

2-1-1990

## Number 21 (February 1990)

Southern Fishes Council

Follow this and additional works at: <https://trace.tennessee.edu/sfcproceedings>



Part of the [Marine Biology Commons](#)

---

### Recommended Citation

Southern Fishes Council (1990) "Number 21 (February 1990)," *Southeastern Fishes Council Proceedings*: No. 21.

Available at: <https://trace.tennessee.edu/sfcproceedings/vol1/iss21/1>

This article is brought to you freely and openly by Volunteer, Open-access, Library-hosted Journals (VOL Journals), published in partnership with The University of Tennessee (UT) University Libraries. This article has been accepted for inclusion in Southeastern Fishes Council Proceedings by an authorized editor. For more information, please visit <https://trace.tennessee.edu/sfcproceedings>.

---

## Number 21 (February 1990)

### Abstract

(February 1990) - Aspects of the Life History of the Blue Shiner, *Notropis caeruleus*, in the Consauga River, Georgia. By R.S. Krotzer, 2 pp.

Decline of the Alabama Shad, *Alosa alabamae* in the Pearl River, Louisiana-Mississippi: 1963-1988. By G.E. Gunning and R.D. Suttkus, 2 pp.

Mating Behaviors of the Blacktail Shiner, *Cyprinella venusta*, from Southeastern Mississippi. By D.C. Heins, 3 pp., plus News Notes.

### Keywords

fishes, blue shiner, *notropis caeruleus*, consauga river, alabama shad, *alosa alabamae*, pearl river, blacktail shiner, *cyprinella venusta*



# Southeastern Fishes Council PROCEEDINGS

DEDICATED TO THE PRESERVATION OF SOUTHEASTERN FISHES

Number 21

February 1990

## ASPECTS OF THE LIFE HISTORY OF THE BLUE SHINER, *NOTROPIS CAERULEUS*, IN THE CONASAUGA RIVER, GEORGIA

R. Stephen Krotzer

Department of Environmental Affairs  
Alabama Power Company G.S.C. #8  
P.O. Box 2641  
Birmingham, Alabama 35291

The historical distribution of the blue shiner, *Notropis caeruleus* (Jordan), includes streams of the upper Cahaba and Coosa river systems of the Mobile Bay drainage in Alabama, Georgia, and Tennessee (Smith-Vaniz, 1968). The species has been extirpated from much of its former range and may no longer exist in the Cahaba river system (Ramsey, 1984). Within its present range, *N. caeruleus* occurs in medium to large streams with cool, clear water and substrates of sand, gravel, and cobble (Gilbert et al., 1980). No life history studies have previously been published for the species. This report provides data on the reproduction and age and growth of *N. caeruleus*.

### MATERIALS AND METHODS

Monthly samples were taken in the Conasauga River at Highway 2, 10.1 air km northeast of Cisco, Murray County, Georgia, from October 1982 to September 1983 with a 3.7 m long, 3.2 - mm mesh nylon seine. Fishes were fixed in 15% formalin and stored in 43% isopropanol. All specimens were deposited in the Auburn University fish collection.

Examinations of ovaries, testes, and nuptial tubercles; determinations of gonosomatic indices (GSI); and measurements of oocyte diameters were used to determine the reproductive cycle of *Notropis caeruleus*. Ovaries were removed from ten adult females each month. The ovaries and specimens were blotted dry and weighed to the nearest 0.001 g using an electronic single-pan balance. The GSI was calculated giving ovarian weight as a percentage of somatic weight of each specimen. Ten oocytes were selected at random from both ovaries of each female, and the diameters were measured to the nearest 0.05 mm using an ocular micrometer in a dissection microscope. Measurements were corrected for nonsphericity by averaging the largest and smallest dimensions of each oocyte.

Age and growth were determined by measuring all specimens from each monthly sample to the nearest 0.1 mm SL. Length frequency histograms were prepared by plotting the percentage frequency for each 1-mm size group per sample. A two-way ANOVA was used to determine if any significant dif-

ferences in SL existed between adult males and females.

### RESULTS AND DISCUSSION

Mature male *Notropis caeruleus* developed nuptial tubercles and a lemon yellow coloration in the fins during the reproductive season; the body developed a metallic blue sheen, as well. Enlarged, opaque testes were first observed in February; tubercles first appeared in April and spawning coloration in May. Tuberculate males with enlarged testes and nuptial coloration were collected in June and July. In August testes were smaller and translucent, spawning colors faded, and nuptial tubercles of most males had regressed.

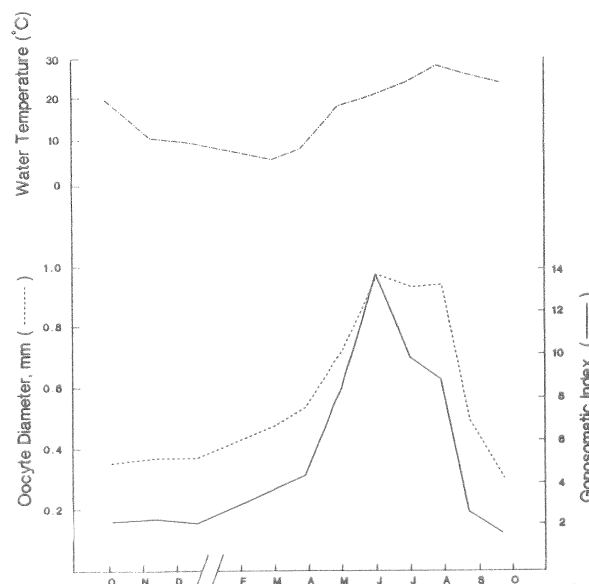


Figure 1. Mean diameters of largest oocytes and mean gonosomatic indices for *Notropis caeruleus* from the upper Conasauga River. River temperatures recorded with samples are also shown.

Tubercles and breeding colors were not observed in female *N. caeruleus*. Oocytes and ovaries exhibited marked changes in size throughout the study (Fig. 1). Both mean oocyte diameter and GSI values peaked in late May or early June, remained relatively high during June and July, and dropped in August, suggesting an early May – late August spawning period.

The occurrence of multiple clutches has been documented or may be assumed (as “fractional spawning”) for several members of the subgenus *Cyprinella* (Gale and Gale, 1977; Gale and Buynak, 1978; Wallace and Ramsey, 1981; Gale, 1986; Heins and Rabito, 1986) and is suspected to occur in at least one other (Cloutman and Harrell, 1987). This reproductive mode is a possibility for the blue shiner, based on a moderately extended spawning period and the occurrence of two distinct groups of developing eggs (larger, mature oocytes and smaller, developing oocytes) in the ovaries throughout this period (see Heins and Rabito, 1986).

