

# Imperiled Fishes in Mississippi

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othing gets a fish enthusiast more excited than to hear tales of the rich diversity of tropical fish faunas. Indeed, many of us perhaps honed our interests in fishes by keeping tetras or cichlids in aquaria.

Notwithstanding the richness of tropical freshwater fish faunas, many do not realize that the southeastern region of the United States also supports an impressive diversity of fishes. This area, referred to as a “piscine rainforest” by Warren and Burr (1994), holds the richest freshwater fish fauna on the North American continent north of México (Warren et al., 1997). Among southeastern states, Mississippi ranks fifth in native freshwater fish diversity. The four states with greater numbers of native freshwater fish species are Tennessee (297; Etnier and Starnes, 1993), Alabama (257), Kentucky (220), and Georgia (219; modified from Warren and Burr, 1994).

On closer examination, the inland fish fauna of Mississippi is comprised of 25 orders, 54 families, and 288 species. Of these species, 204 are freshwater or diadromous natives. The remainder includes 69 primarily estuarine or marine species that commonly enter fresh water, nine species that were introduced into Mississippi from regions outside North America, and six species that are native to North America but transplanted into Mississippi (Ross, 2000).

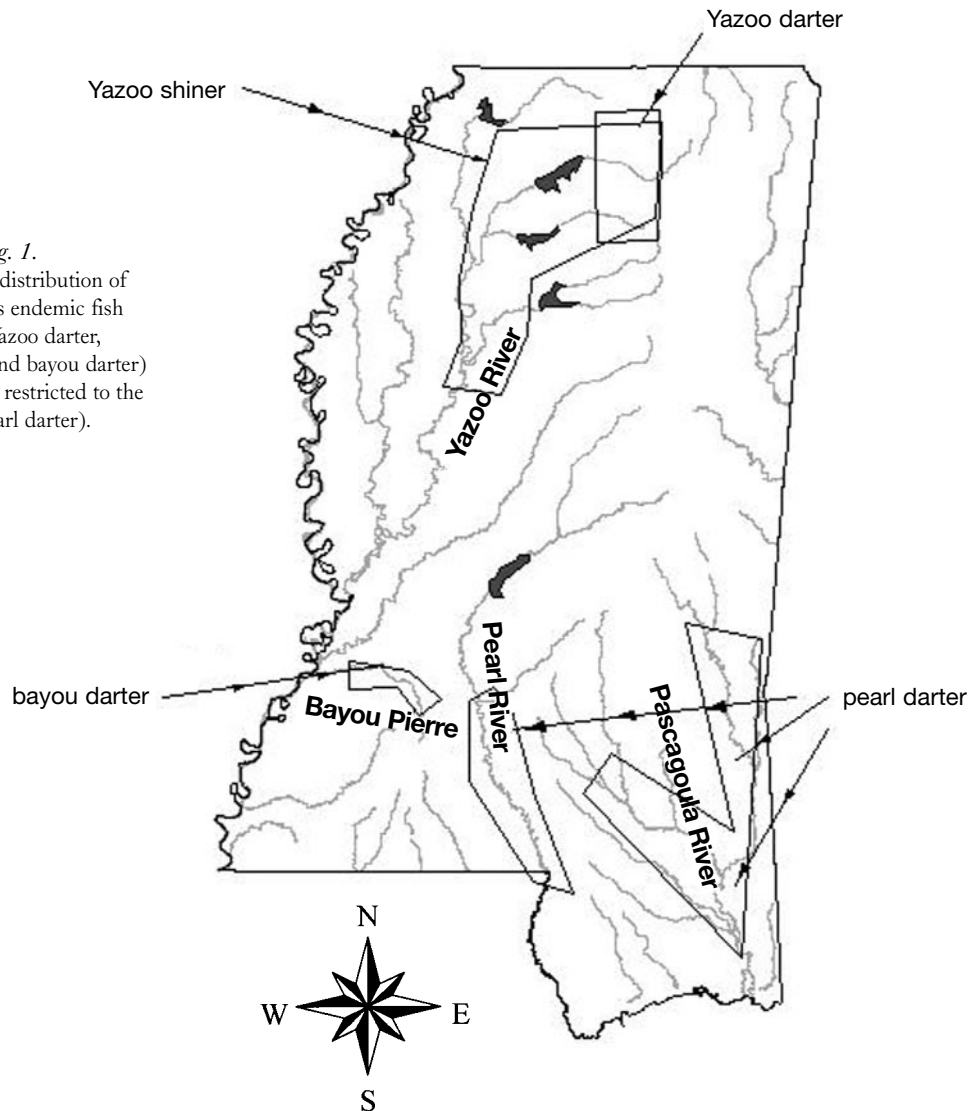
Three species are endemic to the state (Fig. 1). The bayou darter (*Etheostoma rubrum*, Fig. 2) only occurs in the Bayou Pierre system south of Vicksburg. Both the Yazoo shiner (*Notropis rafinesquei*, Fig. 3) and the Yazoo darter (*Etheostoma raneyi*, Fig. 4) are restricted to streams of the Yazoo drainage in northwestern Mississippi. A fourth species, the pearl darter (*Percina aurora*), occurs only in the Pearl and Pascagoula drainages of Mississippi and Louisiana (Fig. 5). Because Louisiana populations of this species are apparently extirpated, the pearl darter is now restricted solely to Mississippi.

