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Abstract

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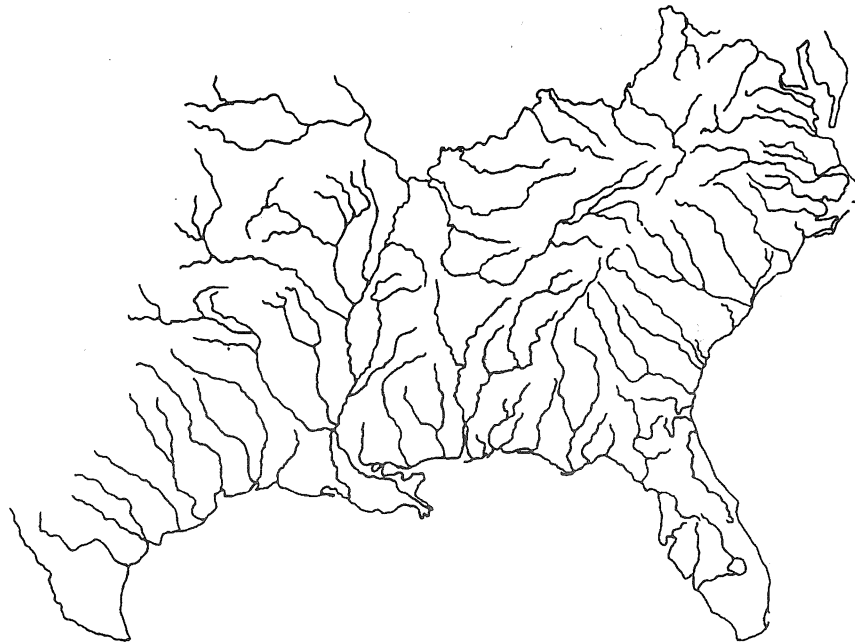
Regional Southeastern Fishes Council Reports

Keywords

blackmouth shiner, *notropis melanostomus*, fishes, upper pascagoula river, bluebarred pygmy sunfish, *elassoma okatie*

Southeastern Fishes Council Proceedings

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Contents

Distribution and habitat affinities of the blackmouth shiner (<i>Notropis melanostomus</i>) in Mississippi, including eight newly discovered localities in the Upper Pascagoula River Drainage. By <i>Martin T. O'Connell, Stephen T. Ross, John A. Ewing III and William T. Slack</i>	1
The bluebarred pygmy sunfish (<i>Elassoma okatie</i>) in Georgia. By <i>Jan Jeffrey Hoover, Steven G. George and Neil H. Douglas</i>	7
Minutes, Business Meeting, 23rd Annual Meeting, Southeastern Fishes Council	10
Regional Southeastern Fishes Council Reports	11

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The abstract should not exceed 250 words. Indent Title, author and address(es). The title should be in all caps. Author(s) names and addresses should follow the title without skipping a line. Use superscript numbers to indicate author affiliations. Skip one line before beginning the abstract, single space and do not indent the abstract. Use a 12 point font and a text pitch of 10 characters per inch. Type face should be *sans serif*. All scientific names should be underlined and measurements in SI units.

For more information contact: Morgan A. McClure, Carolina Ecological Services, 2411 Savannah Highway, Charleston SC 29414, Phone (803) 556-9795, Fax (803) 571-0276, E-mail mcclure@jwu-sc.edu; or Thomas E. Ross, Department of Geology and Geography, University of North Carolina - Pembroke, PO Box 1510, Pembroke NC 28372, Phone (910) 521-6218, Fax (910) 521-6550, E-mail teross@sassett.uncp.edu.

Distribution and Habitat Affinities of the Blackmouth Shiner (*Notropis melanostomus*) in Mississippi, Including Eight Newly Discovered Localities in the Upper Pascagoula River Drainage

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ABSTRACT

Lakes, ponds, and sloughs of the Upper Pascagoula River Drainage, Mississippi, were surveyed for the blackmouth shiner (*Notropis melanostomus*) from April to June, 1995. Because of its limited distribution, the species is federally listed as threatened. Blackmouth shiners were discovered in eight previously unknown sites. These newly discovered Mississippi populations of *N. melanostomus* are similar to Florida populations in that they are associated with clear, stained, acidic waters and abundant submerged vegetation. Unlike Florida populations, the Mississippi populations occupy isolated oxbow lakes and temporary floodplain pools that are only interconnected during floods of the Pascagoula River. The ephemeral nature of some of these habitats may explain why Mississippi populations of *N. melanostomus* appear to be less abundant than Florida populations. This knowledge of the specific habitat affinities of *N. melanostomus* should prove useful in management of the species.

INTRODUCTION

The blackmouth shiner, *Notropis melanostomus*, is currently known only from three separate drainages: 1) Blackwater River Drainage, Florida; 2) Yellow River Drainage, Florida; and 3) Pascagoula River Drainage, Mississippi (Suttkus and Bailey, 1990). In Mississippi, blackmouth shiners have been found in three areas within the Pascagoula River Drainage: 1) Doctor Lake in the Black Creek System; 2) the upper Pascagoula River downstream of state highway 26; and 3) an unnamed oxbow lake off of the lower Chickasawhay River (Ross, in prep.). Although local populations in Florida and Mississippi can be abundant, overall the blackmouth shiner is rare (Suttkus and Bailey, 1990).

Because of "its limited distribution and virtual dearth of information on the status of the extant populations" (Bortone, 1993), *N. melanostomus* is listed as "Threatened" by the American Fisheries Society (Williams et al. 1989). Most of the information about the blackmouth shiner comes from the relatively recent description of the species (Bortone, 1989) and subsequent descriptions of its biology (Suttkus and Bailey, 1990; Bortone, 1993). It is one of the smallest American cyprinids (the largest adult taken at Pond Creek, Florida was 34.6 mm SL) and has a relatively short (< two years) life span

(Suttkus and Bailey, 1990). Other distinct morphological characteristics include a large, oblique mouth and long, well-developed gill rakers (Suttkus and Bailey, 1990). These features suggest that the blackmouth shiner's closest relative is the Kiamichi shiner, *N. ortenburgeri* (Swift et al., 1986; Robison and Buchanan, 1988; Suttkus and Bailey, 1990). Although morphologically similar, the two species have profoundly different habitat preferences and distributions.

Collection records from Florida and Mississippi indicate that the blackmouth shiner may be restricted to oxbow lakes and backwater areas. Suttkus and Bailey (1990) noted that no blackmouth shiners were collected from main channel habitats. Although a 1989 survey (Ross et al. 1989) yielded two of the known localities of blackmouth shiners from backwater areas, this sampling focused primarily on main channel habitats of the Leaf, Chickasawhay, and Pascagoula rivers. Little sampling occurred in oxbow lakes and backwater areas, which are abundant in the Upper Pascagoula River Drainage. Because such areas could contain "other undiscovered disjunct populations [of blackmouth shiners]" (Suttkus and Bailey, 1990), we conducted a survey of oxbow lakes and backwater habitats in the vicinity of the three historic sites. Our objectives were to find undiscovered populations of blackmouth shiners and then describe their habitats.

METHODS

From United States Geological Survey topographic maps (1:24,000), we identified a study area in the Pascagoula River State Wildlife Management Area. The study area extended from Graham Lake near the town of Wade, Jackson County, upstream to the confluence of the Leaf and Chickasawhay rivers, near the town of Merrill, George County. Before sampling began, more potential sites were identified on two scouting trips (14 and 20 April 1995). Bortone (1993) suggested that oxbow lakes and backwater areas of streams were the preferred habitats of Florida blackmouth shiners. Because little is known about preferred blackmouth shiner habitats in Mississippi, our potential sites included habitats that were likely to contain blackmouth shiners (oxbow lakes, backwater areas) and areas less likely to contain blackmouth shiners (sloughs, ephemeral ponds, rivers). Sampling began on 23 May and ended 22 June 1995. A total of 52 collections of fishes, including measurement of habitat variables, was made in the study area.

Initially we used three methods for collecting fishes. In the first method, based on Bortone (1993), we used polarized sunglasses to scan shoreline areas from a 4.3 m (14 ft) aluminum boat powered by an electric trolling motor. When we located a school of fish that could potentially be blackmouth shiners, we attempted to collect the fish using fine-mesh (3.2 mm) dipnets. Fishes collected in this manner were preserved in 10% formalin for identification in the laboratory. No serious effort was given to collecting from schools of fishes that were determined not to be blackmouth shiners (e.g., larger, non-minnow-like fishes). For each site, we recorded the length of shoreline with appropriate habitats (as described by Bortone, 1993) that was scanned and sampled for fishes.

The second method involved seining appropriate habitats with either a 3 x 1.22 m straight seine (3.2 mm mesh size) attached to wooden brailes or a 6 x 1.22 m bag seine (3.2 mm mesh size) attached to ropes. The latter method was used in an appropriate habitat where it was left undisturbed for 15-20 min. After this period, the seine was retrieved by pulling on the ropes attached to its corners. This method allowed for quick retrieval of the seine in areas where the soft, muddy substratum precluded seining by wading. Once we determined that blackmouth shiners were collected more efficiently using the dipnetting method, we discontinued seining on 8 June (last seining collection: MT95-024).

We also placed out two hardware cloth minnow traps in appropriate habitats. Each trap was baited with catfood and was fished for 12-24 h. This method was discontinued after June 5 (last trapping attempt: MT95-016) because no fishes had been caught.

At each site, we measured turbidity, pH, temperature, and water depth. Water samples were placed on ice, returned to the laboratory, and measurements were taken within 48 h of collection. Turbidity (NTU) was determined with a turbidity

meter (HF instruments, Model DRT 1000) and pH was determined with a portable pH meter (Orion Research, Model SA 210). Water temperature was determined with a hand held thermometer. Type and relative proportion of different substrata were visually estimated. Five depth readings were taken in an area considered representative of the area sampled. When blackmouth shiners were collected, the five depth readings were taken at the place of collection. Additional observations included numbers and types of other fish species seen, descriptions of vegetation, and notes on blackmouth shiner behavior.

Using these data on environmental variables, a discriminant function (DISCRIM SPSS^x 2.1; SPSS, 1985) and a canonical variates analysis (CVA; CANOCO 3.12; ter Braak, 1991) were calculated. The objective of these exploratory analyses was to find linear combinations of the environmental variables that separated sites with and without *N. melanostomus* (James and McCulloch, 1990). The relative importance of each variable in identifying blackmouth shiner habitats was also determined. Because our sample size is large relative to the dimensionality of the data, any patterns exhibited are likely to be ecologically consequential (Williams, 1983).

All fishes that were preserved in the field in 10% formalin were later transferred to 45% isopropanol and identified in the laboratory. Morphometric, scale, and fin-ray characters were measured following Hubbs and Lagler (1958), using a dissecting microscope and calipers. Collected material is archived in the University of Southern Mississippi Museum of Ichthyology.