Length-frequency analysis of *N. caeruleus* yielded well-defined size groups (Fig. 2). The lack of overlap between these size groups suggest that they represent distinct year classes. Growth was quite rapid during warmer months, espe-

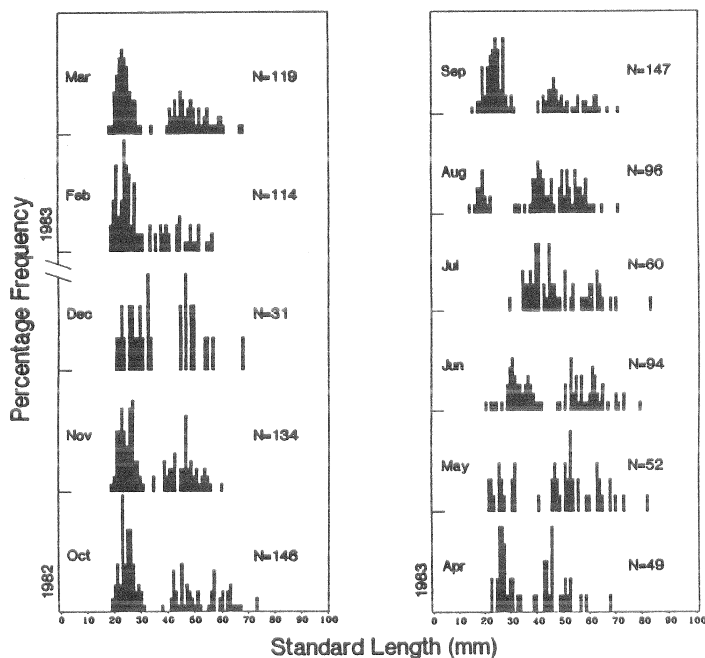


Figure 2. Length frequency distribution of *Notropis caeruleus* collected from the upper Conasauga River.

cially among young-of-year fish, but decreased markedly during the winter. Some age I individuals were large enough to reach sexual maturity and spawn (ca. 40–41 mm SL for males and females) before the end of the reproductive season, but most fish in spawning condition were age II and some might have been age III. There appeared to be considerable mortality among adults during August and September, possibly due to physiological exhaustion accompanying the spawning process. Similar “post-spawning” mortality has recently been observed in another southeastern cyprinid *N. lutipinnis* (Meffe et al., 1988).

With all data pooled, males were significantly larger than females ( $F=21.51$ ,  $P<0.001$ ). Maximum size among individuals collected during the study was 82.0 mm SL for males and 69.3 mm SL for females.

## ACKNOWLEDGEMENTS

Robert Stiles, Malcolm Pierson, and Jacky Windsor helped greatly with the collection of the specimens. Bob Jones prepared Figures 1 and 2. David Heins critically reviewed the manuscript and offered numerous helpful suggestions.

## LITERATURE CITED

- Cloutman, D.G. and R.D. Harrell. 1987. Life history notes on the whitefin shiner, *Notropis niveus* (Pisces: Cyprinidae), in the Broad River, South Carolina. *Copeia* (4): 1037–1040.
- Gale, W.F. 1986. Indeterminate fecundity and spawning behavior of captive red shiners – fractional, crevice spawners. *Trans. Amer. Fish. Soc.* 115: 429–437.
- and G.L. Buynak. 1978. Spawning frequency and fecundity of satinfin shiner (*Notropis analostanus*) – a fractional, crevice spawner. *Ibid.* 107: 460–463.
- and C.A. Gale. 1977. Spawning habits of spotfin shiner (*Notropis spilopterus*) – a fractional, crevice spawner. *Ibid.* 106: 170–177.
- Gilbert, C.R., Boschung, H.T. and G.H. Burgess. 1980. *Notropis caeruleus* (Jordan), Blue Shiner, p. 244. In: Atlas of North American Fresh Water Fishes. D.S. Lee, C.R. Gilbert, C.H. Hocutt, R.E. Jenkins, D.E. McAllister and J.R. Stauffer, Jr. (eds.). North Carolina State Museum of Natural History, Raleigh, North Carolina.
- Heins, D.C. and F.G. Rabito, Jr. 1986. Spawning performance in North American minnows: direct evidence of the occurrence of multiple clutches in the genus *Notropis*. *J. Fish. Biol.* 28:343–357.
- Meffe, G.K., Certain, D.L. and A.L. Sheldon. 1988. Selective mortality of post-spawning yellowfin shiners, *Notropis lutipinnis* (Pisces: Cyprinidae). *Copeia* (4): 853–858.
- Ramsey, J.S. 1984. Freshwater fishes. Pages 1–14 in R.H. Mount, ed. Vertebrate Wildlife of Alabama. Alabama Agricultural Experiment Station, Auburn University, Alabama.
- Smith-Vaniz, W.F. 1968. Freshwater fishes of Alabama. Agricultural Experiment Station, Auburn University. 211 p.
- Wallace, R.K., Jr. and J. S. Ramsey. 1981. Reproductive behavior and biology of the bluestripe shiner (*Notropis callistaenia*) in Uchee Creek, Alabama. *Am. Mid. Nat.* 106:197–200.

PROCEEDINGS is a publication of the Southeastern Fishes Council, Inc. and is published in New Orleans, Louisiana. Officers are: Franklin F. Snelson, Chairman; Bruce Bauer, Chairman-elect; Werner Wieland, Secretary/Treasurer. Editor for the PROCEEDINGS is Michael M. Stevenson, Biological Sciences, University of New Orleans, LA 70148. Phone (504) 286-7057



# DECLINE OF THE ALABAMA SHAD, *ALOSA ALABAMAE*, IN THE PEARL RIVER, LOUISIANA – MISSISSIPPI: 1963-1988

Gerald E. Gunning<sup>1</sup>, Royal D. Suttkus<sup>2</sup>

<sup>1</sup>Department of Biology, Tulane University  
New Orleans, LA 70118

<sup>2</sup>Tulane University Museum of Natural History  
Belle Chasse, Louisiana 70037

**Abstract.** – In 16 years of fish collections from the Pearl River at Monticello, Mississippi, 299,829 fishes representing 84 species were taken; no specimens of the Alabama shad, *Alosa alabamae*, were collected. In 25 years of fish collections from the Pearl River at Bogalusa, Louisiana, 567,441 fishes representing 95 species were taken; 418 Alabama shad were collected. During the first two years of the 25-year study, 384 Alabama shad were collected yielding only 34 specimens taken in the subsequent 23 years; the last specimen was taken in 1980-1981. This study was terminated in 1987-1988.

The Alabama shad, *Alosa alabamae*, is an anadromous species that ascends Gulf coast rivers from the Suwannee west to the Mississippi (Burgess, 1978). The Alabama shad spends most of its adult life in the Atlantic Ocean or Gulf of Mexico and enters coastal rivers to spawn (Pflieger, 1975). The species was once abundant in the Mississippi River and was fished commercially in the early 1900's (Coker, 1920; Evermann, 1902). The species has evidently undergone a marked decline in abundance in the Mississippi (Pflieger, 1975), Alabama and other rivers (Smith-Vaniz, 1968).

We initiated a study of the fishes of the Pearl River in Louisiana and Mississippi in 1963 and have kept detailed records of its relative abundance over the past 25 years.

In Mississippi we collected fishes regularly from 1973 to the present (1988). The study area consisted of 41.8 km of the main stream of the Pearl River both upstream and downstream from Monticello, Mississippi. A total of 512 fish collections was made in the last 16 years (eight stations sampled quarterly in February, May, August and November) with a 3.05 m x 1.83 m seine with 0.47 cm Ace mesh.

