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NEW DISTRIBUTION RECORDS OF GULF SLOPE DRAINAGE FISHES IN THE OCMULGEE RIVER SYSTEM, GEORGIA

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ABSTRACT

Recent fish surveys in the Ocmulgee River system (Altamaha River drainage) in central Georgia by biologists from the Georgia Department of Natural Resources (GDNR) have revealed new distribution records for eight primarily Gulf Slope Drainage species: the eastern blacktail shiner *Cyprinella venusta cercostigma*, blacktip shiner *Lythurus atrapiculus*, silverjaw minnow *N. buccatus*, longnose shiner *N. longirostris*, weed shiner *N. texanus*, flathead catfish *Pylodictus olivaris*, longear sunfish *Lepomis megalotis*, and shoal bass *Micropterus* sp. The five cyprinids are lowland species confined primarily to Coastal Plain streams in the southern portions of their ranges, except in the Chattahoochee and Flint river systems where the species extend significantly above the Fall Line. New records for most of the cyprinids are centered on western tributaries of the Ocmulgee River system in upland, Piedmont portions of the watershed. These western Ocmulgee River tributaries lie in close proximity to eastern tributaries of the upper Flint River, which are suggested as the source of the transfer. Whether the transfer was natural or the result of "bait-bucket" introduction can not be ascertained from available information. Flathead catfish and shoal bass were introduced into the Ocmulgee River in the mid-1970's by GDNR personnel. The source of the population of longear sunfish is unknown. Several of the new record species have close congeners in the Ocmulgee River with which they could conceivably hybridize or compete. Occurrences of a number of native bullhead, sucker and sunfish species are lower in the presence of flathead catfish. We hypothesized that flathead catfish are reducing their populations through direct predation.

INTRODUCTION

Recent fish surveys in the Ocmulgee River system (Altamaha River drainage) in central Georgia (Evans, 1991; Schleiger, in preparation) have revealed new distribution records for eight primarily Gulf Slope Drainage species: the eastern blacktail shiner *Cyprinella venusta cercostigma*, blacktip shiner *Lythrurus atrapiculus*, silverjaw minnow *Notropis buccatus*, longnose shiner *N. longirostris*, weed shiner *N. texanus*, flathead catfish *Pylodictis olivaris*, longear sunfish *Lepomis megalotis*, and shoal bass *Micropterus* sp. The eastern blacktail shiner, blacktip shiner, weed shiner, flathead catfish, longear sunfish and shoal bass were formerly known only from streams draining into the Gulf of Mexico and (in the case of the weed shiner, flathead catfish and longear sunfish) southern tributaries of the Great Lakes. Ocmulgee River system records for these species are the first for an Atlantic Slope drainage basin. Ramsey (1965: Table 1) listed the longnose shiner as occurring in the Altamaha Drainage and is cited by Dahlberg and Scott (1971) and Gilbert and Burgess (1980) who also include the Altamaha River drainage in the longnose shiner's range. No other details on the source of the record are provided. The silverjaw minnow is primarily confined to drainages of the Gulf of Mexico and southern Great Lakes, but also occurs in the lower Susquehanna and upper Rappahannock rivers, Atlantic Slope drainages well to the north of the Altamaha River drainage (Gilbert, 1980).

MATERIALS AND METHODS

The surveys on which the new distribution records are based were conducted between July 1988 and November 1990 by biologists from the Georgia Department of Natural Resources (GDNR), Wildlife Resources Division (JWE, SLS and WC). Fish samples were taken at a total of 149 sites in Piedmont and upper Coastal Plain regions of the Ocmulgee River system between Lake Jackson and the southern limit of the Fall Line Hills physiographic province near Hawkinsville, GA (Fig. 1). Sample gears included seines and three types of electrofishing units: backpack electrofisher, boat electrofisher and a low frequency electrofishing unit (Custom Electronic Design, Model-3A) specially designed for catfish (use of the latter two electrofishing gears was confined to ten sites on the main channel of the Ocmulgee River; Evans, 1991). The collections were sorted and identified by the senior author and student workers (MST and JTH) at the Auburn University Museum Fish Collection. Representative lots of each of the identified species were deposited at the GDNR office at Fort Valley for use as a reference collection. The remainder of the