RESULTS

We collected blackmouth shiners (N=439) from eight previously undiscovered sites in the Pascagoula River System (Fig. 1, Appendix). Morphometric, scale, and fin-ray characters of these fish were similar to those recorded by Bortone (1993) for blackmouth shiners in Florida (Table 1). Two size classes were represented in the collected specimens (Fig. 2). We assumed that the larger size class of fish (SL > 25 mm)

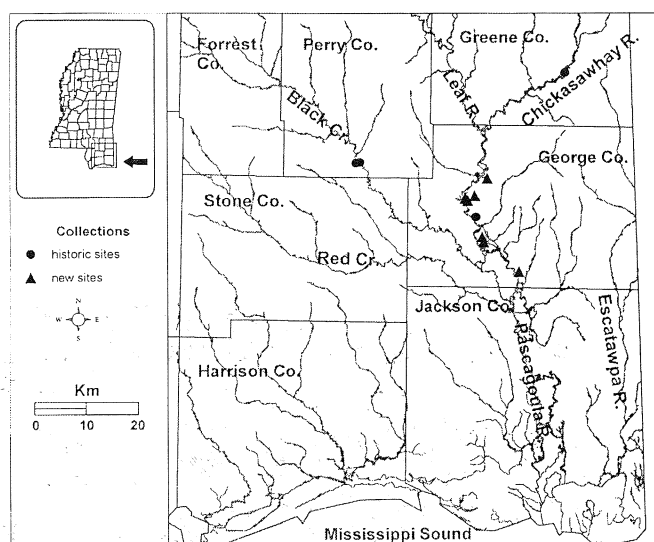


Figure 1. Distribution of the blackmouth shiner in Mississippi including historic sites and sites resulting from the present study.

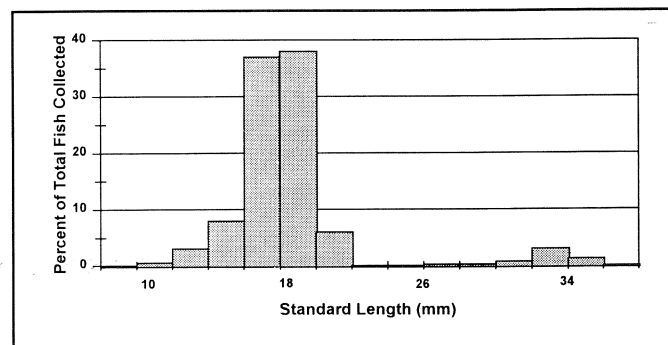


Figure 2. Length-frequency histogram of 439 blackmouth shiners (*Notropis melanostomus*) collected during the survey period of May 23 - June 22, 1995, in the Upper Pascagoula River System.

Table 1. Summary of some morphometric, scale, and fin-ray characters from 87 specimens of blackmouth shiners from the Pascagoula River System, Mississippi. The standard lengths are based on 439 specimens collected (does not include specimens collected for photograph material). Head length and body depth are recorded as a proportion of standard length. Scale count and pored scales are in reference to lateral scales.

Character	Mean	Min	Max	S.D.
Standard length (mm)	18.54	11.50	35.00	3.85
Head length	0.2420	0.2244	0.2727	0.01
Body depth	0.1653	0.1241	0.1981	0.02
Scale count	34.20	32	36	0.99
Dorsal rays	8.02	8	9	0.15
Anal rays	10.40	9	12	0.58
Left pectoral rays	10.90	9	12	0.70
Left pelvic rays	8.09	7	9	0.42
Pored scales	3.65	0	7	1.48

Table 2. Summary of five environmental variables measured at the eight sites where blackmouth shiners were collected in the Upper Pascagoula River System, Mississippi, between 23 May and 22 June 1995. Measurements were taken at the location and depth of where blackmouth shiners were collected.

Variable	Mean	Min	Max	S.D.
water temperature (C)	29.25	24.00	34.00	3.01
air temperature (C)	32.25	28.00	35.00	2.31
pH	6.14	5.51	6.79	0.42
turbidity (NTU)	4.01	2.20	6.00	1.42
capture depth (cm)	67.09	21.00	101.50	19.12

represented adults because 21 mm SL was proposed as the minimum adult size by Suttkus and Bailey (1990). Also, of these 25 larger fish collected, ten possessed pectoral fin tubercles, as described by Bortone (1993). Gonads of tuberculate and non-tuberculate larger fish were excised, treated with methylene blue, examined microscopically, and compared to determine sex. These examinations revealed that only male fish possessed tubercles. This suggests an adult male-female ratio of 1:1. Fish in the larger size class (adults) were found only at two of the eight sites (MT95-017 and MT95-031). The majority (414 of 439) of blackmouth shiners collected, and most of the blackmouth shiners observed, were in the smaller size class (juveniles).

At the eight sites where blackmouth shiners were collected, there was no water current and the water was warm, clear, shallow, and moderately acidic (Table 2). Compared with environmental parameters given by Bortone (1993) at sites

Table 3. Fish species collected at blackmouth shiner sites.

Species	Common name
<i>Aphredoderus sayanus</i>	pirate perch
<i>Esox niger</i>	chain pickerel
<i>Notemigonus crysoleucas</i>	golden shiner
<i>Pteronotropis welaka</i>	bluenose shiner
<i>Erimyzon tenuis</i>	sharpfin chubsucker
<i>Ameiurus nebulosus</i>	brown bullhead
<i>Fundulus notti</i>	southern starhead topminnow
<i>Fundulus chrysotus</i>	golden topminnow
<i>Gambusia holbrooki</i>	eastern mosquitofish
<i>Labidesthes sicculus</i>	brook silverside
<i>Micropterus salmoides</i>	largemouth bass
<i>Pomoxis nigromaculatus</i>	black crappie
<i>Lepomis macrochirus</i>	bluegill
<i>Lepomis marginatus</i>	dollar sunfish
<i>Lepomis microlophus</i>	redear sunfish
<i>Enneacanthus gloriosus</i>	bluespotted sunfish
<i>Elassoma zonatum</i>	banded pygmy sunfish
<i>Etheostoma fusiforme</i>	swamp darter

Table 4. Results of discriminant function analysis of environmental variables measured at sites with and without blackmouth shiners.

Predictor variable	Correlations of predictor variables with discriminant functions	Univariate F (3,28)
vegetation presence	0.90	45.12
detritus substratum	0.31	1.53
sand substratum	0.08	1.68

Canonical R = 0.83

Eigenvalue = 2.16

where blackmouth shiners were collected in Florida, these Mississippi collection sites were deeper and the water was less acidic. The aquatic vegetation associated with these sites included *Potamogeton*, *Nymphaea*, and *Najas*. There were 18 other fish species recorded from these sites (Table 3).

The analyses of the environmental data yielded differences between sites with and without blackmouth shiners. Using measurements of habitat parameters, a discriminant function was calculated for sites with and without blackmouth shiners ($\chi^2 = 32.81$, $p < 0.01$, canonical R = 0.83). Submerged vegetation, detritus (negative loading), and sand were the three habitat parameters significant in determining the presence or absence of blackmouth shiners, but the presence of submerged

vegetation was the single most critical variable (Table 4). The ordination diagram based on canonical variates analysis (CVA) of sites with and without blackmouth shiners, with respect to four habitat parameters (turbidity, presence of sand, detritus, or clay), suggests that water clarity (NTU) had the greatest contribution in determining differences between blackmouth shiner habitats and non-blackmouth shiner habitats (Fig. 3). Also, sites with blackmouth shiners were significantly less turbid than sites without blackmouth shiners (Wilcoxon two-sample test, $t_s = 3.72$, $p < 0.0001$).

In comparing collection sites with the orientation of shorelines, field observations suggested that blackmouth shiners were more common adjacent to shorelines that had a north-south orientation. To test this hypothesis, we compared the orientation of the four permanent lakes where blackmouth shiners were collected to the orientation of 14 other sampled permanent lakes where blackmouth shiners were not collected, using a Mardia-Watson-Wheeler test. Lake orientation (the axis of the longest dimension) was determined from USGS topographic maps (1:24,000). There was no significant difference between the orientation of the four permanent lakes where blackmouth shiners were collected and the orientation of fourteen permanent lakes where blackmouth shiners were not collected (Mardia-Watson-Wheeler test, $B = 6.38$, $p > 0.10$).

DISCUSSION

Our addition of eight blackmouth shiner sites to the known distribution of this species confirms suspicions that other undiscovered disjunct populations exist (Suttkus and Bailey, 1990; Bortone, 1993). We also suspect that further surveys of appropriate habitats in the Pascagoula River Drainage (Leaf River, Chickasawhay River, Black Creek, Red Creek, and others) will yield additional populations of blackmouth shiners. Only two of these blackmouth shiner sites (Hudson Lake and Lower Rines Lake) appeared to have anything close to the "thriving" Florida populations with "schools of several thousand individuals" described by Bortone (1993). The biggest shoals we observed contained hundreds of individuals and these were always juveniles. At the two sites where only adult blackmouth shiners were collected, the shoals never numbered more than twenty individuals. These lower numbers may suggest that Mississippi populations of blackmouth shiners are less viable than Florida populations. The Mississippi populations may also represent more of a patchy distribution than the Florida populations.

The two size classes of blackmouth shiners support Bortone's (1993) contention that blackmouth shiners live no longer than a year to a year and a half, as predicted by Suttkus and Bailey (1990). Adult and juvenile blackmouth shiners were only collected together at one site (MT95-017: 14 adults and two juveniles collected). Blackmouth shiner collections from the other sites were exclusively adults or juveniles. This may be due to the isolation of the populations sampled. Unlike the Florida populations of blackmouth shiners in the Lower

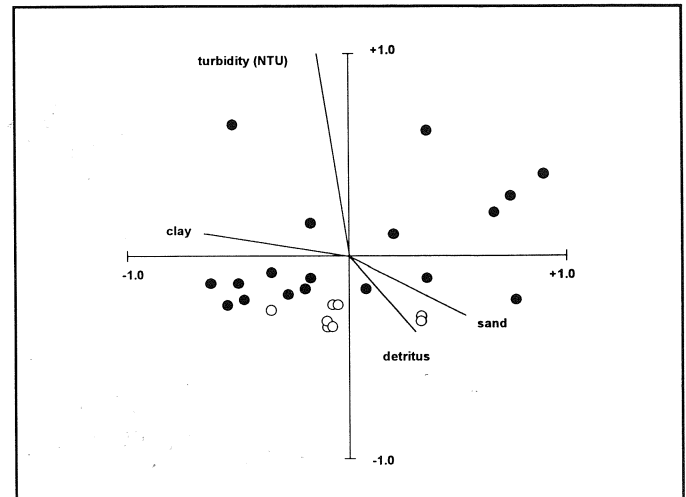


Figure 3. Ordination diagram based on canonical variates analysis (CVA) of sites where blackmouth shiners were found (open circles). The length and direction of the turbidity (NTU) vector suggests that water clarity had the greatest contribution in separating blackmouth shiner habitats from non-blackmouth shiner habitats.

Blackwater River Drainage, there are no permanent water connections between any of the sites where we collected blackmouth shiners. It is possible that each of the populations we sampled was the result of a temporally and spatially unique spawning event. Seasonal flooding may provide the temporary connection between these ponds and pools that allows blackmouth shiners to colonize different areas at different times.

Mississippi populations of blackmouth shiners exhibit a marked affinity toward clear water and submerged vegetation. The Mississippi collection sites were deeper and the water was less acidic than the Florida sites. It is not known if this represents a significant difference in habitats between the Mississippi and Florida populations of blackmouth shiners. This difference may be due to the nature of the Mississippi habitats (oxbow lakes, floodplain ponds) versus the Florida habitats (mostly backwater areas).

Our observations suggest that blackmouth shiners may only occur in lakes and ponds whose geography promotes the growth of submerged aquatic vegetation, low turbidity, or both. The orientation of a lake affects the presence of vegetation because plant colonization is governed primarily by turbulence, substratum, and light intensity and quality (Sculthorpe, 1971). We suggest that the orientation of the shoreline affects whether submerged aquatic vegetation is present, possibly because of protection from east to west winds or increased exposure to light, or both. Because blackmouth shiners are highly associated with submerged vegetation, shoreline orientation may determine if blackmouth shiners will be present in a permanent lake. Although our comparison of lake orientations showed no differences between lakes with and without blackmouth shiners, this could have been due to small sample size.