In Louisiana, 90 km downstream from Monticello, we collected fishes regularly from 1963 to the present (1988). The study area consisted of an 80.5 km (50 mi) segment of the Pearl River composed of a 16.1 km (10 mi) portion of the main stream above and below Bogalusa, Louisiana, and in addition, two segments downstream: 64.4 km (40 mi) of the main stream and West Pearl River, and 64.4 km (40 mi) of the main stream and East Pearl River. A total of 873 fish collections was made which consisted of 25 years of regular collections in the Bogalusa segment (six stations sampled at least quarterly, or more often, in the months of January, April, July and October) and 16 years of collections (1963-64 thru 1978-79) on the West and East Pearl rivers (19 stations combined sampled once each year in October or November).

Generally, approximately 30 minutes was spent at each station except when the river was flooded and depth limited sampling. An effort was always made to sample over all types

of substrate present at a particular station, and under all current regimes. We have used this methodology consistently for many years and consider the samples quantitative enough to indicate relative abundance (Gunning and Suttkus, 1984).

## RESULTS AND DISCUSSION

The Monticello study area yielded 299,829 fishes representing 84 species. No specimens of the Alabama shad were taken during the duration of the survey.

The Bogalusa study area yielded 567,441 fishes representing 95 species. A total of 418 Alabama shad was taken, of which 384 were collected in the first two years of the study, 1963-64 and 1964-65 (Table 1). From 1965-1979, 33 additional specimens were collected, distributed as follows: Main stream of the Pearl River, 11; main stream of the Pearl River and East Pearl River segment, 9 specimens; and main stream of the Pearl River and West Pearl River segment, 13 specimens (Table 1). In the nine years from 1979-1988, only a single specimen was collected from the main stream of the Pearl River in 1980-81 (Table 1). This was the last specimen collected in this study.

The data presented here show a decline in abundance of Alabama shad after relatively high numbers in 1963-1965. This species is declining elsewhere in coastal rivers. It is assumed that locks and dams have contributed to the decreasing numbers both by blocking migrations upstream and by altering habitat conditions by increasing siltation (Douglas, 1974; Burgess, 1978).

## ACKNOWLEDGMENTS

Former students making valuable contributions included Drs. G. Bresnick, J. Caruso, J. Ramsey, M. Sobczak, R. Cashner, B. Thompson, D. Heins, P. Sorensen, S. Rohmann and Mr. K. Goodfellow and Mrs. V. Trau-Colbert.

## LITERATURE CITED

- Burgess, G. H. 1978. *Alosa alabamae* Jordan and Evermann, Alabama shad. p. 62 in D.S. Lee, et al., Atlas of North American Freshwater Fishes. North Carolina State Mus. Nat. Hist., Raleigh, 854 pp.
- Coker, R.E. 1930. Studies of common fishes of the Mississippi River at Keokuk. Bull. U.S. Bur. Fish., 45: 141-225.
- Douglas, N. H. 1974. Freshwater Fishes of Louisiana. Cla-

- tor's Publ. Div., Baton Rouge, Louisiana. 443pp.
- Evermann, B.W. 1902. Description of a new species of shad (*Alosa ohiensis*), with notes on other food-fishes of the Ohio River. Rept. U.S. Fish. Comm., (1901):273-288.
- Gunning, G.E., and R.D. Suttkus. 1984. Stream pollution monitoring using species composition of fish populations and water quality data. In: R.J. Varnell (Ed.), Proc. of the Water Qual. and Wetland Mgt. Conf., New Orleans, LA., pp. 209-221.
- Pflieger, W.L. 1975. The Fishes of Missouri. Missouri Dept. of Cons., Columbia, Mo., 343 pp.
- Smith-Vaniz, W. F. 1968. Freshwater Fishes of Alabama. Auburn Univ. Agric. Exp. Sta., Auburn, Ala., 211 pp.

**Table 1.** Number of Alabama shad, *Alosa alabamae*, collected from the Pearl River near Bogalusa, Louisiana

Year	Main Stream of the Pearl River	Main Stream and East Pearl River	Main Stream and West Pearl River
1963 – 1964	2	4	162
1964 – 1965	2	14	200
1965 – 1966	2	2	2
1966 – 1967	0	5	0
1967 – 1968	9	0	2
1968 – 1969	0	0	2
1969 – 1970	0	0	0
1970 – 1971	0	0	0
1971 – 1972	0	0	0
1972 – 1973	0	0	1
1973 – 1974	0	0	4
1974 – 1975	0	0	0
1975 – 1976	0	0	2
1976 – 1977	0	2	0
1977 – 1978	0	0	0
1978 – 1979	0	0	0
1979 – 1980	0	—	—
1980 – 1981	1	—	—
1981 – 1982	0	—	—
1982 – 1983	0	—	—
1983 – 1984	0	—	—
1984 – 1985	0	—	—
1985 – 1986	0	—	—
1986 – 1987	0	—	—
1987 – 1988	0	—	—
Total	16	27	375

# MATING BEHAVIORS OF THE BLACKTAIL SHINER, *CYPRINELLA VENUSTA*, FROM SOUTHEASTERN MISSISSIPPI

David C. Heins

Department of Biology  
Tulane University  
New Orleans, LA 70118

**Abstract.** — I describe reproductive behaviors of *Cyprinella venusta* from the Escatawpa River, George County, Mississippi, using video-tape replays and direct observations of spawning episodes in aquaria. As is typical of members of this genus, *C. venusta* spawns in crevices. During spawning activities, territorial males alternated between defending the crevice, making solo runs along it, and pairing with individual females as they made runs along the crevice. Defense of the crevice involved swift assaults, chases, agonistic displays, and fights. There were two types of fights: lateral-butting and lateral-ramming. The solo runs by the territorial male include the release of sperm into the crevice before oviposition. Small males (sneakers) deposit sperm in the crevice by darting between and disrupting the territorial male and a female making a run long the crevice; and large and small males may make solo runs along a crevice to spawn there when the territorial male is not in the immediate area, both behaviors serving to cuckold the territorial male. The behaviors shown and the frequency with which common behaviors are expressed by members of *Cyprinella* vary interspecifically and may be related to variation in adult size among populations or to phylogenetic factors.

Fishes in the genus *Cyprinella* show a unique spawning mode called "crevice spawning," which may be a synapomorphy (Rabito and Heins, 1985; Mayden, 1989). This phenomenon allows intrasexual competition among males who attempt to monopolize the crevices. The outcome of the competition determines access to reproducing females and thus the reproductive success of the males. The resulting sexual selection has produced a high degree of sexual dimorphism in aggressiveness, body size, and display or combat structures (tubercles) in members of *Cyprinella*. These factors also may have been significant in the evolution of alternative mating tactics in the genus.

Despite the distinctive reproductive mode of *Cyprinella*, there is little information on spawning behavior of these species. Although *Cyprinella venusta* is known to be a crevice spawner (Pflieger, 1975), its spawning behavior has not been studied. Here I describe the mating tactics of the blacktail shiner in aquaria. I also compare the reproductive behavior of *C. venusta* to that observed in other members of *Cyprinella*.

## MATERIALS AND METHODS

I collected adult *C. venusta* from the Escatawpa River at County Hwy. 612, George County, Mississippi, on 28 May 1987 and transported them to the laboratory for study. Females (n=14) were 67-80 mm and males (n=10) 75-99 mm standard length (SL). For purposes of this study, small males were 75-78 mm SL (n=2); and large males were 85-99 mm SL (n=8). After observations and video taping had been completed, I examined the gonads of the fish using criteria of Mat-

thews and Heins (1984) and found that all of them were sexually mature.

