, T11S, R3W, Sec. 21 (3, SIUC 21687).

**Cypress Darter, *Etheostoma proeliare***

Bay Cr.-Ohio River drainage

- Site 1. Johnson Co., Max Creek at Hwy. 127, 4 km SW Simpson, T12S, R4E, Sec. 19 (4, SIUC 19409).
- Site 2. Johnson Co., Max Creek at Cedar Lake Rd., 2.3 km S jct. w/Hwy. 147, T12S, R4E, Sec. 28 (1, SIUC 19353).
- \* Site 3. Johnson Co., Cedar Creek at Hwy. 147, in Simpson, T12S, R4E, Sec. 22 (3, SIUC 19414).
- Site 4. Pope Co., Hayes Creek at Hwy. 145, 4.8 km E Glendale, T12S, R5E, Sec. 23 (1, SIUC 19424).
- Site 5. Pope Co., Sugar Creek at Hwy. 146, 1.6 km W Dixon Springs, T13S, R5E, Sec. 5 (1, SIUC 19373).
- Site 6. Bay Creek at Hwy. 145, 3.2 km S Dixon Springs, T14S, R5E, Sec. 5 (2, SIUC 19393).

Cache River drainage

- Site 7. Alexander Co., Sandy Creek at Diswood, T15S, R2W, Sec. 10 (32, SIUC 19298).
- Site 8. Alexander/Pulaski cos., Mill Creek 2.4 km WNW Ullin, T14S, R1W, Sec. 22 (4, SIUC 19921).
- Site 9. Pulaski Co., Mill Creek 3.2 km W Ullin, T14S, R1W, Sec. 28 (8, SIUC 19889).
- \* Site 10. Union Co., Big Creek 1.6 km E Dongola, T13S, R1E, Sec. 30 (1, SIUC 19952).
- \* Site 11. Johnson Co., Lick Creek 1.6 km NE Elvira, T12S, R2E, Sec. 6 (5, SIUC 19951).

Ohio River drainage

- \* Site 12. Alexander/Pulaski cos., Cache River just E jct. Hwy. 3 and Hwy. 127, T16S, R16E, Sec. 12 (1, SIUC 19974).

Figure 1. Distribution of *Cyprinella venusta* in Illinois. Dots represent localities with extant voucher material but not necessarily extant populations. Data are: year of collection(s) followed by the number of specimens taken. A, Big Muddy River. B, Clear Creek. C, Orchard Creek. D, Cache River. E, Ohio River.

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Figure 2. Distribution of *Fundulus dispar* in Illinois. Dots represent localities with extant voucher material but not necessarily extant populations. Data are: year of collection(s) followed by the number of specimens taken. A, Sugar-Rock River. B, Fox River Chain-of-Lakes. C, Wolf Lake. D, Kankakee River. E, Illinois River. F, Wabash River. G, LaRue-Pine Hills Ecological Area.

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Figure 3. Distribution of *Etheostoma proeliare* in Illinois. Dots represent localities with extant voucher material but not necessarily extant populations. Data are: year of collection(s) followed by the number of specimens taken. A, Kincaid Creek. B, Cache River. C, Bay Creek. D, Alcorn Creek.

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