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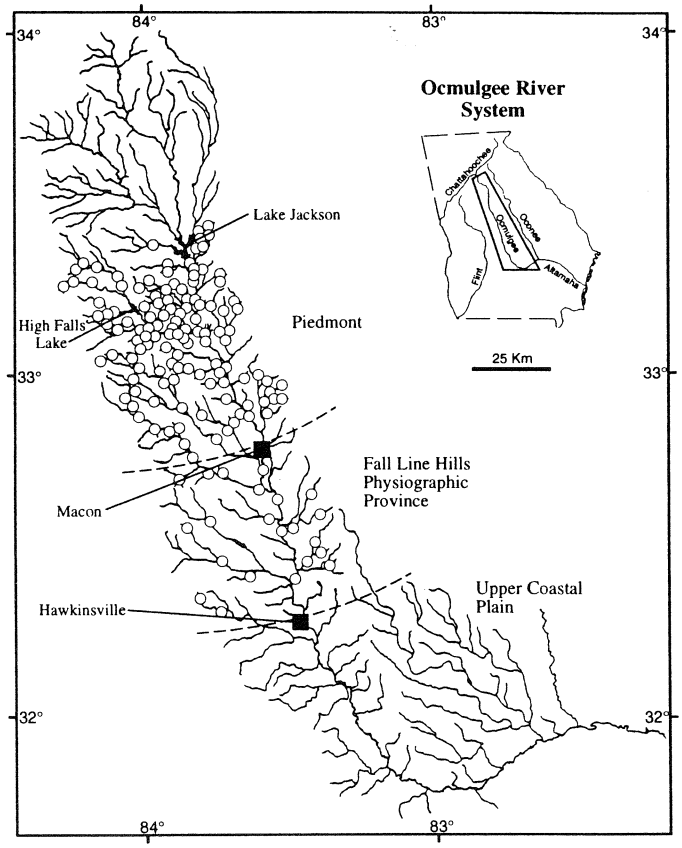

Figure 1. Map of the Ocmulgee River drainage system showing sampling stations for recent GDNR collections (open circles) in relation to physiographic provinces, and the locations of cities and lakes referred to in the text.

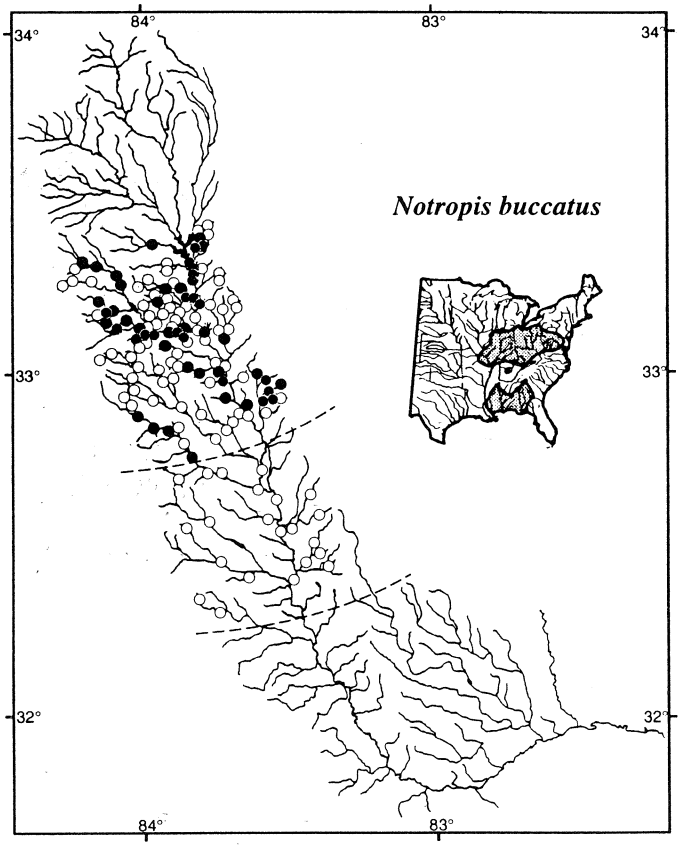

Figure 2. Ocmulgee River system distribution of the silverjaw minnow, *Notropis buccatus* (solid circles) based on recent GDNR collections. Inset map is the species revised overall distribution.

specimens are to be deposited in the University of Georgia, Museum of Natural History Fish Collection for permanent record. Names of species follows Robins et al. (1991).