Every aspect of blackmouth shiner behavior described by Bortone (1993) was observed for Mississippi populations of the species. The blackmouth shiners formed tight schools or shoals that were globular or irregular in shape. These shoals were never less than 20 cm from the water surface and were always associated with submerged vegetation. Blackmouth shiners were easily distinguished from other fishes due to their distinct shoaling. For example, although brook silversides (*Labidesthes sicculus*) were often associated with blackmouth shiners (as with the Florida populations), their schools could be distinguished from *N. melanostomus* schools due to their higher position in the water column, faster swimming, and more orderly schooling.

An important point concerning future management of this species in Mississippi is the ephemeral condition of blackmouth shiner habitats (Bortone, 1993). Four of the eight sites in this study appeared to be temporary floodplain pools or ponds. Over the study period, the water level in these ponds and pools declined, and these habitats could be eliminated during long dry periods. We sampled a historical site in a backwater area of the Pascagoula River and found that the area was completely dry. Also, Suttkus and Bailey (1990) could not find any blackmouth shiners at another historical site (Doctor Lake) during subsequent collection trips. We have found this area to be essentially dried up on at least two occasions since.

The eight sites discovered during this survey were located in the Pascagoula River Wildlife Management Area. As long as this area is maintained as a wildlife area, these blackmouth shiner habitats are not likely to be destroyed by anthropogenic disturbances.

ACKNOWLEDGMENTS

We thank B.W. Albanese and A.M. O'Connell for help with field work.

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APPENDIX

Site	Field Number	Date	Water Body	Location	Gear	Length of Sampled Reach (m)
8	MT95-008	29 May 95	unnamed pond	at corner of road to Dace Lake and road to Hudson Lake; T2S, R8W, Sec 11 UTMX: 332800 UTMY: 3417800	3 m seine	10
24	MT95-024	7 Jun 95	unnamed pond	under rt 26 bridge, first pond west of Big Slough; T2S, R8W, Sec 15 UTMX: 330900 UTMY: 3417300	dipnet	100
31	MT95-031	13 Jun 95	unnamed pond	northernmost of 2 lakes south of Boneyard Lake; T3S, R7W, Sec 23 UTMX: 341300 UTMY: 3404200	dipnet	400
33	MT95-033	13 Jun 95	unnamed pond	west of road to Cochrans Dead Lake; T1S, R7W, Sec 31 UTMX: 335200 UTMY: 3420900	dipnet	300
38	MT95-038	19 Jun 95	unnamed pond	under rt 26 bridge, third pool west of Big Slough; T2S, R8W, Sec 15 UTMX: 331000 UTMY: 3417400	dipnet	170
39	MT95-039	19 Jun 95	Hutson (Hudson) Lake	south of rt 26, west of Big Slough; T2S, R3W, Sec 24 UTMX: 331500 UTMY: 3416900	dipnet	300
48	MT95-048	22 Jun 95	Lower Rhymes	second large lake south of Bilbo Basin; T3S, R7W, Sec 6 UTMX: 334500 UTMY: 3409500	dipnet	150
49	MT95-049	22 Jun 95	Upper Rhymes (Rines) Lake	first large lake south of Bilbo Basin; T3S, R8W, Sec 1 UTMX: 334200 UTMY: 3410400	dipnet	400

The Bluebarred Pygmy Sunfish (*Elassoma okatie*) in Georgia

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INTRODUCTION

The bluebarred pygmy sunfish, *Elassoma okatie*, is a recently described species known from the Edisto, New, and eastern Savannah River drainages in South Carolina (Rohde and Arndt, 1987). We report another population from the western Savannah River drainage in Georgia.

METHODS

The bluebarred pygmy sunfish was collected during four consecutive seasonal surveys (8 December 1995 - 17 October 1996) of fish communities in streams on the U.S. Army Fort Gordon military installation in Richmond County, Georgia. In each of four streams, Brier, Boggy Gut, Sandy Run, and Spirit Creeks, we sampled at four or five locations distributed over linear distances of 2-5 km. A total of 66 collections was made.

Fishes were collected with 2.4 x 3.0 m seines with 5 mm mesh and then fixed in 10% formalin. Fishes were later washed, their total length recorded, and then transferred to 50% isopropanol. Series have been deposited in the Museum of Zoology at Northeast Louisiana University: NLU 72696 (8 December 1995), 72921 and 72933 (3 April 1996), 73318 (16 July 1996), 73491 (17 October 1996).

Standard sample effort was ten hauls stratified among all apparent macrohabitats in a defined reach of stream that usually consisted of a pool-riffle sequence. Habitat measurements were made immediately prior to seining: turbidity with a Hach 2100P turbidimeter; temperature, conductivity, pH and dissolved oxygen with Hydrolab multiparameter water quality probe; and depth and water velocity with a Marsh-McBirney wading rod and FloMate velocity meter at ten equidistant points along a cross-sectional transect.

RESULTS

The bluebarred pygmy sunfish was found at only one location in one stream: Boggy Gut Creek, at Gibson Road bridge, 3 km E of Avondale, Georgia. This station is in the southwest corner of Fort Gordon, section 42, and is 600 m N of an artillery impact area. On pre-1977 USGS maps, this site appears as the outflow of Burch Mill Pond, but the pond no

longer exists. A concrete structure 50 m upstream from the bridge does persist, however, and it partly impounds and diverts the stream channel around itself and creates a backwater. A sandbar extends obliquely downstream from the structure to the western shore at the bridge. We sampled from the bridge upstream to this structure.

Shore slope is not pronounced; it rises 0.14 m every 1 m from water's edge for a distance of 4 m. The channel width is 9-11 m. The substrate is mud, deep silt, and decaying vegetation in the backwater, sand and "pea" gravel in the channel; leaf litter occurs in slack water and eddies throughout. Emergent grasses and forbs and submerged aquatic vegetation, including water milfoil, *Myriophyllum* sp., are abundant in the backwater. Sedge, *Carex* sp., occurs in stream margins, mid-channel, and in patches on the sandbar. A pool 2 m deep occurs under the bridge and extends approximately 10 m upstream into the channel.

The water is clear (< 10 NTUs), acidic ($\text{pH} < 6$), and has a low conductivity ($< 30 \mu\text{S}$); it is typical tannin-stained blackwater (Table 1). Shallow water (< 1 m) of moderate velocity (< 30 cm/s) predominates. Flow is highest in the deepest part of the channel near the eastern shore, lower in the shallows toward the western shore, and negligible in the backwater near the concrete structure. In December, April, and July, stream discharge was 0.6-0.8 m^3/s ; in October it was $< 0.1 \text{ m}^3/\text{s}$.

The bluebarred pygmy sunfish was collected on all four visits to the location (Table 1). Most specimens were taken in the backwater. The total number of specimens taken was 41; 22 from quantitative fish-habitat surveys and 19 from supplemental collections made on 17 October 1996. The 19 specimens taken in supplemental collections were provided to other researchers (J. Jones, Fred C. Rohde) for use in genetic studies. Specimens ranged in size from 17-26 mm TL. We observed breeding coloration on 3 April 1996.

Although the numbers of specimens taken were low, the bluebarred pygmy sunfish was the fifth most abundant species (6.7% of total) of the 26 species collected here (Table 2). More abundant here than the bluebarred pygmy sunfish were the lined topminnow, bluespotted sunfish, pirate perch, and blackspotted sunfish. A single specimen of the banded pygmy sunfish was collected here also.

Table 1. Physical habitat and number of bluebarred pygmy sunfish collected by date in Boggy Gut Creek, Richmond County, Georgia. Water depth and velocity are reported as cross-sectional mean (standard deviation).

Parameter	8 Dec 95	3 Apr 96	16 Jul 96	17 Oct 96
Water temperature (C)	8.5	16.8	23.5	17.0
Conductivity (μ S)	28	22	24	20
Dissolved oxygen (mg/l)	10.2	8.8	4.9	5.9
pH	5.5	4.2	4.8	5.8
Turbidity (NTU)	2.8	3.7	9.6	2.2
Depth (cm)	43(21)	61(43)	71(50)	76(53)
Velocity (cm/s)	14(10)	14(7)	11(4)	1(2)
Number of specimens in 10 seine hauls	6	9	1	6

DISCUSSION

Faded museum specimens of pygmy sunfish suggest that populations existed of the bluebarred pygmy sunfish in Georgia tributaries of the Savannah River, including Boggy Gut Creek, but recent collections failed to substantiate this (Rohde and Arndt, 1987). Our record here, then, may constitute a rediscovery rather than a range extension or new state record. This population is notable for several reasons: it is the only confirmed report from the western Savannah drainage and is the first for Georgia; it is located approximately 90 km NW of the previous northernmost known locality; and it is approximately 250 km from the mouth of the Savannah River while all other documented populations occur within 40-150 km from the mouths of coastal rivers (Fig. 1).

The habitat and species associates of the bluebarred pygmy sunfish in Boggy Gut Creek are consistent with that reported for South Carolina populations, namely shallow, vegetated ditches or ponds, with stained, acidic water, and typically impacted by man (Rohde and Arndt, 1987; Rohde et al., 1994). Lined topminnow, pirate perch, swampfish, bluespotted sunfish, and blackspotted sunfish co-occur, as do other pygmy sunfishes, pickerels, and chubsuckers. Boggy Gut Creek, however, is more acidic (pH of 4.2 - 5.8), and with a greater

Table 2. Relative abundance of fishes that co-occurred with the bluebarred pygmy sunfish on four dates in Boggy Gut Creek, Richmond County, Georgia.

Species	Number collected	Percent of total
<i>Fundulus lineolatus</i> , lined topminnow	65	19.9
<i>Enneacanthus gloriosus</i> , bluespotted sunfish	40	12.6
<i>Aphredoderus sayanus</i> , pirate perch	36	11.0
<i>Lepomis punctatus</i> , blackspotted sunfish	36	11.0
<i>Elassoma okatie</i> , bluebarred pygmy sunfish	22	6.7
<i>Etheostoma fricksium</i> , Savannah darter	19	5.8
<i>Gambusia holbrooki</i> , eastern mosquitofish	13	4.0
<i>Chologaster cornuta</i> , swampfish	12	3.7
<i>Pteronotropis hypselopterus</i> , sailfin shiner	12	3.7
<i>Lepomis auritus</i> , redbreast sunfish	11	3.4
<i>Etheostoma serrifer</i> , sawcheek darter	10	3.1
<i>Esox americanus</i> , redbfin pickerel	8	2.4
<i>Notropis chalybaeus</i> , ironcolor shiner	8	2.4
<i>Erimyzon sucetta</i> , lake chubsucker	6	1.8
<i>Esox niger</i> , chain pickerel	5	1.5
<i>Acantharcus pomotis</i> , mud sunfish	3	0.9
<i>Erimyzon oblongus</i> , creek chubsucker	3	0.9
<i>Lepomis marginatus</i> , dollar sunfish	3	0.9
<i>Micropterus salmoides</i> , largemouth bass	3	0.9
<i>Percina nigrofasciata</i> , blackbanded darter	3	0.9
<i>Etheostoma fusiforme</i> , swamp darter	2	0.6
<i>Lepomis gulosus</i> , warmouth	2	0.6
<i>Notropis cummingsae</i> , dusky shiner	2	0.6
<i>Elassoma zonatum</i> , banded pygmy sunfish	1	0.3
<i>Lepomis macrochirus</i> , bluegill	1	0.3
<i>Noturus leptacanthus</i> , speckled madtom	1	0.3
Total number of species	26	
Total number of specimens	327	

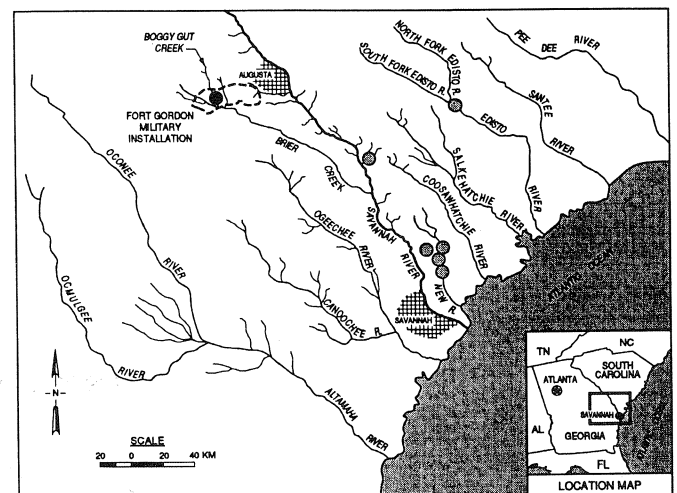


Figure 1. Distribution of the bluebarred pygmy sunfish (after Rohde and Arndt, 1987). Gray circles represent previous records; black circle represents the single locality in this report.

number of species associates present (26 species), than previously described habitats (pH 4.5-7.5; 10-18 species).