I kept the fish in a 208-l aquarium on a 16h light: 8 h dark cycle at about 24° C. I placed a spawning substrate with a crevice, as described in Rabito and Heins (1985), into the aquarium. Descriptions of spawning behaviors were developed from direct observations and replays of video tapes. Based on video tapes alone, I analyzed a total of over 20 hours of spawning behavior; direct observations were not timed.

## RESULTS

The different behaviors I describe varied in duration, intensity, and pattern and occurred in varied sequences. Although competitive encounters usually occurred between males of a similar size, they also occurred between males of very different sizes; but the latter occurrences were usually brief, the smaller male withdrawing shortly after the encounter began.

Spawning episodes were orderly to disorderly. At their extreme, disorderly episodes could best be described as a "free-for-all" where spawning fish were massed at the crevice and struggled to get to it; there was little, if any, defense of the resource. The females seemed to force their way through the large number of individuals massed at the crevice, and males sometimes were unable to attend them as they oviposited. Such an event seemed to be due to swamping by non-territorial males who simultaneously approached the crevice; it also may have been due to the presence of a relatively large number of spawning females.

As orderly spawning activities began, a larger (dominant or territorial) male started swimming in the area of the crevice and attempted to exclude other males from access to it. During spawning activities, the dominant male alternated between defending the crevice, making solo runs along it, and pairing with females as they made runs along the crevice. The territorial male defended the crevice by using different agonistic behaviors: "swift assault", "chase", "agonistic display", and "fight". All such encounters occurred within about 0.5 m of the crevice, excepting chases that sometimes extended farther from it. Agonistic encounters occurred among non-territorial males away from the crevice and involved chases, agonistic displays, and fights.

In a swift assault, the dominant male thrust forward and attempted to ram into another male, usually into his side. The force of the attack often knocked the assaulted male horizontally 90° around his longitudinal axis. A chase occurred when one male pursued a fleeing male beyond the latter's original position. During agonistic displays, males circled head-to-tail

or swam parallel head-to-head with their fins erect and bodies rigid and quivering. Fights were quite variable in intensity and pattern. There were two basic kinds of fights that usually began with a brief agonistic display: lateral-butting fights and lateral-ramming fights. If the males were oriented head-to-tail during the agonistic display, they would circle and butt each other in the side, often in the postero-lateral region of the body, with their snouts. If the males were oriented head-to-head, the fights were more violent; the males rammed head first into each other's side, usually as they swam forward. A male arced out away from a straight-line path and swiftly rammed into the side of his competitor; this knocked the competitor aside horizontally, eliciting a similar attack from him. Thus, the activity of the two combatants often produced a braided pattern of movements. During agonistic displays or fights, males occasionally also bumped each other with their caudal peduncles.

To make a solo run, a dominant male swam up to the crevice. As he began to swim along the opening, he turned horizontally with the ventral surface of the body opposite the crevice. Shortly thereafter he typically began to vibrate the posterior portion of his body which was just opposite, at, or slightly protruding into the crevice. The run along the crevice usually ended when the male turned upward and swam away.

When a female swam into the area of the crevice, the dominant male often orbited around or in front of her or, less frequently, in the area of the crevice. Alternately, the dominant male swam to and followed the female, swimming near, beside, or just slightly behind her. When orbiting, the dominant male swam rapidly in a clockwise or counterclockwise direction. After swimming to the crevice, a female attempting to oviposit turned to swim along it with her ventral surface opposite the opening. The male swam beside and below her along the crevice, sometimes with his head slightly behind that of the female. When ovipositing, a female pivoted suddenly and inserted the vibrating posterior portion of her body into the crevice. The end of one such spawning pass quickly followed when the female exited upward from the crevice with her body arched upward. During the run, the male swam parallel to the female and, after separating from her, usually circled back around to eat eggs that fell out of the crevice.

Large and small, non-territorial males swam up to the crevice and made runs along it when the dominant male was not in the immediate area and could not defend the crevice against intruding males. Additionally, as the dominant male paired with a female and they began to make a spawning pass along the crevice, a small male swimming in the area sometimes swam rapidly to and between the pair to make a brief run along the crevice and quickly swim away. In doing so, he disrupted the paired fish (territorial male and female) causing them to separate and swim away from the crevice.

## DISCUSSION

Rabito and Heins (1985) believed there were three possible functions of solo runs along a crevice by a dominant male: crevice testing, courtship display, and deposition of milt. I believe this behavior primarily serves the latter two functions. Runs along a crevice probably attract the attention of females, particularly in nature when visibility is not likely so good, and

thus show them where a suitable crevice is guarded by a male ready to spawn. Emission of milt is not visible in species of *Cyprinella*, and direct evidence of milt release is not available. However, several lines of evidence suggest that solo runs along a crevice involve emission of sperm. First, the orientation of a male's vent in relation to the crevice and the vibration of his body when making a solo run indicate that sperm are being emitted into the crevice; females show similar behavior when ovipositing. Second, when a male is paired with a female along a crevice as she oviposits, there seems to be little, if any, opportunity for the deposition of sperm because the male's vent is not very close to the crevice. Third, other males, both large and small, exhibit similar behavior in making runs along the crevice when the dominant male is unable to defend it. Fourth, my observations suggest that during disorderly spawning episodes a female may oviposit without pairing with a male.

The behavior of small males in response to a spawning pair represents sneaky behavior (Gross, 1984) and is the first published description of this alternative male reproductive tactic in the genus *Cyprinella*; however, Ferguson (Abstract, ASB Bulletin 36: 66) has reported sneaky males in *Cyprinella trichroistia*. Solo runs along a crevice by non-territorial males (large and small) in the absence of the dominant male appear to have the same effect of cuckolding the dominant male. Thus, this behavior should be considered an alternative mating behavior unique to crevice-spawning, male *Cyprinella*.

I propose the following hypothesis of events involved in the spawning of *C. venusta*. While defending a spawning territory around a crevice through agonistic interactions with other males, a territorial male releases sperm into a crevice as he makes solo runs along it, also signaling to females nearby that he is ready for them to oviposit in the crevice he guards. The eggs of females that oviposit in the crevice are fertilized by sperm present there. Small males take advantage of a situation where the dominant male is attending a female and is unable to guard the crevice. Thus, by darting between the paired fish and disrupting the spawning pass, small males sneak opportunities to deposit sperm in the crevice and gain fertilizations of eggs. Large and small males also may gain fertilizations by depositing sperm in crevices when the territorial male is not in the immediate area.

Variation in the repertoires of members of *Cyprinella* appear to involve differences in the behaviors that are shown and in the frequency with which common behaviors are expressed. The interspecific variation may be related to differences in adult size among populations or to phylogenetic factors.