A number of additional species, such as the southeastern blue sucker (*Cypleptus meridionalis*, see pg. 26), the Tombigbee darter (*Etheostoma lachneri*), the frecklebelly madtom (*Noturus munitus*), the cherryfin shiner (*Lythrurus roseipinnis*), and the broadstripe topminnow (*Fundulus euryzonus*), have a large portion of their range within Mississippi waters.

Although Mississippi and the southeastern region possess diverse fish faunas, this diversity is now at risk. Today, in the contiguous United States, 108 taxa of fishes (including species, subspecies, and some undescribed forms) are federally listed as endangered or threatened (FWS, 1996a).<sup>1</sup> Nationwide, an additional 15 species are listed as either proposed or candidate taxa (FWS, 1996b), bringing the number of fish taxa at risk to 123. However, because of the tedious, time-consuming, and often highly political process of listing species by the federal government, this figure greatly underestimates the number of species that are truly at risk.

Other estimates of at-risk fish species are provided by the American Fisheries Society (AFS) and state natural heritage programs. In 1989, 245 taxa in the United States (plus an additional 119 in Canada and México) were recognized by the AFS as species at-risk (Williams et al., 1989) which included 61 endangered taxa, 85 threatened taxa, and 99 taxa of special concern. As an indication of how well we as a nation have performed as stewards of our natural resources, these 245 fish taxa represent 31% of the United States’ native freshwater fish fauna. Since 1890, 40 fish taxa (including species and subspecies) have gone extinct in North America (Williams and Miller, 1990). When added to the 245 taxa at

<sup>1</sup> When a species is listed as endangered, there is good reason to believe that it is on the verge of extinction. Threatened is used to refer to species that are at immediate risk of becoming endangered. These two terms, when applied by the U.S. Fish and Wildlife Service (FWS) or by some state agencies, legally mandate federal or state protection.



*Fig. 1.*  
The general distribution of Mississippi's endemic fish species (Yazoo darter, Yazoo shiner, and bayou darter) or species now restricted to the state (pearl darter).

risk, our performance as stewards becomes even more dismal, with 36% of our native fishes lost or in danger of being lost.

Imperilment of fishes is particularly high in the western and southern regions of the United States. In fact, Warren and Burr (1994) argue that "the South is on the brink of an extinction crisis in fishes in which more taxa may be lost than the total native fish faunas of some western states!" There are 14 species from Mississippi (two endangered, eight threatened, and four of special concern) included on the AFS list.