RESULTS

The silverjaw minnow was the most widespread and abundant of the species reported herein as new to the Ocmulgee River system. The species was represented by a total of 659 specimens from 51 of the 149 sampling sites (Fig. 2). New distribution records for three of the remaining cyprinids (eastern blacktail, blacktip shiner and weed shiners) are centered mainly on the Towaliga River system above High Falls Lake on the western side of the Ocmulgee River watershed. A total of 28 blacktail shiners was collected at two sites: one on the Towaliga River and one on a tributary, Indian Creek, just upstream from its confluence with the Towaliga River (Fig. 3). The blacktip shiner was represented by 16 specimens from the headwaters of the Towaliga River system: two on the Towaliga River proper and one on Troublesome Creek, a small tributary (Fig. 4). The weed shiner was represented by 158 specimens from seven sites. Six of the sites were in the Towaliga River system (all five of the above sites plus Buck Creek, a slightly more southern tributary which also enters High Falls Lake). The seventh site was on Tobesofkee Creek, a direct tributary of the Ocmulgee River well to the south of the Towaliga River (Fig. 5). Six longnose shiners were collected at a single locality on Tussahaw Creek above Lake Jackson (Fig. 6).

Distribution records for the flathead catfish, longear sunfish and shoal bass are centered on the main channel of the Ocmulgee River. Flathead catfish were collected at six Ocmulgee River sites (98 specimens total), and one site on Sabbath Creek (one specimen), a small tributary, near its confluence with the Ocmulgee River (Fig. 6). Longear sunfish were collected at four sites (20 specimens total) in the recent GDNR survey: Tussahaw Creek above Lake Jackson, and three sites on the Ocmulgee River below Lake Jackson (Fig. 4). Additional records in the Auburn University Museum Fish Collection (not shown in Fig. 4) place the species in Lake Jackson as early as 1973 (AUM 18388), in the Ocmulgee River below Lloyd Shoals Dam (south of the GA Hwy 16 crossing) as early as 1977 (AUM 15641), and, more recently, in Falling Creek east of Juliette (AUM 26146). The shoal bass was collected at eight of ten main river sites (81 specimens) plus 17 sites on tributaries of varying sizes (61 specimens, Fig. 7).

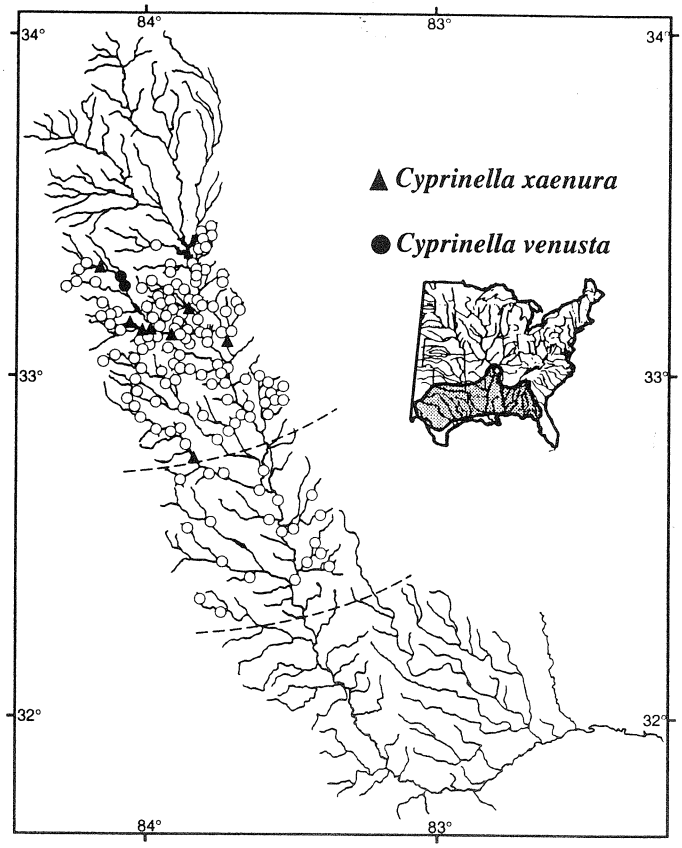

Figure 3. Ocmulgee River system distributions of the blacktail shiner *Cyprinella venusta* (solid circles) and Altamaha shiner *C. xenura* (solid triangles) based on recent GDNR collections. Inset map is revised overall distribution for the blacktail shiner.