Some behaviors may occur only in particular species or species groups. Swift assaults have not been described for the genus heretofore and may be unique to *C. venusta*. Similarly, pelvic and anal fin grasps have been reported only for *C. spiloptera* (Gale and Gale, 1977). As discussed above, sneaky behavior has been reported for only two *Cyprinella* to date. Likewise, use of a crevice by males when the territorial male was not in the immediate area has been observed in only one other member of the genus, *C. callitaenia* (Wallace and Ramsey, 1981). Although some behaviors may be limited to certain species, others may be shared by many, if not all, species of *Cyprinella*. Agonistic displays, chases, and fights are shown in a number of species (Outten, 1958; Pflieger, 1965;

Stout, 1975; Gale and Gale, 1977; Rabito and Heins, 1985). The agonistic behavior of *C. venusta* seems to be typified by a higher degree of violent encounters with conspecific males than in other *Cyprinella*. For example, males of *C. leedsii* mostly exhibit "mock battles" (extended agonistic displays and lateral-butting fights), chases, and threat displays (Rabito and Heins, 1985); but the larger *C. venusta* often showed swift attacks, fights and chases. Swift attacks were not observed for *C. leedsii*, and *C. venusta* spent relatively little time engaging in agonistic displays (Heins, pers. obser.). In addition, fights described for other species generally seem to involve lateral butting (Pflieger, 1965; Stout, 1975; Rabito and Heins, 1985) rather than the more violent lateral-ramming fights that I also observed for *C. venusta*.

Comparisons of behaviors in *Cyprinella* are tentative because variable treatments in earlier reports do not always allow direct comparison. In some cases, behaviors were named but not described. In others, descriptions of behaviors lack the details necessary to be certain of their identity. Furthermore, observations have been made for only a small number of species in the genus.

To summarize, I have described reproductive behaviors in *C. venusta*, including alternative mating tactics among males. Alternative mating tactics in *C. venusta* arise from sexual selection based on its crevice spawning mode. Dominant, territorial males sequester and defend presumably limited spawning crevices in nature (Pflieger, 1965) through primary tactics involving aggressive, sometimes violent, competition to monopolize access to females. Large (non-territorial) and small males use alternative tactics to gain fertilizations of eggs. Both large and small males will spawn in a crevice when the territorial male is not in the immediate area. Small, sneaky males dart between the territorial male and a female making a spawning run along the crevice.

## ACKNOWLEDGEMENTS

Steve Herbert helped with the collection of individuals observed in this study. Tulane University supported, in part, this research project.

## LITERATURE CITED

- Gale, W.F., and C.A. Gale. 1977. Spawning habits of the spotfin shiner (*Notropis spilopterus*) – a fractional, crevice spawner. *Trans. Amer. Fish. Soc.* 106:170-177.
- Gross, M.R. 1984. Sunfish, salmon, and the evolution of alternative reproductive strategies and tactics in fishes, p. 55-75. *In*: Fish reproduction: strategies and tactics. G.W. Potts and R.J. Wootton (eds.). Academic Press, London.
- Mathews, M. M. and D.C. Heins. 1984. Life history of the redbfin shiner, *Notropis umbratilis* (Pisces: Cyprinidae), in Mississippi. *Copeia* 1984: 385-390.
- Mayden, R.L. 1989. Phylogenetic studies of North American minnows, with emphasis on the genus *Cyprinella* (Teleostei: Cypriniformes). *Univ. Kansas Mus. Nat. Hist. Misc. Publ.* 80: 1-189.
- Outten, L.M. 1958. Studies of the life history of the cyprinid fishes *Notropis galacturus* and *rubricroceus*. *J. Elisha Mitchell Sci. Soc.* 74:122-134.
- Pflieger, W.L. 1965. Reproductive behavior of the minnows, *Notropis spilopterus* and *Notropis whiplii*. *Copeia* 1965: 1-8.
- . 1975. Fishes of Missouri. Missouri Department of Conservation, Jefferson City, Missouri.
- Rabito, F.G., Jr., and D.C. Heins. 1985. Spawning behavior and sexual dimorphism in the North American cyprinid fish *Notropis leedsii*, the bannerfin shiner. *J. Nat. Hist.* 19:1155-1163.
- Stout, J.F. 1975. Sound communication during the reproductive behavior of *Notropis analostanus* (Pisces: Cyprinidae). *Amer. Midl. Nat.* 94: 296-325.
- Wallace, R.K., Jr., and J.S. Ramsey. 1981. Reproductive behavior and biology of the bluestripe shiner (*Notropis callistaenia*) in Uchee Creek, Alabama. *Amer. Midl. Nat.* 106: 197-200.

## MINUTES

### Business Meeting 15th Annual Meeting Southeastern Fishes Council

The Southeastern Fishes Council met at Charlotte, N.C. in the Welwyn Room of the Hilton at University Place on April 7, 1989. Chairman Robert E. Jenkins presided. The meeting was called to order at approximately 5:04 pm local time.

Secretary's Report: The Minutes of the 1988 meeting appeared in the *PROCEEDINGS*. The Minutes were approved without correction.

### Treasurer's Report:

	<u>Balance</u>
Checking Account (1-31-89)	\$1,371.55
1989 dues received (3-31-89)	380.00
Cost of Issue No. 18	(310.31)
Checking Account Balance (3-31-89)	1441.24
Paine Webber Cash Fund (2-24-89)	1761.31
TOTAL ASSETS (4-1-89)	\$3202.55



Editor's Report:

Mike Stevenson reported that Issue No. 18 of the *PROCEEDINGS* had been mailed and he is currently working on Issue 19 with a projected mailing date of June 1989. In Issue No. 19 he plans to have a map showing the limits of all regions and a new drawing of our logo. Mike also indicated that he has received manuscripts for a possible December issue.

Chairman Jenkins indicated he had a few items he wished to inform the membership of before continuing with the order of business.

1. Regional Reports (perhaps better called Subregional Reports) should be transmitted to the Secretary in writing for inclusion in the minutes.

Rick Mayden questioned whether we should continue to publish Regional Reports in the *PROCEEDINGS* as was done in Issue No. 18. Perhaps we should publish these separately as a newsletter. There is concern over the use of manuscript names when publishing these reports. There was general agreement that manuscript names used in Regional Reports should not appear in the *PROCEEDINGS*.

2. Should we publish a Membership Directory? Secretary Wieland indicated this is being looked into and may be possible at minimal cost once the membership files are transferred to a computer data base.
3. There are several committees for which the Chair does not have a record of membership. If you are on a committee, or know who the members of these committees are, please contact the Chair.

Bob Cashner then indicated that he was the Chair of the Nominating Committee and further indicated he was prepared to make nominations for Chairman Elect.

Not wishing to prolong the meeting Chairman Jenkins turned the order of business to the election of officers.

Election of officers:

Bruce Bauer was elected as Chairman Elect.

Old Business:

1. Chairman Jenkins stated that at our last meeting there was a question as to whether the Council had any "Life Members." A discussion followed and from evidence gathered it was agreed that Herbert T. Boschung and Royal D. Suttikus were "Life Members."

2. The Chair related to the membership that we need to become more concerned as to what system or method is used by the various southeastern states in granting scientific collecting permits. Bob has written to the appropriate state agencies and hopes to get answers soon. He will report to the membership either at the next meeting or through the *PROCEEDINGS*.

Jim Williams indicated that in the future someone (SFC, ASIH, AFS, etc...) will need to contact these states about their regulations on collections. This should be done before collection guidelines are put into place by each state.

Carter Gilbert indicated that perhaps if an article were published on this subject one could cite this article and it would have more of an effect than just a letter.

3. Fish Count – What is the status of the Desert Fishes Council fish count? Jim Williams could not provide any information as he did not attend the last meeting of DFC. There was a suggestion that perhaps we could publish our fish count in the *PROCEEDINGS*.