Perhaps the best insight on degree of imperilment is provided by state natural heritage programs, since these recommendations are based on regular input from biologists working in the field. State natural heritage programs use a ranking system developed by the Nature Conservancy. A partial listing of state ranks used in this system includes:

- S1** critically imperiled because of extreme rarity, or because of other factors making a species especially vulnerable to extirpation
- S2** imperiled because of rarity, or because of other factors making a species vulnerable to extirpation
- S3** rare or uncommon in the state
- S4** apparently secure in the state
- S5** demonstrably secure within the state
- SH** of historical occurrence in the state, perhaps not verified in the past 20 years, and suspected of still being extant
- SA** accidental, in the sense of being a waif, i.e., a species that does not normally occur in the state (Mississippi Natural Heritage Program, 1998)

The state ranks of Mississippi fishes are based on an ongoing collaboration with biologists at the Mississippi

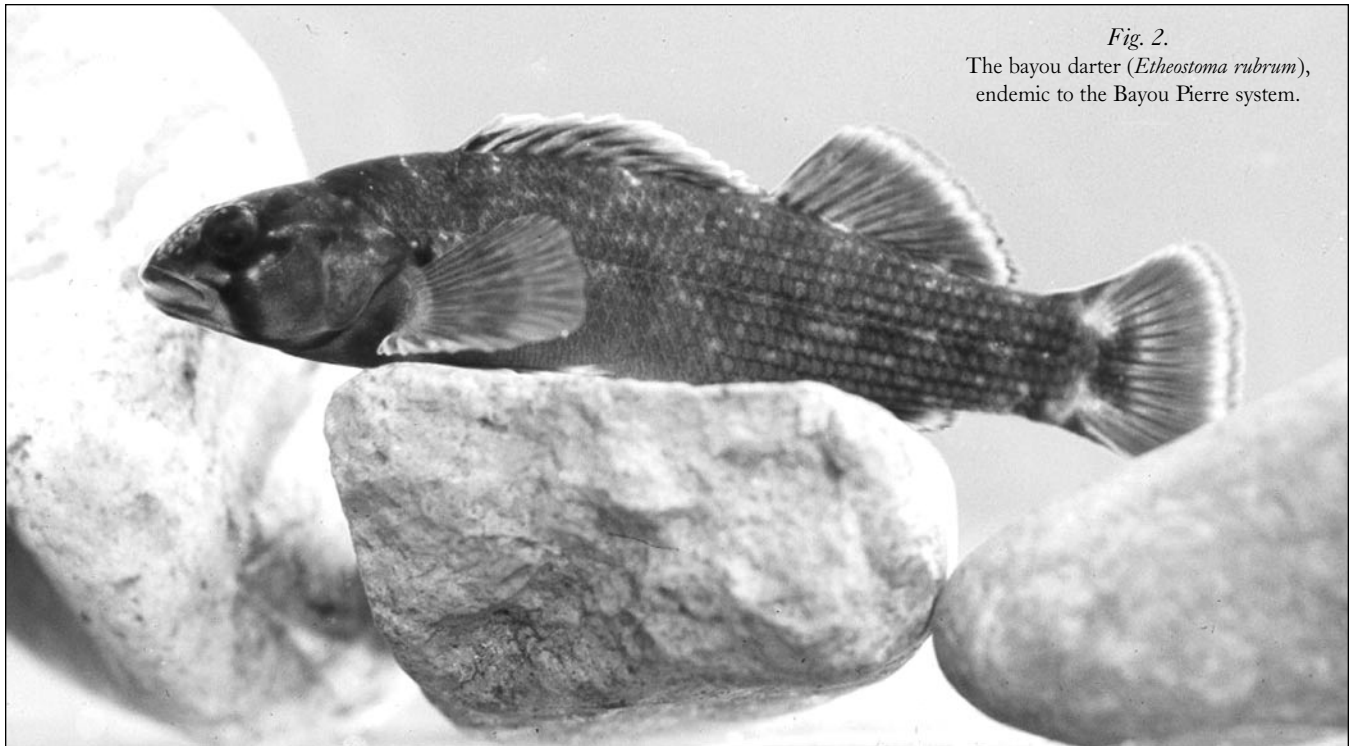


Fig. 2.  
The bayou darter (*Etheostoma rubrum*),  
endemic to the Bayou Pierre system.