The bluebarred pygmy sunfish is listed as a species of special concern in South Carolina (Schmidt, 1996). The Nature Conservancy indicates that its status in South Carolina is unknown, but that the species is "imperiled globally" due to rarity, restricted distribution, or vulnerability (South Carolina Department of Natural Resources, 1996). This is the first confirmed report of the species in Georgia, and to date it has no status as a state-threatened species (Georgia Department of Natural Resources, 1992). Several fishes with restricted ranges within the state, however, are considered to be "special animals;" these include mud sunfish, Savannah darter, sawcheek darter, and sailfin shiner (Georgia Department of Natural Resources, 1996). The vulnerability of the bluebarred pygmy sunfish is suggested by the small number of known populations (Fig. 1) and by their proximity to disturbed habitat (Rohde and Arndt, 1987), and in Georgia by its restricted distribution. Listing as a species of special concern will likely be considered by the Georgia Natural Heritage Program (Robyn MacBeth, pers. comm., 1997).

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MINUTES

Business Meeting 23rd Annual Meeting Southeastern Fishes Council

The 23rd annual meeting of the Southeastern Fishes Council was held at the Hyatt Regency Hotel in Greenville, South Carolina on 18 April 1997, site of the 1997 meeting of the Association of Southeastern Biologists (ASB). Executive Committee members attending were Stephen J. Walsh (President), Mary C. Freeman (Treasurer), and Gerald R. Dinkins (Secretary). Steve called the meeting to order at 4:58 PM.

Copies of the 1996 SFC meeting minutes were then distributed. Steve noted that in the interest of time everyone would be given a few minutes to review the previous year's meeting minutes rather than having the secretary read them. After a brief period a motion was made to accept the 1996 meeting minutes, and was carried by voice vote. Mary then gave the Treasurer's report and provided a brief explanation of each item. Steve recognized and thanked Gerry, artist of the 1997 SFC button depicting the unique robust redhorse, for his effort in producing the button. A motion was made to accept the Treasurer's report, seconded, and passed unanimously by voice vote.

A short discussion was led by Steve Walsh regarding some of the issues associated with publishing the Proceedings, followed by Committee Reports. Mel Warren of the Nominations Committee reported that Stephen T. Ross and Robert C. Cashner were nominated for Chair-Elect, and Mary Freeman and Gerry Dinkins were nominated for Treasurer and Secretary, respectively, for the election to be voted upon during the meeting with terms to extend from 1997-1999. Steve opened the floor for additional nominations. None were made and Mel distributed election ballots.

The meeting then moved on to old business. Steve yielded the floor to Hank Bart who gave a brief report of his efforts to resolve SFC's tax exempt status. Hank, along with the former SFC secretary, submitted a Tax Exempt Status form to the Internal Revenue Service, and our exempt status is pending. Hank reported that additional time and \$150 will be required to finalize tax exempt status. Continuing with old business, Steve provided a summary of his correspondence with Partners in Wildlife and the Fish and Wildlife Diversity Funding Initiative.

Continuing on to regional reports, Steve asked each reporter to provide a summary of their regional activities. Beginning with Region I (Northeast), Fritz Rhode spoke about Bob Jenkins and Wayne Starnes' efforts to find the Carolina redhorse, and the pending channelization of the Roanoke River with long-term monitoring of *Percina rex*. Fritz reported that the threatened and endangered fishes of North Carolina will soon be published, and two ammocoetes of *Ichthyomyzon greeleyi* were captured recently in Staccoa Creek (possibly a new drainage record). Fritz will try to get additional specimens of the mountain brook lamprey with colleagues from Furman

University and Bud Freeman.

For the Region II (Southeast) report, Bud Freeman corrected a mistake in Noel Burkhead's report relative to the number of *Moxostoma robustum* stocked at the locations noted. Steve Walsh said he would bring this to Noel's attention.

Dave Etnier (Region III, North-Central) asked Bud to bring everyone up to date on recent efforts to capture sicklefin redhorses in the Little Tennessee River system. Bud reported that redhorses were captured in the mouth of Abrams Creek (Chilhowee Reservoir) and in Fontana Reservoir, but no sicklefins were taken. Peggy Shute spoke about the discovery of *Alasmodontia raveneliana* in lower Tuckaseegee River, North Carolina. Peggy also spoke about the Little River Action Team, their efforts to build a coalition to protect the river, and fish distribution maps needed by Larry Master of the Nature Conservancy in Boston.

Bernard Kuhajda (Region IV, South-Central) reported that with the recent capture of a two-pound immature Alabama sturgeon approximately two miles downstream of Claiborne lock and dam, the total number of specimens of this species known to have been captured in the 1990s stands at five. This most recent individual was caught on a trotline. The U. S. Fish and Wildlife Service has provided funding to partially retrofit a fish hatchery at Marion, Alabama, for captive propagation of this species. Bernie also reported that students of Stephen T. Ross recently captured a Gulf sturgeon in the Pascagoula River—a new record for the Pascagoula. The University of Alabama Ichthyological Collection (UAIC) has moved to a new location, the Scientific Collection Facility, with new compactable shelving which triples the former shelf space!!

John Harris (Region V, Northwest) was not present to give a summary of the regional report.

Frank Pezold (Region VI, Southwest) reported that the Red River chloride control project is still alive, and spoke about information being disseminated regarding the project's pros and cons. Frank also discussed the upcoming retirement of Neil Douglas. A "Neil-Fest", planned for May 10, was noted. For more information regarding festivities, the audience was asked to contact Frank.

Following the Regional reports, Mel Warren announced that tallying of SFC election ballots was completed: Stephen T. Ross was announced as the new Chair-Elect, and Mary Freeman and Gerry Dinkins were re-elected to posts of Treasurer and Secretary, respectively.

Moving on to new business, Steve Walsh distributed a paper copy of the pilot SFC web page and opened the floor for comments. A suggestion was made to put an index of past Proceedings articles rather than actual text of the articles, and someone questioned how upkeep of the website would be supported. Gerry Dinkins volunteered to develop a new SFC

logo, with assistance and comments from other members. Mel Warren suggested that development of the web page should not be deferred for lack of a new logo. Mel advised providing immediate public access to the web page via the Internet and including a newly-designed logo at a later date. Steve called for a voice vote to proceed with development of an official SFC web page. A motion was made, seconded, and carried.

Steve then moved to proposed resolutions and informed attendees that Hugh Irwin of the Southeast Appalachian Forest Coalition (SAFC) had approached him regarding environmental concerns about the Conasauga River. A coalition of groups is working on Conservation Plans for actions on southeast forests, and they are particularly interested in the Conasauga River and Citico Creek watersheds. SAFC wants to propose resolutions which would encourage the Forest Service to delay large-scale logging until conservation plans are in place. Under these plans, the whole watershed of each would be managed as one unit. Relevance of this approach is timely because Forest Service has more than one major project currently planned within the Conasauga watershed. One of these involves logging approximately 8,000 acres and constructing many miles of new roads. Steve acknowledged recent scientific efforts in both watersheds by Peggy and J. R. Shute and Patrick Rakes, and asked for their assistance in bringing to the attention of appropriate Forest Service managers the sensitivity of both watersheds. Steve noted that the resolution would be directed toward the District Manager, Regional Manager, and Regional Office of Forest Service. A motion was requested and received for assisting SAFC with this resolution.

The next resolution discussed pertained to a proposed titanium mine on approximately 38,000 acres of Trail Ridge, adjacent to the Okefenokee Swamp. In April, DuPont was strongly urged by the Secretary of the Interior to withdraw their mining plans because of serious concerns about environmental impacts on the ecosystem and a perceived conflict between the proposed mining and the intended use and protection of the swamp associated with the Okefenokee National Wildlife Refuge. A general discussion ensued of how the SFC should respond. A motion was made and passed by voice vote that a position statement would be drafted by Steve Walsh for review by the Resolutions Committee.

Mel Warren was asked by Steve to take the floor and discuss two initiatives that Mel had prepared. Mel spoke about his recent efforts to develop resolutions urging the Environmental Quality Committee of the American Society of Ichthyologists and Herpetologists (ASIH) and the Endangered Species Committee of the American Fisheries Society (AFS) to accept a representative from the SFC on a two-year term. A question was asked if the SFC person should be a "dues-paying" member of both ASIH and AFS. Mel responded by saying yes. Mel then talked about the need for developing a list of imperiled fish species emphasizing the southeast. Concerns were expressed about inadequacies of the most recent AFS list of endangered and threatened fishes. Mel argued that a more comprehensive effort, drawing on expertise within the

southeastern ichthyological community, is needed because of recent findings and because the U. S. Fish and Wildlife Service recently dropped recognition of "candidate" species for listing under the Endangered Species Act. Consequently, Mel suggested that there are many "orphan" species that need monitoring, and that development of a list of taxa would bring much-needed publicity to the plight of species and populations of concern. To that end, Mel read a resolution he had had drafted regarding this issue. Steve called for a motion for the SFC to endorse Mel's efforts and for him to finalize and submit these resolutions through appropriate channels to the ASIH and AFS. A motion was made, seconded, and approved by voice vote.

Steve Walsh asked for any other items of interest to the SFC; none were forthcoming. A motion for adjournment was made, seconded, and the meeting concluded.