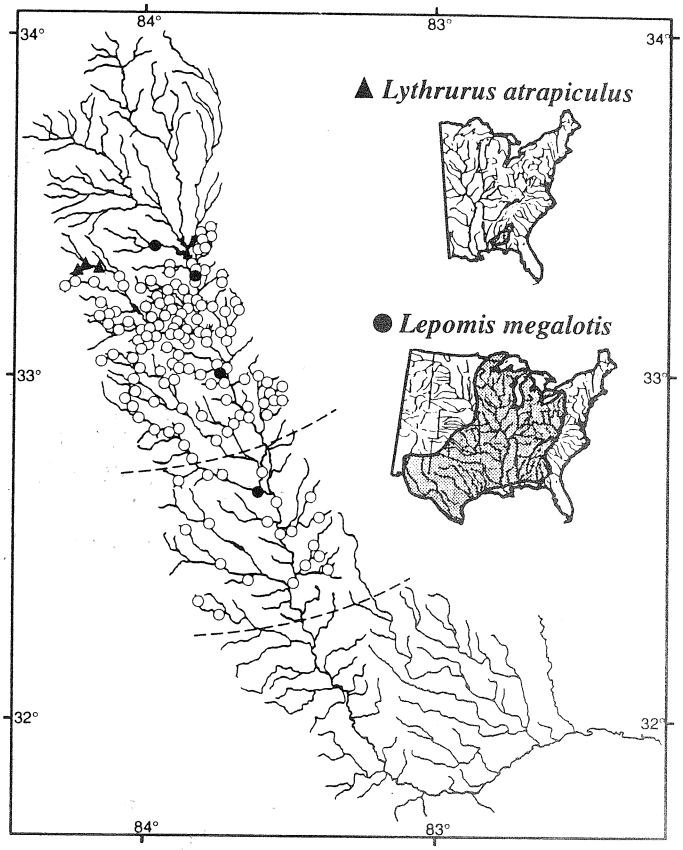

Figure 4. Ocmulgee River system distributions of the blacktip shiner *Lythrurus atrapiculus* (solid triangles) and the longear sunfish *Lepomis megalotis* (solid circles) based on recent GDNR collections and (longear sunfish) records in the Auburn University Museum fish collection. Inset maps are revised overall distribution maps for the two species.

DISCUSSION

The five cyprinid species herein reported as new to the Ocmulgee River system are lowland species that are primarily confined to Coastal Plain streams throughout most of the southern portions of their ranges. However, all of these species extend significantly above the Fall Line into the Piedmont Physiographic Province in the Chattahoochee and Flint river systems (Apalachicola River drainage). The new records are all from upland, Piedmont portions of the Ocmulgee River watershed (i.e., above the upper boundary of the Fall Line Hills Physiographic Province, Figs. 1-6), so the transfer likely involved populations from upland portions of the Chattahoochee and/or Flint river systems. Tributaries of the Chattahoochee and Flint rivers, particularly eastern headwater tributaries of the Flint River, lie in close proximity to western tributaries of the Ocmulgee River (see inset map in Fig. 1). Flint River specimens of the weed shiner differ from more western populations in having deeper bodies and higher numbers of body circumferential scales (Suttkus and Raney, 1955), and Ocmulgee River system specimens exhibit these characteristics.

It is unclear whether the cyprinids entered the Ocmulgee River system at the same or different times, or whether the transfer was natural or the result of "bait-bucket" introduction. The restricted occurrences of two of the species (eastern blacktail and blacktip shiners), and the concentration of collections of a third (the weed shiner), in streams of the Towaliga River system above High Falls Lake suggests that the upper Towaliga River was involved in the transfer of these species into the Ocmulgee River system. The dam that formed High Falls Lake was constructed in 1904 (GDNR, pers. comm.). We consider it most likely that the above cyprinids entered the upper Towaliga River after this time and that High Falls dam is preventing downstream dispersal of two of the species (*Cyprinella venusta* and *Lythurus atrapiculus*). If the above scenario if correct for all three species, then the weed shiner has dispersed downstream across High Falls Reservoir to at least one other part of the Ocmulgee River watershed since its introduction.

A similar scenario, but with much wider subsequent dispersal, could account for the Ocmulgee River distribution of the silverjaw minnow. However, this explanation is com-