Buck Snelson asked if there was a target date when these collections should be made? If the target date is in the spring is this a good time (i.e. in the S.E. the waters are high at this time and it can be very difficult to collect, however, at this time of year there are no fry and the adults are available)?

Steve Ross related that he has been conducting a "count" since 1975 but he samples in the Fall.

After some discussion the consensus was that samples from various parts of the S.E. will not be comparable anyway. Therefore each individual could pick their own time and method.

There was a question from the floor regarding why these fish counts should be conducted and what they would show? This was answered by indicating that information from such counts could show long term trends at specific localities.

4. Bob Cashner stated there was no button this year and perhaps the job of putting out a new button each year should not be the responsibility of the Chair. Bob volunteered to produce the button for the Charleston meeting and will coordinate this in the future. Afterward several suggestions were heard from the floor for future buttons.

Buck Snelson suggested the possibility of a T-shirt instead of a button where upon Carter Gilbert added that "a T-shirt lives forever."

Mike Stevenson provided a list of buttons he has available and the order in which they were produced. Buttons were produced from 1980 to 1987 with 1981 and 1985 missing.

New Business:

1. Bob Stiles informed the membership as to the latest environmental problem on the Cahaba River. The Cahaba is the last major free flowing river in Alabama and has a rich and diverse fauna. There is a proposal to drill for "coal bed methane" in the Cahaba basin. The Alabama Department of Environmental Management is currently in the process of reviewing some of these proposals. There are at present about 1000 methane wells proposed for the Cahaba basin.

The proposals request permission to discharge from these wells into the Cahaba River. The original proposal gives a discharge rate of 130,000 lbs. per day which will enter the river. This discharge will contain large amounts of chlorides. The general public in the area is greatly upset because they perceive a deterioration of water quality in the Cahaba River.

Current guidelines are that the four day average discharge does not exceed 400 mg Cl/l and the average daily discharge

does not exceed 860 mg Cl/1. No guidelines for a one time maximum discharge limit which can not be exceeded has been established, only average discharge rates.

A permit to discharge has already been granted for a small facility at Centreville, Alabama. The Alabama Department of Environmental Management has established a deadline of April 19, 1989, for submission of comments on these proposals.

After discussion the membership expressed great concern for the stability of the Cahaba River fauna. The proposed manner of disposal for discharge from these wells is probably the least expensive method, but is not considered to be environmentally sound. Since those individuals making these proposals stand to make a profit from the sale of the resulting methane it is reasonable that they should be willing to provide a more environmentally safe method of disposal. The membership did not foresee any problem of establishing such an environmentally sound method of disposal using current technology.

Chairman Jenkins, upon unanimous recommendation of the membership, asked Bob Stiles to draft a letter regarding the Council's concerns on this matter for distribution to the Executive Committee. This letter should specifically list all critical species, in addition to fishes, within the Cahaba basin. The Council will then forward this letter to the Alabama Department of Environmental Management prior to the April 19 deadline.

2. Chairman Jenkins asked for input as to the northwest limit of the S.E. Region. There seems to be a discrepancy on this limit between what is stated in the Constitution and available maps. Someone from the floor commented that Ray Bouchard may have a copy of the original map.

After discussion a motion was made to adopt the limits as stated in the Constitution and redraw the map accordingly. The motion was passed.

3. Secretary/Treasurer Wieland informed the membership that after some investigation he has learned from the IRS that the Council does not have official tax exempt status. Although we do have a "tax ID number" on our Paine Webber account the origin of this number is in question.

The membership asked the Secretary/Treasurer to take appropriate steps to resolve this matter.

#### Regional Reports:

Oral Regional Reports were given by the following individuals:

Bob Jenkins	– Northeast
Noel Burkhead	– Southeast
David Etnier	– North-central
Rick Mayden	– South-central
Bob Cashner	– Southwest
no report	– Northwest

Due to the late hour the Chair asked for a motion to adjourn the meeting. The motion passed and the meeting ended at 6:47 p.m.

Everyone was reminded that the 1990 meeting will be in Charleston, SC with ASIH.

Respectfully submitted,

Werner Wieland

Secretary

## REGIONAL SFC REPORTS

### REGION I – Northeast

The Roanoke logperch, *Percina rex*, is almost through the federal process of being listed as endangered nationally. That status was officially accorded the Cape Fear shiner, *Notropis mekistocholas*, in 1988.

The Virginia Endangered Species Symposium will be held 28-29 April 1989, at Virginia Tech. This comes about 10 years after the first such Virginia symposium. As with the first, the symposium proceedings will be published. The Fishes committee is chaired by R.E. Jenkins.

Grave concern was expressed regarding the increasing popularity, as an aquarium pet fish, of the red shiner, *Notropis lutrensis*. This species is often called the rainbow shiner in the aquarium trade; its generic allocation will be *Cyprinella*. This fish is generalized and seemingly hardy, and when introduced to a drainage it has potential to effect reduction and extirpation of endemic *Cyprinella* species, as it has done in some areas outside the southeast. It has become established in the Pee Dee drainage, North Carolina.

R. Jenkins

### REGION II – Southeast

Gary Meffe (Savannah River Ecology Lab) and Buck Snelson (University of Central Florida) recently published *Ecology and Evolution of Live Bearing Fishes (Poeciliidae)*. Also, they are investigating energetics and lipid cycling in *Gambusia* relative to annual and single ovarian reproductive cycles. Ecological studies by GM focus on genetic structure of fish populations and genetic responses to environmental perturbations.

George Burgess from the Florida Museum of Natural History is finishing, with David Synder, a manuscript on fishes of the lower St. Johns River; other activities are marine. Carter Gilbert, with Jim Williams and Noel Burkhead, reports that the fishes of Florida book will be completed in 2 or 3 years. The fish accounts for the 10 year update of FCREPA (Fla. Comm. on Rare and Endangered Plants and Animals) are nearly finished. The present list has not changed considerably from the 1978 list, except in Special Concern categories, or some additions.

Noel Burkhead and Jim Williams from the National Fisheries Research Center, Gainesville are conducting ecological and distributional studies of *Etheostoma okaloosae*, *E. wapiti*, and *E. (ulocentra)* sp. "Cherokee darter"; distributional work on the enigmatic *Moxostoma* sp. cf. *carinatum* shelved pending funding. Jim Williams and Dave Etnier just published description of the boulder darter, *Etheostoma wapiti*; it is federally Endangered. Jim Williams, and others, just published national lists of Rare, Threatened, and Endangered fishes, and Extinct North American Fishes in *Fisheries*. Analysis of trends from 1979 to present indicate decline of many extant species. Jim Clayton and Ann Foster completed first year of monitoring 60+ radio-tagged Gulf sturgeons in the Suwannee River. The Gulf sturgeon is presently under review for Federal listing as Threatened. Dawn Jennings and Jim Williams are continuing distributional studies of Florida exotic fishes, particularly the blackchin tilapia and co-authored with Walt Courtenay, a list on exotics for much awaited 1990 common names list. Dawn has a manuscript in press on temperature tolerance of blackchin tilapia relative to its Florida distribution.

Buck Snelson (University of Central Florida) has in press in *Copeia*, a paper on geographic variation of *Notropis ardens*. He is also working on an electrophoretic study of *Ellossoma*, and habitat requirements and ecology of *E. okatie*.