REGIONAL SFC REPORTS

REGION I - Northeast

It's redhorse update time again. Dr. Bob (Roanoke College) is still immersed in *Moxostoma* systematics. He has been sampling, studying in museums, taking anatomical data, occasionally summarizing to find trends and differences, and occasionally writing parts of manuscripts. In addition to this group he is studying jumprocks, *Scartomyzon*, and torrent suckers, *Thoburnia* in order to bring his level of knowledge up with those of redhorses to avoid making conclusions in papers that need to be revised later. One of these papers to be published concerns further phylogenetic analysis. Bob is emphasizing study of young of the year redhorses, partly to identify characters enabling easy identification. He's had good success so far. With Roanoke College students Mark Clements, Aaron Coons, Stephanie Moore, and Loren Walker, three studies of life history aspects of suckers are well advanced: (1) reproductive behavior and habitat of redhorses and jumprocks; (2) age, growth, and maturation of the river and robust redhorses, and maximum age and size of redhorses; and (3) foods of age-0 river redhorse and comparative feeding behaviors in the *Moxostoma* group. Bob wants feedback from colleagues about his tentative plans to change some common names, some warranted due to taxonomic changes, others because current names have undesirable connotation. Aiming to use best names for all time, after the "dust settles" regarding controversy of name-changing, Bob is considering or has concluded: (1) black redhorse to become dusky redhorse. It's not a black fish; it usually is about as brassy as golden redhorse; the name black redhorse has led to many, many misidentifications. (2) Blacktail redhorse should change to stripetail redhorse. Only two or three caudal rays are dusky or black, and this is often or usually masked in life by red; the highly diagnostic tail has a white and black stripe in

preservative. (3) Black jumprock is better termed blacktip jumprock. "Black" jumprock is a misnomer; its best diagnostic field and lab characteristics are small black tip on dorsal fin and caudal lobes. (4) The name V-lip redhorse will be reallocated to *Moxostoma collapsum* (Cope), which he elevates to species from under the synonymy of *M. anisurum*. (5) *Moxostoma pappillosum*, which briefly had the name V-lip redhorse, will be called slender redhorse. (6) Elevated to species from synonymy under *M. macrolepidotum*, *Moxostoma breviceps* will be dubbed hookfin redhorse, partly in contrast to the even more falcate dorsal fin of the undescribed sicklefin redhorse. (7) Bob repeats that the true *Moxostoma robustum* (Cope) is to be called robust redhorse. (8) The latter's imposter, undescribed species, formerly called smallfin redhorse, will be named brassy jumprock; many southeastern fishery scientists and consultants are using the latter two revised names. (9) the undescribed "grayfin redhorse" is better named Apalachicola redhorse; it's endemic to that drainage and occasionally it has orange in lower fins. (10) *Scartomyzon congestus*, "gray redhorse", should be called gray jumprock. That's it, folks. Give him your comments. In summer 1998, Bob is slated to complete for VA Game and Inland Fisheries, an updated, annotated distributional treatise on Virginia freshwater fishes.

Gene Maurakis of the Science Museum of Virginia has several manuscripts in progress on chubs with Bill Woolcott and several students. In addition, Gene and Bill published papers on agonistic combat of *Nocomis* in Va J. Sci. Fall 1997 and nocturnal breeding behavior in *N. leptocephalus* and *micropogon* in J. Elisha Mitchell Sci. Soc. One of Gene's students is finishing thesis on breeding behaviors in *Notropis alborus*. They are also wrapping up field studies in the spring on stimulus attraction of nest associates to chub nests and spawning behavior in *Nocomis raneyi* and *platyrhynchus*. The Science Museum and VIMS have formed a collaboration to promote marine science literacy in VA and mid-Atlantic states.

Mike Pinder (Virginia Game and Inland Fisheries) is very excited on the progress of their mussel and nongame fish cultivation station at the Buller Fish Hatchery along the South Fork Holston River. At this facility they will be testing different techniques used to reintroduce mussels to streams within their historic range. They are also developing techniques to hold, raise, and hopefully propagate a host of nongame fishes. Madtoms, cyprinids, and darters will be especially targeted. They will be using a flow-through system to raise the animals. After a long absence, the Dept. of Game and Inland Fisheries has reorganized the Fish Taxonomic Committee, now called Nongame Fish Advisory Committee. The committee comprises members of academia, environmental reviewers, and natural resource managers. The aim is to provide guidance and advice to policies and projects involving nongame fishes. The committee will also help the department in species ranking procedures, develop protocols for the reintroduction of threatened and endangered species, and

prioritize protective measures for the commonwealth's fish fauna. The state is currently funding Conservation Fisheries (J.R. Shute and P. Rakes) to augment populations of yellowfin madtom in Copper Creek. Nests will be removed and young reared for a year in aquaria. Hopefully, this will increase the survival rate of this species until the creek's problems are fixed. In 1997, Mike and Paul Bugas, Region 4 Fisheries Manager, continued survey of upper James River streams for roughhead shiner, a state species of special concern. Of the four historical sites known for roughheads, telescope shiners have taken over, fulfilling the prediction of Bob Jenkins back in the 1970's. Mike will continue surveying sites in the 1998 field season.

Welcome to Wayne's World (Starnes). The main thing is the construction of the new NC State Museum Research Laboratory, a 19,000 sq ft facility which will house wet collections and associated researchers. Completion is expected now in early May and movement, consolidation, and organization of the NCSM and former Duke, IMS, and miscellaneous other collections to commence soon after. Sorting and cataloging of backlogs and data basing and GIS linkage of the above collections is to follow over the next several years; this should result in 80,000 or more lots. Meanwhile, construction of the new main museum continues towards a late 1999 completion date. That museum's galleries will have heavy emphasis on regional aquatic habitats, including fishes, as well as a complete marine gallery committee. What time Wayne can squeeze in for other efforts has been devoted to field surveys for Carolina, sicklefin, and robust redhorses (with Jenkins, Bud Freeman and others), rice eel work in GA and FL (populations are now known from Atlanta, Tampa Bay area, and near Miami), and attempting to complete lingering Potomac, Colorado River chubs, and other fish projects. PART IV. A REEVALUATION OF THE FRESHWATER FISHES. ENDANGERED, THREATENED, AND RARE FAUNA OF NORTH CAROLINA is finally, at long last, now out!!! Hallelujah!!!

Mary Moser (UNCW) and Fritz Rohde (NC Marine Fisheries) have finished their work in the Waccamaw River basin - gear comparisons and hurricane effects. They report the first occurrence of the brook silverside, *Labidesthes sicculus*, in Lake Waccamaw. What this bodes for the endemic silverside is unclear.

Rohde, Rudolf Arndt (Richard Stockton College), and Jeff Foltz (Clemson Univ.) are continuing their studies on South Carolina's freshwater fishes. Rohde is collaborating with Joe Quattro (Univ. South Carolina) and Jim Grady (UNO) on genetic variation in the Waccamaw killifish, *Fundulus waccamensis*.

Fritz Rohde

REGION II - Southeast

Relative to the status of *Etheostoma trisella*, Bud Freeman (University of Georgia, UGA) was accompanied during summer 1997 by personnel of the U.S. Fish and Wildlife Service (USFWS), Tennessee Valley Authority (TVA) and National Resource Conservation Service (NRCS) to the powerline route that crosses the Conasauga River and many of its tributaries. TVA corrected the soil erosion and sedimentation construction mistakes that had occurred as a result of contractor activities. These actions will help reduce the ongoing impacts of erosion associated with the powerline crossing. However, the riparian canopy has been removed for approximately 100 feet on each bank where a crossing occurs and will not be allowed to grow back, thus adding to the cumulative impacts affecting the Conasauga River and its fauna. The effects of the construction on the ephemeral tributary that is the second known spawning site of *Etheostoma trisella* are at present unknown. All of the riparian vegetation has been removed along an approximately 150-foot reach in the central portion of this stream. This will accelerate evapotranspiration and may result in dessication of the stream occurring earlier each year than normal. *Etheostoma trisella* was also recently taken from the main channel of the Coosawattee River. Further surveys are being conducted by Bud and researchers from UGA in the Etowah, Oostanaula and Coosawattee rivers as part of the tri-state water study.

Research and artificial propagation of the robust redhorse continues. The hatchery rearing program was relatively successful last year. Cooperators released approximately 25,000 "phase-1" robust redhorse fingerlings into the upper Broad River (Savannah River drainage) during October and November of 1997. Fish hatcheries in Georgia and South Carolina participated in last year's rearing activities. Consistent results from the hatcheries are still elusive, so more research will be focused upon early survival and rearing. Personnel of the Georgia Power Company collected an adult robust redhorse from the Savannah River near Plant Vogel during October, while conducting routine sampling for contaminant analysis. The fish was brought back to the McDuffie hatchery after several long distance calls from the field. David Walters (UGA) was dispatched to photograph the specimen and collect a tissue sample for genetic analysis. The fish, a large female, was tagged and released in the vicinity of its capture. The annual robust redhorse conservation committee meeting was held the last week of October 1997 at the Georgia Department of Natural Resources (GADNR) headquarters in Social Circle, Georgia. This meeting was well attended and included representatives from Georgia, South Carolina and North Carolina.

A small group of state biologists from Georgia and Alabama, USFWS biologists, and U.S. Geological Survey (USGS) cooperative-research unit biologists from UGA have met twice concerning the status of lake sturgeon in the Coosa River. Sampling began in February in an effort to collect

individuals of this elusive species. A public outreach campaign conducted by the GADNR in northwest Georgia has resulted in several verbal records of lake sturgeon caught since the 1960's, along with a home video filmed in 1962 and a photograph from 1980 of a sturgeon purported to have been collected from the Oostanaula River system. Bud Freeman has examined these photographs and identified them as lake sturgeon.

Bud, Gerry Dinkins (3D/International; Knoxville, TN), and Steve Walsh (USGS; Gainesville, FL) are evaluating the distributional status of lampreys in Georgia, stimulated in large part by recent collections of substantial amounts of material through surveys for the Georgia Department of Transportation and miscellaneous other studies.

Steve Walsh reports that proposed titanium oxide mining by DuPont adjacent to the Okefenokee Swamp is an issue that is currently under extensive public debate. DuPont hired a nonprofit organization (named Resolve) that specializes in mediating environmental disputes through a "collaborative problem-solving process to help a diverse, representative group of stakeholders find a mutually-acceptable way of resolving controversy." A Core Group has been formed and several public forums were conducted last year. The U.S. Department of the Interior is boycotting the "collaborative" process, thus employees of the USFWS and USGS have been prevented from participating in the meetings that have ensued. Late in 1997, discussion focused on what might happen if there is no consensus among stakeholders, and efforts were being made to select technical expertise in evaluating potential consequences of mining. Although publicly claiming that it vows to do no harm to the Okefenokee Swamp, DuPont is clearly pursuing every avenue that would allow the company to proceed with mining activity on Trail Ridge.

Jan Hoover and Jack Killgore (Waterways Experiment Station; Vicksburg, MS) are studying spawning grounds and aquatic food webs at Fort Gordon, Georgia. Fish communities there are diverse and include several species of special concern, but fish densities are low and floodplain habitats are limited. Jan and Jack also reviewed wetland fish studies of the southeast in the newly published book "Southern Forested Wetlands: Ecology and Management (M.G. Messina and W.H. Conner, eds., Lewis Publishers, Boca Raton).

Jack and Phil Kirk recently completed a 7-year study of fish assemblages in once-weedy Lake Marion. They found that fish abundance was not associated with long-term declines in hydrilla, now controlled by triploid grass carp, because woody structure and other vegetation persisted. Phil and Jim Morrow, who studied population dynamics of Lake Marion grass carp several years ago, are continuing their work using newly collected otoliths to examine long-term changes in growth and mortality.

Effective at the end of December 1997, Carter Gilbert retired as curator of fishes from the Florida Museum of Natural History (FLMNH), thereby ending the longest continuous reign of a distinguished ichthyologist at that institution. To celebrate this honorable occasion, Jim Williams (USGS) hosted an

informal retirement party at his Gainesville home in late January, which was well attended by former students, various colleagues from throughout the Southeast, and assorted associates. A good time was had by all and a light "roasting" ensued following food and beverages. Dave Etnier (University of Tennessee, UT) humorously reminisced about the three things that first came to mind when thinking of Carter (use of a mudpack for sunscreen on his forehead, stripping to the buff in full public view on the highway through Cross Creek, and Carter's legendary frugality). Dave ceremoniously presented a gift in the form of a plastic dinner plate that Carter had used to devour \$30 worth of food at a grad student reception during the Knoxville ASIH meetings; in awe, UT students had enshrined the dish for years to honor just such an occasion as Carter's retirement. The FLMNH is expected to advertise for a replacement ichthyologist sometime later this year, a search that will obviously be of great interest to the SFC.