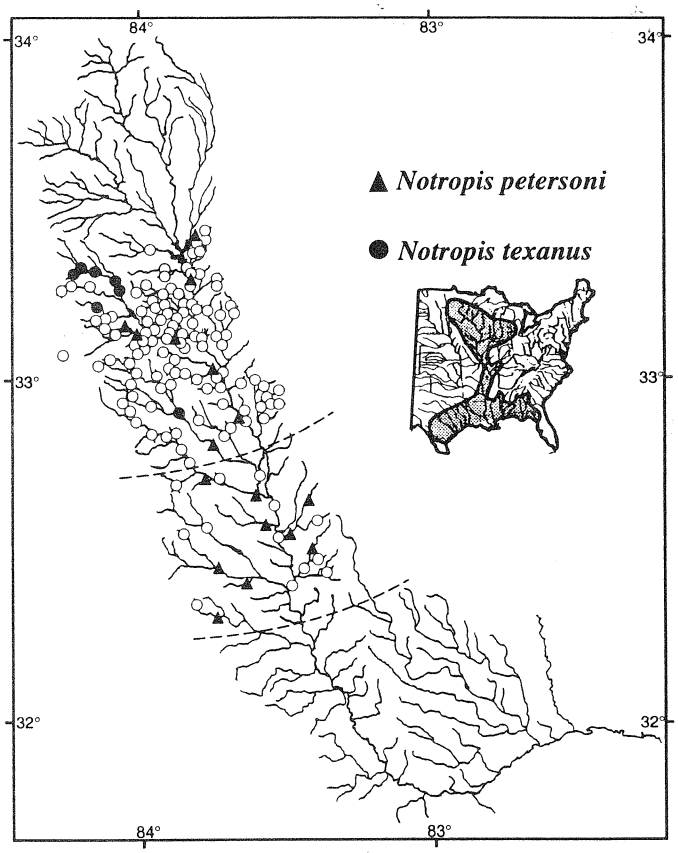

Figure 5. Ocmulgee River system distributions of the weed shiner *Notropis texanus* (solid circles) and coastal shiner *N. petersoni* (solid triangles) based on recent GDNR collections. Inset map is revised overall distribution for the weed shiner.

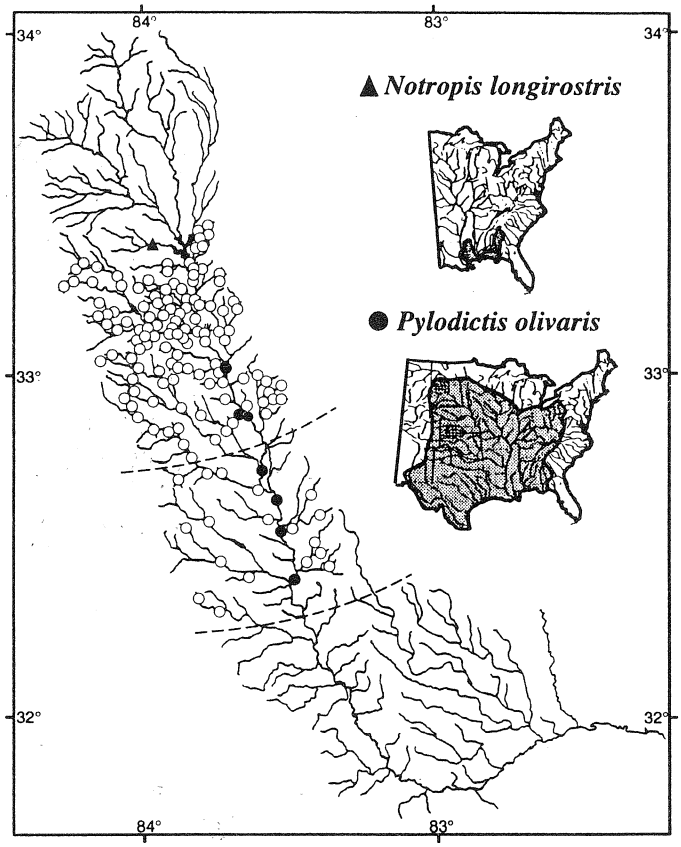

Figure 6. Ocmulgee River system distributions of the longnose shiner *Notropis longirostris* (solid triangles) and the flathead catfish *Pylodictis olivaris* (solid circles) based on recent GDNR collections. Inset maps are revised overall distribution maps for the two species.

plicated by the occurrence of the silverjaw minnow in Tussahaw Creek above Lake Jackson (Fig. 2). Lloyd Shoals Dam which formed Lake Jackson was completed in 1910 and would have posed a barrier to colonization of Tussahaw Creek by direct upstream movement after this time. If the silverjaw minnow entered the Ocmulgee River system prior to 1910, it would have had access to other streams in the upper portion of the watershed above the present Lake Jackson. The species is not listed as occurring anywhere in the Altamaha River system in Dahlberg and Scott's (1971) report on the freshwater fishes of Georgia, which included several collections from the Ocmulgee River system. Moreover, the silverjaw minnow was not recorded in GDNR surveys of the South and Yellow rivers (Hess et al., 1978; 1979), two of the three main Ocmulgee River tributaries above Lake Jackson. We consider it unlikely that previous workers overlooked such a distinctive species. Thus, the most plausible explanations for the silverjaw minnow's present Ocmulgee River system distribution based on available information are: a) entry into the system below Lake Jackson after 1971 with subsequent widespread dispersal to unimpounded sections of the Ocmulgee River system, and independent establishment above Lake Jackson in Tussahaw Creek; or b) entry above Lake Jackson after the late 1970's with widespread dispersal below the lake, and as yet undocumented occurrence above Lake Jackson, except in Tussahaw Creek.