Bruce Bauer (Breedlove, Dennis, and Assoc.) is working with Dave Etnier on a description of *Etheostoma (Ulocentra)* sp., "Cherokee darter", an Etowah River endemic north of Atlanta. This species probably merits federal listing.

Walt Courtenay (Florida Atlantic University) is still attacking USFWS and pet industry for lack of regulation regarding exotic species. Eilene Garcia, his graduate student, is studying growth of spotted tilapia at different salinities.

Bill Loftus (Everglades National Park) is finishing projects on marsh productivity relative to drought cycles (several papers and new twists). He is also preparing a manuscript on movements of walking catfish during rains and beginning to investigate a mercury problem in the Everglades.

N. Burkhead

## REGION III – North-central

On 26 October 1988 representatives of NC Game & Fish, UT, and GSMNP met at the Little Tennessee River at the mouth of Sawmill Creek, co. rd. 1125, Swain Co., NC, for the purpose of capturing *Hybopsis monacha* and transplanting them into lower Abrams Creek in the Smokies. Personnel included Dave Etnier, Steve Moore, Bill McLarney, John Alderman, Ken Taylor, Allan Brayton, Heath Sohen, Greg Russell, Edith Hahn, and David Pipes. Our permit allowed us to capture up to 250 spotfin chubs for transplant. We did it! The fish were mostly taken in pool areas along the north bank, where they were abundant. Our quota was reached shortly after noon. The fish were held in mesh cribs in the river, then transferred to plastic bags, about 20 fish per bag, and each bag was placed in a styrofoam cooler. We drove to Chilhowee Reservoir, put in two boats, and motored upstream to the mouth of Abrams Creek and then up Abrams Creek to the lowermost unimpounded pool areas, where the fish were released.

Initial mortality was only six fish. On 30 October, in conjunction with our ongoing survey of the fishes of Great Smoky Mountains National Park, we revisited lower Abrams Creek. One seine haul in the uppermost release pool produced 13 fat, healthy, and apparently happy *Hybopsis monacha*. Plans are underway to transplant an additional group of adults on 22-23 May.

Our efforts continue to re-establish smoky (*Noturus bail-eye*) and yellowfin (*N. flavipinnis*) madtoms in Abrams Creek. A larger culture facility complete with a refrigeration/temperature control unit and excellent filtration was set up at Aquatic Specialists, the aquarium shop run by Randy Shute and John Tullock. Post-hatching mortality was virtually eliminated, but we still lost some eggs that were harvested too early. Young were stocked into Abrams Creek last summer and fall (188 *N. baileyi* and 155 *N. flavipinnis*). Since last summer represented the third year of this program, we have some hope of locating some of these fish (or their offspring) in Abrams Creek this summer. During May we will monitor Citico Creek in order to determine if populations remain sufficiently robust to allow the program to continue. North Fork Hoston River in Virginia has been identified as an additional site for *N. flavipinnis* transplants.

A tiny population of *Hemitremia flammea* (perhaps fewer than 200 individuals) has been located in Cades Cove in the Smokies. This is the only population known from the entire Little Tennessee River system. They occur in several small springs adjacent to upper Abrams Creek. Marcia Sossamon will be doing her MS research on this population in addition to assessing status of other populations in east Tennessee and determining life history parameters.

We have been funded by the Park Service to survey the fishes of Great Smokies National Park. Work started last fall, and will continue this spring. About 25 sites are being sampled, and earlier collection data is being summarized.

Last fall we sampled Isom Lake, a well protected natural cypress swamp near Reelfoot Lake and part of Reelfoot National Wildlife refuge. Our brief visit indicated large populations of *Fundulus chrysotus*, *F. dispar*, *Lepomis symmetricus*, and *Etheostoma fusiforme*, all of which have very restricted distributions in Tennessee.

Jim Habera of Ecological Analysts, Inc., has discovered a large population of *Etheostoma fusiforme* in the Tallulah River system, upper Savannah River drainage of Rabun County, Georgia. This is in the Blue Ridge! They have been taken from the tailwater of Nacoochee (=Seed) Reservoir downstream into lower Rabun Reservoir.

*Carpiodes velifer* adults were recently collected from Nolichucky River and upper Clinch River in east Tennessee. Earlier records from this area, based on juveniles, had never been accepted with complete confidence. In addition, we collected a large juvenile from lower Duck River last fall — the first record from the middle or lower Tennessee River drainage.

D.A. Etnier

## REGION IV – South-central

Scott Mettee, Patrick O'Neil, Royal Suttikus, and Malcolm Pierson report that work is ongoing on a manuscript on the



fishes of the Black Warrior River System and the Alabama tributaries of the Tombigbee River system. The Geological Survey of Alabama would like to announce two new faunal publications in Alabama: "Fishes of the Lower Tombigbee River in Alabama and Mississippi" by Mettee et al. and "Aquatic Invertebrates in the Warrior Coal Basin of Alabama" by Harris, et al.

David Heins and John Baker reported that their work with the life histories of *Noturus hildebrandi*, *Etheostoma lynceum*, and *E. caeruleum* continue. John is also working with spawning site selection in *Cyprinella venusta*, with respect to stream flow in the Pearl and Sabine rivers. David is also working with spawning behavior with *C. venusta* from the Escatawpa River.

Steve Bortone reports that a recent survey of the Oklawaha darter indicates that populations appear to be stable, even in some creeks receiving spray-field effluent.

Bob Cashner reports that he, Sam Rogers, and Jim Grady are working on the biochemical systematics of the *Fundulus* subgenus *Zygionectes*, particularly the *F. notti* species complex. Mark Warren is completing a two-year study on the distribution of fishes in the Buffalo River, Mississippi. Phil Denette is studying fish community stability in the Little Buffalo River.

Malcolm Pierson reports that he, Mike Howell, Bob Stiles, John Ramsey, Scott Mettee, Patrick O'Neil, and Royal Suttikus are working on the "Fishes of the Cahaba River System in Alabama." Malcolm also reports that aquatic biologists are sampling fishes and macroinvertebrates from the lower Tallapoosa River below Thurlow Dam.

Mel Warren reports that as part of a wider geographic variation study of *Lepomis punctatus* the nominal Coosa River undescribed subspecies discussed by Bailey (1938) is apparently not worthy of recognition.

John Ramsey reports that he is continuing to work on the shoal bass (*Micropterus* sp., cf. *punctulatus*) and Cahaba shiner (*Notropis* sp., cf. *volucellus*) descriptions. He and John Selden Burke have been examining the present and historic distribution and conservation status of the Alabama sturgeon (*Scaphirhynchus* sp., cf. *platyrhynchus*). John and Thomas Brantly are also involved with paddlefish movements in the upper Alabama River. James Orr and John Ramsey are also examining reproduction and ecological limitation of a distributionally marginal population of *Etheostoma jordani*. Jim Williams is nearing completion of the description of the Alabama sturgeon.

David Etnier reports that the description and systematic relationships of the undescribed Boulder darter is nearly completed. Mary Jane Larkin is examining systematics of *Etheostoma nigrum* from the south-central portion of the range.