Carter completed his long-awaited, edge-of-your-seat type catalogue of North American fishes, had it published (photocopied) through the newly-created "special series" of the FLMNH, and is offering it for sale at the bargain price (?) of \$40; orders can be placed through Rhoda Bryant at the museum with checks payable to the University of Florida Foundation.

Noel Burkhead (USGS; Gainesville, FL) had major back surgery in early February and was out of commission at the time of the call for regional report information. Noel has been out of his typical convivial character for many months, and we hope the surgery will alleviate the pain and lead to a full recovery to good health; the SFC membership joins together in wishing Noel a speedy return to electrofishing in the Southern Appalachians and sharing his unique brand of humor with colleagues in the field and at future meetings. He promises (threatens?) a vigorous return to old form soon, so those that think they got off easy in this year's report better be prepared for 1999!

Jim Williams (USGS; Gainesville, FL) and field assistants completed fish and mussel collections in the Flint River drainage and mussel collections in the Coosa River drainage in fall 1997. This work was done for the U.S. Army Corp of Engineers and USFWS as part of the tri-state water project. Jim and crew also completed mussel surveys in the Yellow River drainage of Alabama and Florida last August as part of a project supported by the U.S. Environmental Protection Agency.

Leo Nico (USGS; Gainesville, FL) continued fish, mollusk, and crayfish surveys of the Avon Park Bombing Range (U.S. Department of Defense) in central Florida. Leo also conducted quantitative sampling at several fixed sites throughout south Florida as part of the USGS National Water Quality Assessment program. Leo continues focusing on several projects involving nonindigenous fishes and is nearing completion of a coauthored, comprehensive review of fish introductions throughout the U.S., to be published by the American Fisheries Society.

Frank Jordan has left his native turf at Jacksonville University for the Big Easy and is now employed at Loyola University in New Orleans; a collective rumble was reported to have reverberated through the entire global Jesuit community. Despite the change, he is still hyperactive in Florida with studies on seasonal variation in habitat use, size and age structure, and population genetics of marsh fishes in the Florida Everglades (with Joel Trexler; Florida International University, FIU), distribution, habitat use, and trophic ecology of fishes in oligohaline and tidal freshwater portions of the St. Johns River, experimental analysis of habitat selection by important estuarine fishes and invertebrates (with students Heather Soulen, Mark Bartolini, Stephanie Sanborn, and Joanna DeSalvo), and comparisons of food webs in enhanced and unenhanced portions of the Kissimmee River.

Howard Jelks (USGS; Gainesville, FL) has been converted to a permanent full-time federal employee. He and Frank are continuing their work with personnel of Eglin Air Force Base and USFWS on ecological studies of Okaloosa and brown darters. Howard is also working with Bob Lewis and Noel Burkhead on a general aquatic faunal survey of Eglin AFB. Howard and Noel also completed an experiment evaluating the effects of fine sediments on the spawning success of the crevice-spawning tricolored shiner last year, and hope to conduct similar studies on surrogate species of darters in the future.

Bill Loftus (FIU) continues to work on his dissertation research on mercury bioaccumulation in the Everglades National Park (ENP) aquatic food web. Together with Joel Trexler and other collaborators, Bill is also involved in empirical studies of aquatic community structure and dynamics in the seasonally variable wetlands of southern Florida. These projects include: analysis of long-term aquatic animal databases; life history and population dynamics of the Everglades crayfish; experimental studies of population growth and predator-prey interactions of fishes in ENP; population structure and spatial delineation of aquatic consumer communities in ENP; and surface water-ground water interactions involving aquatic animals in the rocky glades habitat of ENP.

The relentless lure of northcentral Florida continues, as Gary Meffe relocated to Gainesville and began duties as Editor of *Conservation Biology* late last year. Gary has little to report on current research activities, but we all know that his attraction for exciting studies on lipid energetics of *Gambusia* is unlikely to wane.

Stephen J. Walsh

REGION III - North-Central

Status surveys and other interesting finds

The current status of *Erimystax cahni*, slender chub, is still unknown. No additional specimens have been collected since the one adult collected by Etnier and class at Frost Ford on the Clinch River in October last year (1996).

Tim Broadbent of the Tennessee Wildlife Resources Agency (TWRA) reported what is surely an Atlantic needlefish (*Strongylura marina*) from the Tennessee River (Kentucky Reservoir) at the New Johnsonville Steam Plant, a few miles below the mouth of the Duck River. The specimen is on its way to U.T., but has not arrived at this writing.

Don Harris, American Aquatics, Norris, identified a large bighead carp captured by fishermen in the Town Creek embayment of Guntersville Reservoir last summer.

Two populations of *Gambusia holbrooki* have turned up in east Tennessee, one in the Pistol Creek system of Little River and the other in the Baker Creek system of the Little Tennessee River, both in Blount County.

Etnier's Regional Faunas class determined that specimens of *Noturus nocturnus* from the lower Mississippi river proper are not waifs—they live in the riprap areas along with *Percina shumardi* and adult *Macrobrachium ohione* in the Dyersburg, Tennessee area.

Pat Rakes, Conservation Fisheries, Inc. (CFI), reports that the current status of *Fundulus julisia*, Barrens topminnow, is still extremely tenuous. Currently, there are cooperative efforts between CFI, U.S. Fish & Wildlife Service, The Nature Conservancy, the Tennessee Wildlife Resources Agency, and the Tennessee Aquarium for long-term conservation of the species that might include reintroductions within the historic range of the species.

J. R. Shute and Pat Rakes (CFI) surveyed portions of Copper Creek of the Clinch River system, in Virginia for the Virginia Game & Inland Fisheries and the U.S. Fish & Wildlife Service. They were searching for *Noturus flavipinnis*, yellowfin madtom. Only a few individuals had been seen at a single locality in recent years. They observed several individuals (including young of year) at various localities as result of snorkel surveys. This survey will continue in the 1998 field season, and attempts to delineate the current range of the species within Copper Creek, and to estimate the overall status of the population will be a part of the effort.

Charlie Saylor, Ed Scott, and Amy Wales, Tennessee Valley Authority (TVA), report results of 1997 TVA surveys. Ed Scott surveyed the fish community in the tailwaters of several TVA dams, and reported the following. As a result of the first year of a ten year study in Douglas Tailwater related to turbine upgrades at Douglas Dam on the French Broad River, Ed found that *Percina tanasi* continues to be distributed from the mouth of the French Broad River near Knoxville, upstream almost to Douglas Dam (about 30 river miles), and are relatively common in the lower end of this reach. Fifty-five individuals were captured between river miles eight and 14.

Cycleptus elongatus was also taken from within this reach of the French Broad River. The ten-year study was developed after snail darters were found from the mouth of the French Broad River near Knoxville, upstream almost to Douglas Dam (about 30 river miles) in 1996. See below for additional comments about this stretch of the French Broad River. Ed also reported single redband and coppercheek darters from the tailwater of Normandy Reservoir, Duck River Mile 241. He also reported that the fish community in the tailwaters of Tims Ford Reservoir (Elk River) appeared much improved in 1997, with several darter species (9) present there. Habitat also exists for boulder darters (see below).

Amy Wales reported collections of *Etheostoma cinereum* and *Percina burtoni* from several localities in the Duck River system. Charlie Saylor reported that *Percina burtoni* appears to have a strong population in White Oak Creek, (as many as 13 stream miles), a tributary of lower Kentucky Lake. He also reports that *Macrhybopsis aestivalis* was found in the Nolichucky River upstream from Davy Crockett Reservoir and from French Broad River above Douglas Reservoir, which considerably extends the range of the species. TVA crews also collected one *Erimystax insignis* at the French Broad site. Saylor also reported that Scott Mettee (Alabama Geological Survey), in surveys for TVA, collected *Cycleptus elongatus* in Bear Creek, AL, near Pickwick Reservoir backwaters.

Scott Mettee (Alabama Geological Survey) reported that they conducted approximately 90 level-1 fish bioassessments in the southern bend area of the Tennessee River drainage, which expands the number of stations and samples in this area to 140 and 300 since the Alabama fish book was published. As part of this effort, they added new distribution records for *Percina phoxocephala* (two collections) from the Bear Creek system, and the first hands-on records of *Notropis photogenis* in Shoal Creek.

Jeff Garner (Alabama Game & Fish) and Stuart McGregor (Alabama Geological Survey) reported several significant finds of endangered mussel species in the Alabama portion of the Tennessee River drainage. These include: white wartyback (*Plethobasus cicatricosus*) and pink mucket (*Lampsilis abrupta*) in the mainstem Tennessee River below Wilson Dam; Cumberland combshell (*Epioblasma brevidens*) and fine-rayed pigtoe (*Fusconaia cuneolus*) in Bear Creek.

Captive propagation, reintroduction and other management activities

Captive populations are being maintained at CFI for the following species: *Cyprinella caerulea*; *C. monacha*; *Erimystax dissimilis*; *Notropis mekistocholas*; *Phoxinus cumberlandensis*; *Phoxinus* sp. (Laurel dace); *Fundulus julisia*; *Noturus baileyi*; *N. miurus*; *N. flavipinnis*; *Elassoma alabamiae*; *Etheostoma wapiti*; *E. percnurum*; *E. luteovinctum*; and *Percina copelandi*. Recent success in captive reproduction include *C. caerulea* and *P. copelandi*. The *P. copelandi* are intended as surrogates for attempting captive propagation of the rare *P. aurora*; *N. miurus* is a surrogate for *N. flavipinnis*; and *E. dissimilis* is a surrogate for *E. cahni*. The Tennessee Aquarium has been assisting in

rearing *C. monacha* produced by CFI to stocking size. Recent successful captive spawnings include *C. caerulea* and *P. copelandi*.

The goal of maintaining these captive populations is to refine techniques for working with more rare species and to produce young for attempts at reintroducing the species at appropriate localities within their natural ranges, or augmenting natural populations. However, some captively produced offspring are being used for water quality/toxicity testing. These include *N. mekistocholas*, *C. monacha*, and *C. mekistocholas*.

The Tennessee Aquarium has produced a plan to propagate and reintroduce *Acipenser fulvescens* at appropriate localities within Tennessee, with support from the Tennessee Wildlife Resources Agency and the U.S. Fish & Wildlife Resources Agency. A probable site for the initial transplant of the sturgeons will be the forks of the river area in Knoxville, where, as noted above, improvement in water quality in both the lower French Broad and lower Holston rivers has occurred.

No stockings were made in 1997 using captively-produced blackside dace. A total of 120 captively-produced boulder darters were stocked at Hamilton Mill on the Elk River (Giles Co., TN) in May (and eight were collected at the same site in less than an hour in September). As previously reported, *C. monacha*, *N. baileyi*, *N. flavipinnis*, and *E. percunum*, were again captively propagated. Individuals produced in 1996 were stocked in late spring 1997, and individuals produced in 1997 will be stocked in spring 1998. To date, a cumulative total of more than 2500 *C. monacha*, nearly 1500 *N. baileyi*, 500 *N. flavipinnis*, and more than 1300 *E. percunum* have been reintroduced into Abrams Creek in the Great Smoky Mountains National Park, (Blount County, TN). For the third consecutive year, reproduction was documented for *E. percunum* and *N. baileyi*. Three *N. baileyi* nests were observed during the 1997 field season, and several young of year *E. percunum* were also observed.