The longnose shiner was taken only in Tussahaw Creek above Lake Jackson. Previous reports of the species' occurrence in the Altamaha River drainage are based on Ramsey's (1965) listing, which apparently is not based on museum records. The species was not reported from the South and Yellow rivers above Lake Jackson by Hess et al. (1978, 1979). Available information suggests that the longnose shiner's point of entry into the Ocmulgee River system was Tussahaw Creek and that Lake Jackson is currently serving as a barrier to its dispersal to other parts of the watershed. Although the silverjaw minnow and the longear sunfish also occur below Lake Jackson, their occurrence in Tussahaw Creek may be related to the longnose shiner's occurrence there.

Flathead catfish and shoal bass were introduced into the Ocmulgee River in the mid-1970's by GDNR personnel. Flathead catfish were introduced into the Ocmulgee River near the GA Hwy 96 bridge in 1973 from previously introduced stock in the upper Flint River (Evans, 1991). The flathead catfish is not native to the Flint River and is believed to have

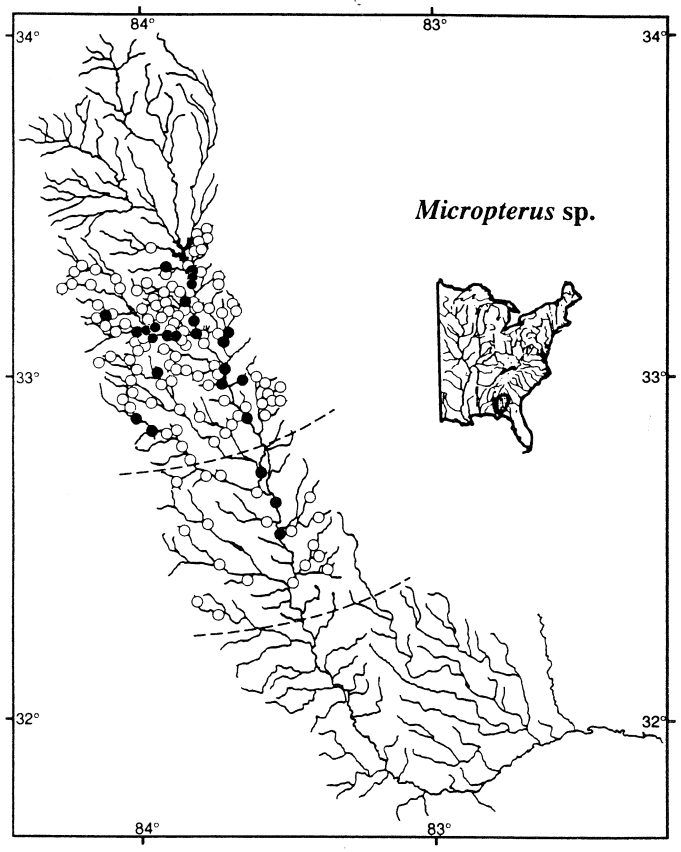

Figure 7. Ocmulgee River system distribution of the shoal bass *Micropterus* sp. (solid circles) based on recent GDNR collections. Inset map is the species' revised overall distribution.

been introduced there by angler stocking in about 1950 (Quinn, 1988). The Ocmulgee River population has since expanded downstream into the lower Altamaha River, and upstream as far as the low head dam at Juliette which is apparently posing a barrier to further upstream movement. The species has also recently been taken in the Oconee River from its confluence with the Ocmulgee River up to the GA Hwy 22 crossing at Milledgeville, GA (Evans, in preparation), and it is known to inhabit High Falls Lake on the Towaliga River, apparently having been independently established there (Evans, 1991). We expect the flathead catfish to eventually extend up the Ocmulgee River as far as Lloyd Shoals Dam below Lake Jackson.