Natural Heritage Program and Mississippi Museum of Natural Science and represent a consensus opinion (as of February 1999). Because ranks are dynamic, they are given herein as: (1) special concern (corresponding to state Heritage categories S1, S2, S3, and SH); (2) apparently secure (corresponding to state Heritage categories S4 and S5); and (3) accidental (state Heritage category SA).

At present, there are seven species officially recognized as endangered in Mississippi (Mississippi Department of Wildlife, Fisheries and Parks, 1994), and an additional 64 considered as species of special concern. Consequently, 70 species comprising 35% of Mississippi's native fish fauna are to some degree imperiled.

Primary reasons for the loss of fish species include: (1) physical habitat loss or damage, (2) chemical pollution, (3) overexploitation, and (4) introduction of nonnative species (Warren and Burr, 1994). Nonnative fish species are considered "exotics" if they are from a different country or "transplants" if they are located outside of their natural ranges but within their country of origin. At present, the Mississippi fish fauna contains at least 10 exotic species and six species transplanted from other regions of Mississippi or the United States. Although some of the exotic species are uncommon, goldfish, common carp, and grass carp are particularly widespread.

The introduction of nonnative fishes has been described as a "game of environmental roulette where the stakes are

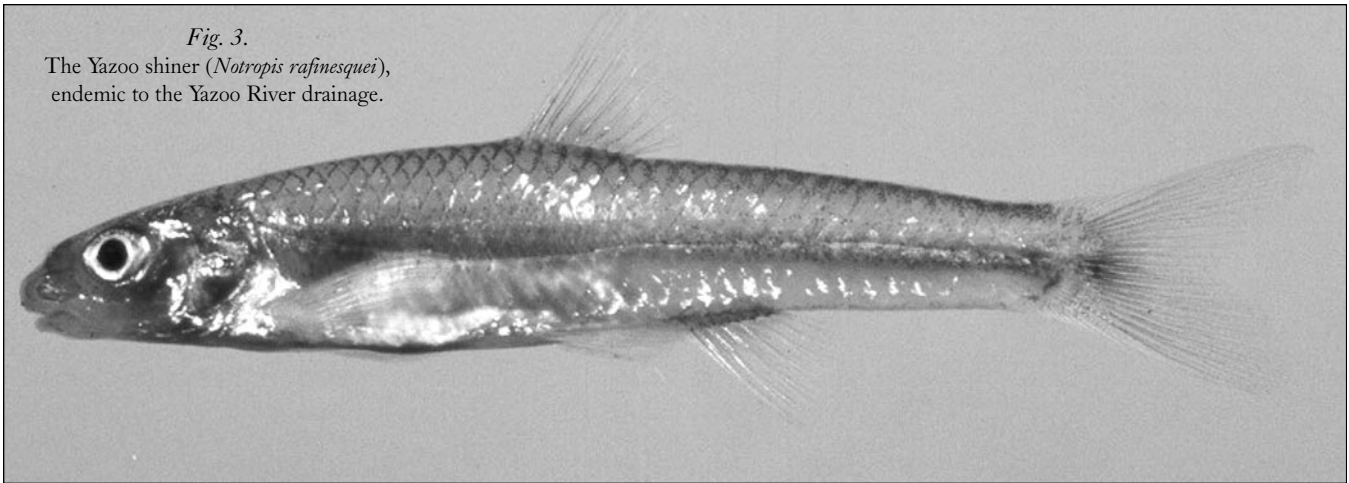
often high and the chances of winning are exceedingly low" (Courtenay and Hensley, 1980). When a species is removed from the ecosystem in which it evolved and is placed in a different system, the natural checks and balances may no longer be operative. If the nonnative species persists in the new environment, then it may displace or even eradicate native species.

There are numerous cases documenting damage to native fishes by nonnative fish species (e.g., Ross, 1991; Courtenay, 1993). In the Southeast, grass carp (*Ctenopharyngodon idella*) have been introduced to control aquatic plants, many of which are also exotics. Grass carp are now spawning in the wild and have the potential to cause a widespread, detrimental impact on the native fish fauna by eliminating or reducing submerged aquatic vegetation. For instance, in the Black Creek system of the Pascagoula drainage, 13 species tend to occur primarily in vegetated areas (Baker and Ross, 1981; Ross et al., 1987). If vegetation were removed or substantially reduced, it is highly likely that most or all of these species would suffer decreases in abundance. These species include the recreationally important basses and sunfishes, as well as numerous smaller ecologically and aesthetically important species, such as minnows, darters, and madtom catfishes.