As recommended by Noel Burkhead to provide supplemental boulder darter spawning substrates, the Tennessee Wildlife Resources Agency (TWRA) and CFI placed more than 175 artificial structures at a boulder darter locality in the Elk River. These structures were placed in a variety of habitats and flow conditions. More than 120 captively-produced boulder darters were stocked in these areas, with the intent of augmenting existing populations. Bob Hatcher (TWRA) is very interested to see if this management technique shows promise, because it may be used in attempts to expand the range of the species within the Elk River, or when attempting to reintroduce the species into other streams within their historic range. Hatcher seeks recommendations from other experts concerning additional rare southeastern fish species that might be aided by installation of artificial structures.

Dick Neves (VPI) has been successful in propagating mussels, including the endangered tan riffleshell (*Epioblasma walkeri*); in cooperation with TWRA, TVA and the U.S. Forest Service, several captively-produced individuals were stocked in

the Hiwassee River (dewatered area above Appalachia powerhouse) to augment an existing population there.

Jim Layzer (Tennessee Tech. Univ.), in cooperation with TWRA, USGS, and FWS stocked several species of common mussel species in the Douglas tailwater area of the French Broad River. This was done to test habitat suitability prior to attempting to establish rare mussels in this area.

Local and regional watershed activities

Watershed association activities were initiated in the Conasauga and Little River (mainstem Tennessee River tributary near Knoxville) systems. The Little River association was initiated by the TVA River Action Team, in cooperation with state and local organizations. The Conasauga association was initiated by The Nature Conservancy (TNC), and has also had involvement from many federal, state (both GA and TN) agencies, and local groups. Both of these associations are evolving to become their own entities, separate from the federal or state agencies. Leslie Collie (TNC) reported on several projects that are underway in the Conasauga and the Clinch watersheds. These include work with the Chattahoochee National Forest to relocate the Cottonwood Patch Horse Camp (on the banks of the Conasauga River just upstream from the mouth of the Jacks River); improving blue shiner habitat; work with five local landowners to establish riparian buffer; and coordination with the local utility to reduce impact of a water line installation on coldwater darter habitat. She also reports that TNC's three year old Clinch River Community Project is going well, with over 30 individual projects in place in the watershed.

Peggy W. Shute and David A. Etnier

REGION IV - South-Central

Bruce Thompson at Louisiana State University has described two more southeastern logperch, *Percina suttkusi* and *P. kathae*. He has finished a status report on *Fundulus jenkinsi*, and has recently received funding to look for the newly described and rapidly disappearing *Percina aurora* from the Pearl River Drainage. Bruce is also describing the nursery habitats of *Paralichthys squamilentus*, a poorly known estuarine/marine flatfish.

Bob Cashner at the University of New Orleans reports that he has funding for a study of the nekton of Lake Pontchartrain estuary, which began in 1996 and will continue at least through the Summer of 1998. Thanks to the generous assistance of Bruce Thompson (LSU) and Hank Bart (Tulane), Bob has more than 2,000 collections over a 45 year period from earlier intensive surveys on Lake Pontchartrain. Julian Humphries is managing this data-base. UNO has taken or has records for specimens of the Rio Grande cichlid, *Cichlasoma cyanoguttatum*, from four localities over 30 miles on the south

shore of Lake Pontchartrain; indications are that it has become established. Bob has two students working on pH tolerances of *Notropis texanus* and *Cyprinella venusta* to attempt to better understand the apparent disappearance of *C. venusta* from Bayou Lacombe, a tributary to Lake Pontchartrain. In 1975, the blacktail shiner was the numerically most abundant species in the system. A study by Mike Farabee in 1988-89 revealed that the species was no longer present. Surveys every spring from 1991 to the present have not yielded a single specimen. Jeff Stewart has completed his study on changes in fish fauna of the Bogue Chitto River (Pearl River Drainage) over a 20 year period, and is writing his thesis. He has accepted a position as Collection Manager of the fish collection at Southern Illinois University-Carbondale. Chris Schieble has also finished his project on life history aspects of the shadow bass, *Ambloplites ariommus*, in Louisiana and Mississippi, and is writing his thesis. He is currently serving as the Field Technician for the UNO Lake Pontchartrain Ecosystem Project.

Jan Hoover at the Corps of Engineers Waterways Experiment Station in Vicksburg, Mississippi reports that several studies on paddlefish and sturgeons in the lower Mississippi River Basin are nearing completion. Jack Killgore, working with commercial fisherman William Lancaster, is describing habitat utilization and preferences of sturgeons in the genus *Scaphirhynchus*. Jan Hoover and Steven George are studying morphometric characters of shovelnose and pallid sturgeons, *S. platyrhynchus* and *S. albus*. They found that allometric growth of several anatomical structures is significant and may influence field identifications. Jan and Steven have also documented variation in rostrum morphology of paddlefish. Jack Killgore, with Jim Morrow and Phil Kirk, completed a demographic study of shovelnose sturgeon in which age, growth, and mortality data are represented. Reid Adams, who previously determined critical swimming speeds of adult shovelnose sturgeon, is now quantifying sustained, prolonged, and burst speeds of juvenile pallid sturgeon (spawned at Gavins Point National Fish Hatchery). Specimens from these projects have been donated to several museums and broodstock to Natchitoches National Fish Hatchery. The Waterways Experiment Station Fish Team is also evaluating effects of low flows on fish assemblages of the Big Sunflower River and of levee construction on borrow pit communities adjacent to the Mississippi River.

Chris Taylor at Mississippi State University in Starkville has collected fishes from 40 sites throughout the Luxapalila Creek System (Tombigbee River Drainage). He was able to reconstruct historical pre-Tennessee/Tombigbee Waterway fish assemblages for 24 of these sites. Results indicate that the assemblage structure of sites on smaller streams has changed more than those on larger streams, and smaller streams have gained species while larger streams have lost diversity.

Melvin Warren and Wendell Haag at the US Forest Service Hydrology Lab in Oxford, Mississippi, have been examining headwater mussel communities restricted to a few watersheds in the Mobile Basin. These communities are separated by long

stream reaches unsuitable for adult mussels and/or host fishes. Assessment of the genetic structure of these isolated populations is needed to evaluate their potential long-term viability. This information is vital in assessing and reshaping current management plans.

Mark Peterson at the Gulf Coast Research Lab in Ocean Springs, Mississippi is working on a manuscript resulting from his research on *Cycleptus elongatus* from the Pearl and Pascagoula rivers. Stuart Poss, also at the Gulf Coast Research Laboratory, reports the creation of a new web site (<http://www.ims.usm.edu/musweb/endanger.html>) of potentially endangered fish species, funded by the US Gulf of Mexico Program (USGOMP). This work is the result of collective efforts of numerous museums with holdings of fishes from the Gulf of Mexico and nearby coastal drainages. This web site is currently being expanded to include non-indigenous species, which is again being supported in part by USGOMP.

Elise Irwin at the Alabama Cooperative Fish and Wildlife Research Unit at Auburn University and Mary Freeman at the US Geological Survey Biological Resources Division at the University of Georgia, Athens are initiating a five-year study to quantify littoral fish abundance and assemblage dynamics on sand and gravel bars in the lower Alabama River. First-year samples revealed over 30 fish species using bars, and an overwhelmingly large nighttime aggregation of cyprinids and juvenile channel catfish. Long-term investigations seek to relate fish abundances to differences in bar habitats. Elise and graduate student Allyse Ferrara are investigating life history and population characteristics of *Lepisosteus osseus* below Jordan Dam on the Coosa River. Elise and another student, Glenn Kowalski, are studying the distribution of endemic and threatened aquatic fauna in the upper Tallapoosa River, including *Etheostoma tallapoosae* and *Cottus* sp. cf. *C. bairdi*.

Carol Johnston has moved from Oxford to the Department of Fisheries and Allied Aquacultures at Auburn University. She will be teaching an ichthyology course and continuing her research on sound production in cyprinids and percids, movement and microhabitat studies of the federally Threatened *Cyprinella caerulea*, and concluding a study of movement of stream fishes in the Ouachitas. Carol will also be starting a project with the federally Threatened *Cottus pygmaeus*.

Scott Mettee of the Geological Survey of Alabama in Tuscaloosa reports that the Biological Resources Section completed Section 6 status surveys on *Cycleptus elongatus* in the Alabama River, *Noturus munitus* in Alabama, mussels and fishes in the Tennessee River Drainage, and land use as related to biodiversity in Locust Fork of the Black Warrior River. The Survey has published on a biological/water-quality study for the lower Cahaba River system and a ground-water project in relation to the Alabama cave shrimp. Scott's section has initiated a two-year fish bioassessment study in the Tennessee River Drainage with TVA and continues to assist Alabama Game and Fish in sampling efforts for *Scaphirhynchus suttkusi*. Staff recently completed a biological/water quality study investigating the impacts of various types of forest clearcuts and

road crossings on stream ecosystems, and they assisted Alabama Department of Environmental Management in collecting over 30 fish samples in the Black Warrior River System to develop IBI metrics for streams in the area. They have also been involved in three 319 non-point pollution studies which included fish and benthic invertebrate collections and habitat delineations. Scott reports that work will continue on Section 6 surveys, fish bioassessments with TVA, Alabama sturgeon sampling, and ongoing 319 program efforts. He will also initiate biological sampling in the Choctawhatchee River System. Lastly, Scott would like to invite all SFC members to visit and use the Geological Survey of Alabama fish collection, which has new shelving to accommodate samples collected and processed over the last five years. He plans to put digital distribution maps and fish and habitat photographs on the Survey's home page. He can be contacted via email at smettee@ogb.gsa.tuscaloosa.al.us or phone (205)349-2852 for more information.

Ken Marion and Robert Angus at University of Alabama-Birmingham have completed a 1995-96 bioassessment study of the upper Cahaba River. Numerous habitat, ichthyofaunal, and benthic macroinvertebrate assessments were used to examine the effects of urbanization on the habitat quality and fish assemblages. Habitat assessment scores tended to decrease from the headwaters to below Birmingham, primarily due to siltation. Species of cyprinids and percids which are sensitive to anthropogenic disturbances are becoming less abundant in the system, and macroinvertebrate population assemblages decline downstream of urbanization. Even with these degraded habitats, the upper Cahaba River is still in reasonably good shape. Dr. Angus, along with W. Mike Howell of Samford University, recently received an EPA grant to study the effects of environmental hormone disruptors on fishes. *Gambusia affinis* will be used as a model to screen environmental pollutants for their endocrine disrupting capacity.

Bob Stiles at Samford University continues his study on the population size and basic biology of *Cottus pygmaeus* in Coldwater Spring. Preliminary results indicate larger populations of both *C. pygmaeus* and *Etheostoma ditrema* than had previously been suspected. Bob Stiles and Paul Blanchard began a study last fall on water quality parameters of the Cahaba River that could impact on the possible reintroduction of *Cyprinella caerulea*. Dr. Blanchard is also examining water quality parameters in Turkey Creek (Locust Fork of Black Warrior River), the only known localities of *Etheostoma chermockii*. Both of these water quality projects will employ integration of GIS tools and spatial modeling.

Malcolm Pierson of the Alabama Power Company in Birmingham has begun a resurvey of stream habitat historically inhabited by *Cyprinella caerulea*. Initial sampling in Little River and upper Choccolocco Creek (both Coosa River Drainage) has revealed good, reproducing populations, but no range extensions. Malcolm has concluded a study on fish collections from below Jordan Dam on the Coosa River from 1992-96. A total of 67 species from 18 families was

documented, with numbers of fluvial specialists and dependants generally increasing since the implementation of a continuous minimum flow in 1990. Numbers of habitat generalists have either decreased or remained stable. Overall, there has been an obvious improvement in microhabitat conditions since continuous minimum flow was initiated.