Shoal bass from the upper Flint River were introduced into the upper Ocmulgee River below Lake Jackson in 1975. The species has since spread throughout Piedmont portions of the watershed. The source of the introduced population of longear sunfish in the Ocmulgee River system is unclear. Swift et al. (1986) list the species as "suspected but without museum records or other substantiation" for the Chattahoochee River. There are several records of longear sunfish from the Apalachicola River drainage in the Auburn University Museum Fish Collection, however all are from western tributaries of the Chattahoochee River. We know of no records from eastern tributaries of the Chattahoochee River, the Chattahoochee River proper, or the Flint River, so the transfer (natural or unnatural) likely did not involve nearby streams.

The possibilities of hybridization or competitive displacement are perhaps greatest in cases where the newly recorded species have close congeners with similar ecologies in the Ocmulgee River system. Three congeners of the blacktail shiner, *C. callisema*, *C. leedsi* and *C. xenura*, are native to the Ocmulgee River system. The Altamaha shiner *C. xenura* is endemic to upper reaches of the Oconee and Ocmulgee river systems. The latter species has recently been listed as "endangered" in the state of Georgia. The species was collected at eight sites in the recent survey, all in the upper Piedmont section of the watershed, but none syntopic with *C. venusta*. The Ocmulgee shiner *C. callisema*, a species largely confined to the Altamaha River system, is apparently widespread and abundant in the Ocmulgee River system. A total of 946 individuals was taken from 35 mostly Piedmont sites during the recent survey. The species was syntopic with *C. venusta* at one of two Towaliga River sites. The bannerfin shiner *C. leedsi*, a more widespread species ranging along the lower Coastal Plain from the Ochlocknee and Suwannee river drainages to the lower Savannah River, was taken primarily in the lower main channel of the Ocmulgee River in the recent surveys. Altamaha River drainage populations of all three of the native *Cyprinella* could conceivably be negatively impacted through hybridization or competitive displacement if the blacktail shiner expands below High Falls Reservoir.

The coastal shiner *Notropis petersoni*, a member of the *texanus* species group (Swift 1970), extends well inland onto the Piedmont along the Atlantic Slope. However, over most of the Eastern Gulf Slope, the coastal shiner's distribution is complementary to that of the weed shiner where the two species are sympatric, suggesting the possibility of competitive avoidance. The coastal shiner was common in GDNR collections from both Piedmont and upper Coastal Plain regions of the Ocmulgee River system. The species was collected near sites where weed shiners were collected, but the two species were never collected syntopically. Spread of the weed shiner to other parts of the Ocmulgee River system could restrict coastal shiner populations to lower Coastal Plain portions of the watershed as seen in Gulf Slope drainages to the west.

There is correlative evidence that flathead catfish are negatively impacting populations of several native fish species in the Ocmulgee River. Occurrences and abundances of silver redhorse *Moxostoma anisurum*, smallfin redhorse *M. robustum*, snail bullhead *Ameiurus brunneus*, flat bullhead *A. platycephalus*, and redbreast sunfish *Lepomis auritus*, were negatively correlated with flathead catfish occurrence and abundance (Evans, 1991). The mechanism of interference may be direct predation. Suckers and catfish of a variety of species are common items in the diet of flathead catfish (Minckley and Deacon, 1959; Edmundson, 1974; Davis, 1985). The greatest impact appears to be on snail and flat bullhead. Combined electrofishing catch-per-unit-efforts for

these species reached 70 per hour above Juliette Dam but were zero below the dam where flathead catfish were present (Evans, 1991).

There are concerns that shoal bass are hybridizing with redeye bass *Micropterus coosae*, a native bass in the upper Ocmulgee River system. The results of two independent genetic investigations addressing this issue (D. Philipp, Illinois Natural History Survey, personal communication and R. Dunham et al., in preparation) are in conflict. Redeye bass were identified from a total of 29 sites in the upper Ocmulgee River system, including 13 of the 17 sites where shoal bass were taken, with no apparent evidence of hybridization between the two species. The two species occur sympatrically in the Chattahoochee River system, with the redeye bass generally favoring upland streams, and the shoal bass occupying lowland streams and the Fall Line Hills transition area.

The redbreast sunfish *Lepomis auritus*, a species native to the Ocmulgee River system and considered by many to be the Atlantic Slope equivalent of the longear sunfish, occurred syntopically with the longear sunfish at three of the four sites where the latter species was collected. The redbreast sunfish was the numerically dominant sunfish at two of the syntopic sites. The longear sunfish was the dominant sunfish only in Tussahaw Creek. The dollar sunfish *Lepomis marginatus*, another native and closely related sunfish species occurred syntopically with the longear sunfish at one site in the Fall Line Hills transition zone. However, competition should be less of a concern here because the latter two species are ecologically isolated and coexist over a large portion of their native ranges.