Everyone has an opportunity to help restrict the spread of nonnative fishes and thus enhance our native fish resources. In particular, anglers should avoid using nonnative

*Fig. 3.*

The Yazoo shiner (*Notropis rafinesquei*),  
endemic to the Yazoo River drainage.



bait species such as goldfish or the European rudd. Aquarists can contribute by making sure nonnative aquarium fishes and vegetation are not released into natural waters. Unfortunately, over one-half of the exotic fishes established in U.S. waters have come from the aquarium industry (Courtenay, 1993). It is unlawful to stock or cause fish to be released into public waters of Mississippi without a permit from the Mississippi Department of Wildlife, Fisheries and Parks.

The successful establishment of nonnative fishes increases in likelihood as natural habitats become altered, usually through the activities of humans. Such alterations may decrease the survival of native fishes, thus lessening the chance of the introduced fishes being eliminated by interactions such as predation or competition (Ross, 1991), or may simply provide a habitat more suited to the nonnative fishes. Activities that have resulted in the establishment of nonnative fishes include channelization, dam and reservoir construction, and changes in water quality due to agriculture, urbanization, and industrialization. Fish populations may suffer in many ways including loss of spawning or feeding habitats, decreased genetic exchange among populations, and changes in seasonal flow and temperature patterns. Fragmentation of moderate and large rivers by dams, interbasin diversions, and irrigation has been extreme on a national and worldwide level. Within the contiguous United States there remains only one large river drainage that has not been dammed or otherwise modified on its main channel (Dynesius and Nilsson, 1994). This river drainage is the Pascagoula, located in southeastern Mississippi. However, despite this unique acclaim, the Pascagoula is presently threatened by a dam on one of its upstream tributaries, the Bouie River.

The increasing pressures being placed upon our use of natural resources require careful assessment of how these

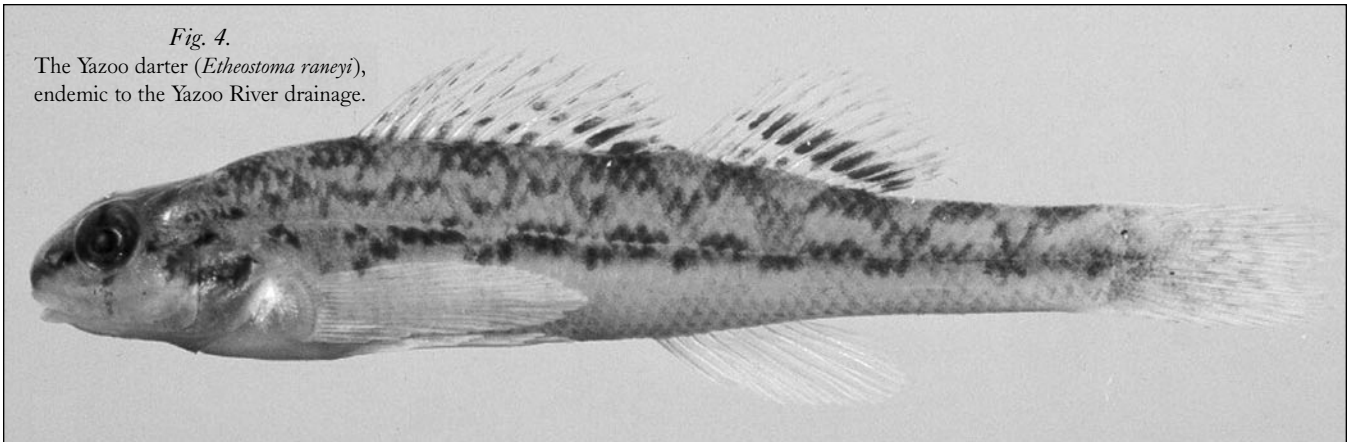
demands, both individually and collectively, impact our natural environment. Perhaps no better guidelines for making wise decisions about land use have been offered than those proposed by the great American conservationist Aldo Leopold (1966), who said, "Quit thinking about decent land-use solely as an economic problem. Examine each question in terms of what is ethically and esthetically right, as well as what is economically expedient. A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise."