Bud Freeman at the University of Georgia's Institute of Ecology in Athens plans on conducting surveys in the Oostanaula River targeting *Acipenser fulvescens*. It appears that several historic records from this area of the Coosa River are valid, although no voucher specimens exist. A recent information-seeking campaign by the Georgia Department of Natural Resources has uncovered two additional pieces of photographic evidence from 1962 and 1980, further supporting the existence of the lake sturgeon in the Coosa River Drainage.

Hank Bart at Tulane University reports that he, along with students Kyle Piller and Jason Tipton, have discovered the only known breeding area for the pearl darter *Percina aurora*. They found eight breeding males with running milt in the Leaf River (Pascagoula River Drainage) in May 1997. These pearl darters were in a shallow, firm gravel riffle at mid channel. No females were collected in spawning condition on the riffle and no spawning was observed while snorkeling, though water conditions were somewhat turbid. The species was collected in three other parts of the Pascagoula Basin during 1996-1997, all within the Leaf River. Status work is continuing and the Fish and Wildlife Service is considering listing the species. Hank is finishing the taxonomic description of the rush darter, *Etheostoma* sp. cf. *parvipinne*, and has proposed to start a status survey after completing the description. He has been unable to collect the species in two of the three known areas of occurrence (Jefferson and Etowah counties, Alabama) and wants to look for other populations. Hank is working with The Nature Conservancy in acquiring a parcel of land in Pinson, Alabama that includes Penny's Spring, where the rush darter has been taken. This spring is also home to an introduced population of *Etheostoma nuchale*. With proper management, the spring may serve as a refuge for both darter species. Lastly, Hank is planning to conduct a status survey of the coal darter, *Percina brevicauda*, in 1998.

Carl Couret at the US Fish and Wildlife Service in Daphne, Alabama, reports on the status of the Tri-State Water Management Plan, which involves water allocation disputes between Alabama, Georgia, and Florida in the Alabama-Coosa-Tallapoosa River (ACT) and the Apalachicola-Chattahoochee-Flint River (ACF) basins. The Service's concerns in these basins include 28 federal protected species and six federal candidate freshwater species, three anadromous fish species, 63 aquatic species endemic to these basins, and five National Refuges, Hatcheries, and Areas. Compact Agreements between states were signed in November 1997 which established the ACT and ACF river basin commissions. These commissions direct the states to develop a consensus allocation formula for each basin by 31 December 1998. These formulae are to equitably apportion surface waters such that water

quality, biodiversity, and ecology are protected. The Service and other federal agencies are assisting the Corps in developing their draft EIS's for each basin, which will be the Corps input into the federal commissioners' decision on water allocation formulae. There is an opportunity through these formulae to protect and/or restore ecological integrity, biodiversity, and water quality by (1) conserving and possibly restoring natural flow regimes in remaining riverine reaches, (2) identifying minimum flow levels in these riverine reaches, (3) accurately assessing potential impacts, and (4) performing aquatic monitoring studies. Equal consideration should be given to the modification of operation rules for existing dams, establishment of instream flows, and constraints on consumptive use. The ACT-ACF compacts are precedent setting because they recognize instream values and, because they are the first water compacts in the southeast, may be used as models for future compacts in our area. Because there are no apparent public meetings after the state's allocation formulae are released to the public, it is important to provide input to the state commissioners before December 1998. Points of contact for the ACT Basin Compact are Alabama Governor Fob James (State Commissioner), Representative Richard Laird (alternate Commissioner), and Walter Stevenson (ADECA-Office of Water Resources).

Frank Parauka at the Service's office in Panama City, Florida, reports that his office, along with the National Marine Fisheries Service, have sponsored Dwayne Fox of the North Carolina Cooperative Fish and Wildlife Research Unit in his search for spawning sites of *Acipenser oxyrhynchus desotoi* in the Choctawhatchee River Drainage. Twenty adult Gulf sturgeon (25-80 kg) were collected in Choctawhatchee Bay prior to their upstream spawning migration, sexed, and surgically implanted with radio and sonic tags. These fish were tracked to upstream locations, and egg samplers deployed at these areas. Gulf sturgeon eggs were collected at six locations in the Choctawhatchee and Pea rivers near Geneva, Alabama. Sites were characterized with limestone bluffs/outcropping and hardbottom substrate. Tagged sturgeon will be monitored as they leave the river system. Migratory patterns and marine habitats will be studied. Frank also reports that his office and Eglin Air Force Base are partnering a project to monitor sub-adult Gulf sturgeon in Choctawhatchee Bay. Sixteen sturgeon (2-19 kg) were collected in the Choctawhatchee River and equipped with external sonic tags. Monitoring of movements in the bay and marine habitats will be supplemented with remote sensors at Destin Pass and Santa Rosa Sound. Preliminary data from last year indicates that five of six sub-adults tagged remained in the bay during the entire winter. Nadine Craft of the Florida Department of Environmental Protection is conducting a similar study in Pensacola and Escambia bays in Florida, where she has tagged 12 sturgeon (2-45 kg) in the Yellow River.

Jim Williams at the US Geological Survey Biological Resources Division at the Florida Caribbean Science Center reports on the findings of a mussel survey of the Escambia and

Yellow river systems from 1990-96 that he worked on with Holly Blalock and Doug Shelton. Thirty-six of 64 historical sites and 59 new sites were surveyed for mussels in the Escambia River Drainage; 28 of the 30 species historically known from the basin were found. In the Yellow River Drainage, seven of the 11 historic sites and 71 new sites were surveyed; 11 of 15 historic species were collected, as well as two previously unreported species. Rare mussels known from the basins were found at only a few sites. Future efforts will concentrate on resurveying the remaining historical sites.

A second Alabama sturgeon is now a resident of Marion Fish Hatchery in Alabama. This specimen was collected by Phillip Kilpatrick of the Alabama Game and Fish in December 1997 in Claiborne Pool on the Alabama River. It was captured on a trotline baited with nightcrawlers at a historic site in a hole off the end of a sand bar. Phillip reports a recent sexing of both specimens showed that the newest sturgeon is a male, and the specimens captured last Spring is a female; the female does not appear ready to spawn this year. Efforts will continue this Spring to collect more sturgeon for future captive propagation.

Rick Mayden and Herb Boschung at the University of Alabama continue to work on the Freshwater Fishes of Alabama. Rick and Brooks Burr at Southern Illinois University at Carbondale are nearing completion of the description of a new blue sucker from the eastern Gulf Slope. Rick is also continuing a status survey of and diversity study within *Etheostoma ditrema*. Lastly, he is working on a phylogeny of snubnose darters with graduate students Cesar Blanco and Jessica Dorion, and David Nieland of the Coastal Fisheries Institute, Louisiana State University, using allozyme characters.

Bernie Kuhajda

REGION V - Northwest

The White River Navigation Project which was re-authorized by the Water Resources Development Act of 1996, and which proposes to construct and maintain a 200 foot wide by nine foot deep navigation channel from the mouth upstream to Batesville, AR (approximately 255 river miles), continues to lurk in the shadows. Proponents of the project, primarily the Arkansas Waterways Commission and allies, have been to Washington seeking funding and touting the transportation benefits to be derived from the project. U.S. Fish and Wildlife Service, White River National Wildlife Refuge personnel have been monitoring development of the project as it would impact fish and wildlife resources within their jurisdiction. Preliminary discussions among Memphis District Corps, Arkansas Game and Fish Commission, and Corps Waterways Experiment Station personnel were held in mid-March 1998 to determine what biological data were needed to assess impacts of the proposed project to wildlife resources.

The U.S. Department of Agriculture Forest Service is preparing an Ozark - Ouachita Highlands Assessment, which is essentially an inventory of resources in the region served by the Ouachita, Ozark-St. Francis, and Mark Twain National Forests. The assessment covers aquatic resources of the interior highlands in portions of Arkansas, Missouri, Oklahoma and Kansas. Publication is slated for late 1998. Henry Robison reports that a fish records database has been completed for localities sampled within the Ouachita and Ozark - St. Francis National Forests in Arkansas.

Henry Robison has completed a status survey report for the Strawberry River orangethroat darter, *Etheostoma fragi*.

The zebra mussel (*Dreissena polymorpha*), which is found in the Arkansas River, AR, in considerable numbers, suffered population declines this past summer, presumably as a result of low dissolved oxygen associated with a week of 100+ F temperatures. Apparently most adult zebra mussels suffered mortality in the Dardanelle and Ozark Pools, but by fall, young were beginning to reestablish in most parts of these pools. Tremendous changes in water clarity have been observed in Dardanelle Pool during the past two years, and changes to fish community composition are being evaluated by biologists from Arkansas Tech University and the Arkansas Game and Fish Commission.

Missouri Department of Conservation personnel report concerns of water quality degradation resulting from the construction and operation of chip mills (producing wood chips for particle board, paper products, etc.) and the emergence confined animal feeding operations, especially in the northern portion of the state.

The Topeka shiner (*Notropis topeka*) has been proposed for listing as a federally protected endangered species. In Missouri, the species range has been significantly reduced and is very rare at sites where it still occurs.

The Corps of Engineers is studying a proposed New Madrid Floodway project to reduce flooding in Mississippi River tributaries in the bootheel of Missouri. The project has two components to reduce the magnitude and duration of floodwaters behind the levees: 1) construction of pumping stations, and 2) dredging of Mississippi River tributaries such as St. John's Bayou. Surveys to assess impacts rediscovered the golden topminnow (*Fundulus chrysotus*) which was thought to be extirpated in Missouri. Corps Waterways Experiment Station biologists are involved with assessing potential impact of the proposed project to aquatic resources.

Recent aquatic resource surveys (fish and mussels) conducted by Missouri Department of Conservation personnel in the Meramec River have shown species richness remains similar to earlier surveys. However, abundance for many species appears to be down, and many land use changes have occurred in the upper portions of the drainage basin. Especially prominent have been the proliferation of gravel mines in the headwaters of the Meramec.

Surveys to assess population trends of the "big river" chubs *Macrhybopsis gelida* (sturgeon chub), *Macrhybopsis meeki*

(sicklefin chub), and *Platygobio gracilis* (flathead chub) were conducted in the Missouri River during the past year. Relative abundance for *gelida* and *meeki* were down, but numbers for the flathead chub were higher than in the early 90's.

David Galat reports that the Missouri River "benthic fishes" project has completed two years of field work with one more to go. This cooperative research project involving six U.S. Fish and Wildlife Service coop units and numerous other state and federal cooperators includes surveys for benthic fishes and analysis of age/growth and population structures along 2300 miles of the Missouri River. Five doctoral candidates are involved with the project, and annual reports are available by request from Galat at David_Galat@muccmail.missouri.ed.

John L. Harris

REGION VI - Southwest

All is pretty quiet on the western front, at least in regard to environmental issues involving streams. Jack Killgore and Bradley Lewis (Waterways Experiment Station, Vicksburg, MS), are evaluating the feasibility of restoring spawning habitat in the Cypress Bayou system. Controlled discharges from Lake O' the Pines, simulating natural hydroperiods, are being evaluated by sampling larval fish assemblages from floodplain habitats.

Christine Davis (Northeast Louisiana University) is studying age, growth and reproduction of the redbfin darter, *Etheostoma whipplei artesia*, in a Gulf coastal plain watershed. Brian Hooper (Northeast Louisiana University) is examining fish assemblages associated with floatants in Black Bayou Lake National Wildlife Refuge north of Monroe.

Frank Pezold