ACKNOWLEDGMENTS

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MINUTES

Business Meeting
20th Annual Meeting
Southeastern Fishes Council

The Executive Committee of the Southeastern Fishes Council (SFC) met at noon on Thursday, 14 April 1994 at Ming Cort Restaurant on International Drive in Orlando, Florida. In attendance at this meeting were Chairman David Heins, immediate past Chairman Bruce Bauer, Chair-Elect Steve Walsh, and Secretary/Treasurer Hank Bart. Chairman Heins called the meeting to order at 12:30 local time. The first item of discussion was the Constitution and Bylaws. Chairman Heins stated that he wanted to simplify the structure of these documents, deleting committees that apparently were never formed and changing the structure of others to make them more effective. Heins suggested separating the Secretary/Treasurer into two separate positions, and giving the Secretary responsibility for local arrangements and publicity. Heins also wanted to explore ways of getting the Chair-Elect more involved in responsibilities of governing the Council. He suggested that regional reports be submitted early in the year and published in the issue of the *Proceedings* preceding the annual meeting. This way, issues raised in the reports can be discussed and appropriate actions taken, rather than dominating the business meeting with readings of the reports. The suggestion was also made that resolutions and other actions requiring approval of the Executive Committee and/or the membership be publicized prior to the meeting so that they can be discussed during the business meeting, and if approved, acted upon shortly after the meeting.

The second item of discussion was the nagging issue of tax exempt status. The Secretary/Treasurer presented a letter from a CPA in New Orleans who offered to file the necessary papers for federal tax exempt status for a fee of $1,000 plus out-of-pocket expenses. The suggestion was made that the fee be fixed at a maximum of $1,100, in effect limiting out-of-pocket expenses to $100. The third and final item for discussion was a suggestion by Mel Warren that the SFC co-sponsor a symposium with the American Fisheries Society on imperiled freshwater fishes in the southeastern U.S. All agreed that this would be a very good activity for the SFC. Chairman Heins said that the symposium and the proposal concerning resolution of our tax-exempt status would be brought to the floor of the business meeting as Executive Committee motions. The Executive Committee meeting adjourned at 1 p.m. local time.

The business meeting was held in the afternoon on Thursday, 14 April 1994, in Salon 5 of the Clarion Plaza Hotel in Orlando, FL. Chairman Heins called the meeting to order at 4:30 PM local time. The minutes of the 1993 Business Meeting appeared in *Proceedings* Issue #29. They were approved without corrections. It was reported that the artwork for the 20th Annual Meeting button (featuring the imperiled and soon to be described Pearl darter) was produced by Pamela Caruso for Royal Suttkus, who graciously consented to allow us to use it. In response to a request for artwork for future buttons, Mark Sabaj of the Illinois Natural Survey provided copies of his drawings of the frecklebelly darter (*Percina stictogaster*) and the snail darter. The latter illustration, which was penned especially for the SFC, will be used for a special 20th Anniversary button in 1995.

The Treasurer's Report was read and approved (see below). It was then reported that a letter had been received from a CPA in New Orleans who offered to file the necessary papers for tax exempt status for a fee of $1,000 plus out-of-pocket expenses. Chairman Heins introduced an Executive Committee motion that the SFC pay the CPA a maximum of $1,100 for settling the SFC's tax status with the IRS. The discussion that followed was focused mainly on the large size of the fee. It was pointed out that the CPA's normal fee was $70.00 per hour, and considering the length of time the SFC has been in existence, the job of filing and responding to inquiries from the IRS could easily take 25 hours or more. The CPA had agreed to cap his fee at $1,000. Stephen Ross felt that the expense was justified because it would settle an issue that has plagued the SFC far too long, and because of the fund-raising opportunities tax-exempt status would afford. The motion was voted upon and passed.

Continuing with Executive Committee business, David Heins mentioned Mel Warren's interest in organizing a joint SFC-AFS symposium on imperiled southeastern fishes for the AFS meeting in Tampa in 1995. An executive committee motion that the SFC co-sponsor the symposium passed. Chairman Heins also mentioned planned changes to the Constitution and Bylaws and requested input. Steve Walsh agreed to Chair the Nominating Committee for the election to be held in 1995. Dave Etnier, Chair of the Resolutions Committee, reported that resolutions opposing chip mills in the Tennessee River Valley and landfills on the Etowah and Conasauga rivers were forwarded in 1993, and that all three