#### Literature Cited

- Baker, J. A., and S. T. Ross. 1981. Spatial and temporal resource utilization by southeastern cyprinids. *Copeia* 1981 (1): 178-189.
- Courtenay, W. R., Jr. 1993. Biological pollution through fish introductions, p. 35-61. *In: McKnight, B. N. (Ed.) Biological pollution: the control and impact of invasive exotic species.* Indianapolis: Indiana Academy of Sciences.
- , and D. A. Hensley. 1980. Special problems associated with monitoring exotic species, p. 281-307. *In: Hocutt, C. H., and J. R. Stauffer, Jr. (Eds.) Biological monitoring of fish.* Lexington, Mass.: Lexington Books.
- Dynesius, M., and C. Nilsson. 1994. Fragmentation and flow regulation of river systems in the northern third of the world. *Science* 266: 753-762.
- Etnier, D. A., and W. C. Starnes. 1993. *The fishes of Tennessee.* Knoxville: University of Tennessee Press.
- FWS (U.S. Fish and Wildlife Service). 1996a. U.S. listed vertebrate animal species index by lead region and status as of March 31, 1996. FWS home page (<http://www.fws.gov/~r9endspp/96cnorwt.html>).

Fig. 4.

The Yazoo darter (*Etheostoma raneyi*), endemic to the Yazoo River drainage.



- . 1996b. Endangered and threatened wildlife and plants: review of plant and animal taxa that are candidates for listing as endangered or threatened species. 50 CFR, Pt. 17. U.S. Fish and Wildlife Service, Washington, D.C.
- Leopold, A. 1966. *A Sand County almanac, with essays on conservation from Round River*. NY: Ballantine Books.
- Mississippi Department of Wildlife, Fisheries and Parks. 1994. Official state list of endangered and threatened vertebrates. Public Notice No. 3357 [30 March 1994].
- Mississippi Natural Heritage Program. 1998. Mississippi Natural Heritage Program zoological master list of special animals. Mississippi Museum of Natural Science, Jackson.
- Ross, S. T. 1991. Mechanisms structuring stream fish assemblages. Are there lessons from introduced species? *Environmental Biology of Fishes* 30: 359-368.
- . 2000. *The inland fishes of Mississippi*. Jackson: University Press of Mississippi.
- , J. A. Baker, and K. E. Clark. 1987. Microhabitat partitioning of southeastern stream fishes: temporal and spatial predictability, p. 42-51. *In*: Matthews, W. J., and

D. C. Heins (Eds.). *Evolutionary and community ecology of North American stream fishes*. Norman: University of Oklahoma Press.


- Warren, M. L., Jr., and B. M. Burr. 1994. Status of freshwater fishes of the United States: overview of an imperiled fauna. *Fisheries* 19 (1): 6-18.
- , P. L. Angermeier, B. M. Burr, and W. R. Haag. 1997. Decline of a diverse fish fauna: patterns of imperilment and protection in the Southeastern United States, p. 105-164. *In*: Benz, G. W., and D. E. Collins (Eds.). *Aquatic fauna in peril: the southeastern perspective*. Special Publication 1, Southeast Aquatic Research Inst. Decatur, Ga.: Lenz Design and Communications.
- Williams, J. E., and R. R. Miller. 1990. Conservation status of the North American fish fauna in fresh water. *Journal of Fish Biology* 37 (Suppl. A): 79-85.
- , J. E. Johnson, D. A. Hendrickson, S. Contreras-Balderas, J. D. Williams, M. Navarro-Mendoza, D. E. McAllister, and J. E. Deacon. 1989. Fishes of North America endangered, threatened or of special concern: 1989. *Fisheries* 14 (6): 2-20. 



Fig. 5. The pearl darter (*Percina aurora*), endemic to the Pearl and Pascagoula River drainages. Now assumed to be extirpated from the Pearl drainage.