Steve Ross reports that he and Bill Brenneman have completed their third year on the "Inland Fishes of Mississippi" project. Presently, they have about 40,000 species lots from Mississippi. This project has been funded for an additional two years for field work and color photography of fishes. Steve, Dave Wilkins, and Scott Peyton recently started a survey of the fishes of the Pascagoula, Chickasawhay, and Leaf rivers. Mark Peterson has completed his study of lower Old Fort Bayou, emphasizing the costs and benefits of freshwater fishes moving into low salinity water. Bill Brenneman is be-

ginning field work with "Comparative ontogenetic life history attributes of upper and lower reach stream fishes and the consequences of fish assemblage structure."

Bernard Kuhajda and I are studying the life histories of *Notropis chrosomus* and *Noturus funebris*. Mark Ferguson is studying life history aspects of the Alabama shiner (*Cyprinella callistia*). Herb Boschung is actively working on his manuscript on Alabama Fishes.

R. Mayden

## REGION V – Southwest

R. D. Suttikus reports that the Red River Lock & Dam #2 at rm 87 below Alexandria, LA has been closed and backed up to above rm 112. He reports some current but the river is channelized with an alga bloom and stagnant conditions at Alexandria. It is clear, however, above and below the pool. *Notropis hubbsi* was collected in a cut-off bend in backwater but with an open lower end. Also taken were shad, *Menidia*, a white bass x striped bass hybrid and a very dead *Ptenopomodon*. Also, at Fort Jackson while collecting in the Mississippi River at rm 20 (above head of passes) he obtained the expected red fish, speckled trout and black drum in the main channel but also unexpectedly, due to low water conditions, spots, silver perch, mojarra and hardheads.

Frank Pezold reports from Monroe, LA that the Corps of Engineers is researching plans to further dredge and channelize the Ouachita River after an eight year hiatus. This will become part of the proposed Ouachita – Black River Navigation Project. Frank also reports that Neil Douglas' student Madelen Carter is investigating chromosomal variation between members of the *Fundulus notti* species complex. Another student, Todd Slack is investigating the impact of summer surface water withdrawal for irrigation in four NE Louisiana streams with assistance from the Corps of Engineers. Mike Jones, a student of Frank Pezold, will conduct an electrophoretic study on *Lepomis marginatus* and *L. megalotis* populations west of the Mobile Bay drainages. Neil Douglas is working with the Corps in comparing "improved" (i.e. rip-rap stabilization) versus "unimproved" channelized stream tributaries to the Tombigbee River, as to fish faunal changes.

R. Cashner

## NEWS NOTES

### NOTICE

In my paper "Atlas of Fishes of the Upper Tombigbee River Drainage, Alabama-Mississippi," SFC PROCEEDINGS No. 19, July, 1989, I inadvertently failed to acknowledge Dr. Royal D. Suttikus, Tulane University, and Dr. William Fink and Douglas Nelson, University of Michigan Museum of Zoology for their contributions of data. I apologize to Royal, Bill and Doug for my careless oversight. I appreciate the editor of

SFC *PROCEEDINGS* for giving me the opportunity to apprise the membership of the facts.

Herbert Boschung  
U of A

**Conservation Awards** – The Chevron Conservation Awards are open to any citizen volunteer, professional or organization (including public agencies) based on significant results for a conservation project which protects or enhances an area's natural resources. Inquires should be directed to Chevron Conservation Awards, P.O. Box 7753, San Francisco, CA 94120-7753 or (415) 894-2457. This year's winners from the southeast are:

**DISTRICT OF COLUMBIA** – American Forestry Association, Washington, the oldest citizen conservation organization in the U.S., promotes the wise use and management of forest resources. Its "Global ReLeaf" project helps public understanding of global warming.

**GEORGIA** – Dr. Eugene Odom, Athens, is known world wide as the "father of modern ecology" and authored *Fundamentals of Ecology* that pioneered a holistic approach to ecology. He co-founded the Institute of Ecology at the University of Georgia.

**NORTH CAROLINA** – Eddie C. Bridges, Greensboro, for his ingenious idea to sell lifetime fishing and hunting licenses and for lobbying for the ratification of the North Carolina Wildlife Endowment Fund supported by those fees to be used for the support of conservation programs in the state.

**TEXAS** – Texas Parks and Wildlife Department, Austin, for in 1988, successfully negotiating the acquisition of the 336-square-mile 215,000 – acre Big Bend Ranch in West Texas, the state's largest parkland acquisition in history.

**Congressional Directory: Environment** – a new publication that outlines how environmental issues are handled in Congress as to whom are the legislators, committees and staffers that deal with this legislation. Cost is \$87.50 + \$4.50 handling from Environmental Communications, 6410 Rockledge Dr., Suite 203, Bethesda, MD 20817.

**Red Shiner warning** – Past SFC Chairman Bob Jenkins sent a letter of warning to the editor of T.F.H. Publications regarding the release of *Cyprinella lutrensis* outside its native range. This has obviously already been done but aquarist have begun to take an interest in this species under the appellations "Asian fire barb", "rainbow dace" and "redhorse minnow". Bob's intent was to make known the appropriate common name, introduce the recent taxonomy, welcome new knowledge as to the spawning of the red shiner but primarily to enlighten as to the aggressive nature of this species and the damage done outside its native range. Take home lesson: "Keep the red shiner in aquaria!"

**Editorial Policy Statement** – It has been my practice to avoid anonymity in the peer reviewing process. I have chosen that over, as I see it, the only viable alternative of the double-

blind review where the author becomes anonymous to the reviewers also. I feel the former keeps things in the open and that is desirable among colleagues. Consequently, all authors are privy to the reviewers and vice versa. This should enhance direct communication within the society. I wish to thank the following reviewers for Nos. 17, 18, and 20: Noel Burkhead, Brooks Burr, Bob Cashner, Neil Douglas, Carter Gilbert, Jim Grady, Dave Heins, Bob Jenkins, Frank Pezold, Royal Suttkus, Jamie Thomerson, and Jim Williams.

**Cahaba River Fishes** – A report on the fishes of the Cahaba River System in Alabama by J. Malcolm Pierson, W. Mike Howel, Robert A. Stiles, Maurice F. Mette, Patrick E. O'Neil, Royal D. Suttkus and John S. Ramsey has been published as Bulletin 134 by the Geological Survey of Alabama. Copies are available from the Publication Sales Office, P.O. Box 0, Tuscaloosa, AL 35486-9780.

**PROCEEDINGS back issues** – All back issues are in stock except Volume 2, nos. 1 & 2. We have especially large numbers of Volumes 3 and 4 (all numbers). There will be a charge of \$1.00 per number for those available except for number 19 which is \$7.50. Orders may be placed with the editor.

**UAIC** – The University of Alabama Ichthyological Collection is requesting reprints and other forms of publication that were based on material in the museum. They will utilize this information for a collection improvement grant request. They are also creating an ichthyological reprint library and would appreciate any publications for that purpose also.

**Fishes of the Western Mobile River Basin in Alabama and Mississippi** – By Maurice F. Mettee, Patrick E. O'Neil, J. Malcolm Pierson and Royal D. Suttkus, as Atlas 24 from the Geological Survey of Alabama, Biological Resources Division is now available from the Publication Sales Office, P.O. Box 0, Tuscaloosa, AL 35486-9780.

## ATTENTION

### SFC MEETING CHANGE

In correction of the ASIH 70th annual meeting announcement, The Southeastern Fishes Council Business Meeting will occur **Saturday, 16 June, 1 – 3 PM** in the Simmons Center. Not as published to occur on Monday from Noon – 1:30 P.M.