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Abstract

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Minutes, Business Meeting, 28th Annual Meeting, Southeastern Fishes Council

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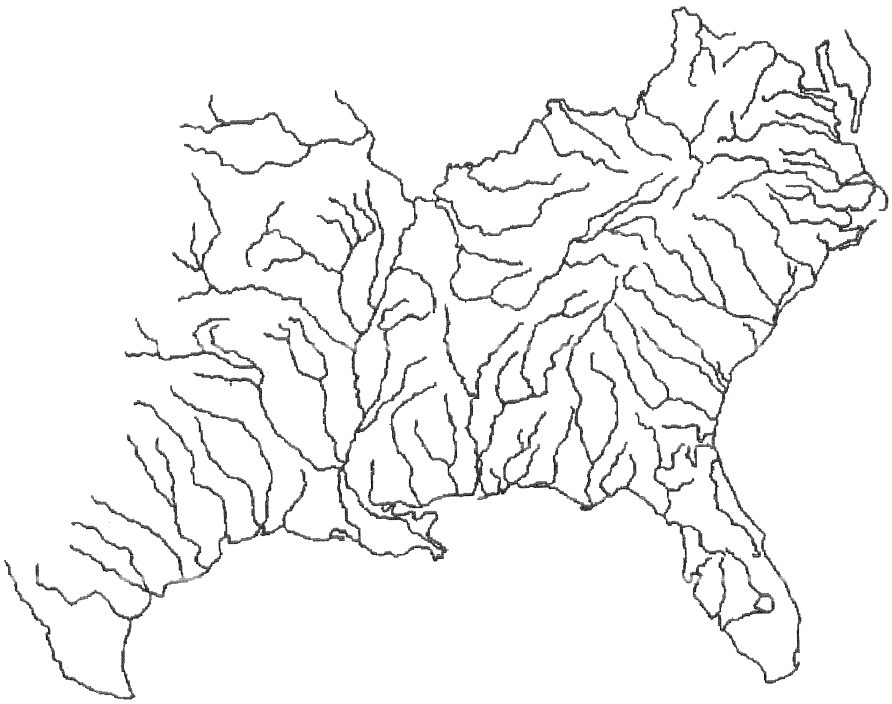

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An Annotated List of the Fishes Known from the Dan River in Virginia and North Carolina (Blue Ridge/Piedmont Provinces)

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ABSTRACT

Rohde et al. (2001) reported on the longitudinal distribution of fishes in the Dan River, located in the Blue Ridge and Piedmont provinces in Virginia and North Carolina, based on data from 298 collections made through the year 2000. The present paper is an annotated species list based on our previous research and an additional 1,064 specimens from eight collections made in 2001. Sixty-eight species and 47,526 specimens in 11 families were taken in the Dan River from 1968-2001. The family most commonly represented was Cyprinidae with 21 species and 29,562 specimens taken, followed by the Centrarchidae (12; 5,168), Percidae (7; 3,431), Catostomidae (11; 3,198), and Ictaluridae (9; 3,096). Six other families included eight species that comprised 6.4% (3,071 specimens) of all individuals collected. Fourteen species and four families not taken in the above collections are added from the literature and personal communications. In sum, we report a total of 82 species of fishes in 15 families from the Dan River. We divide the river into six sections, based on physiographic characteristics. These sections are, from upstream: Uplands (located at ca. rkm 320-312); Upper Gorge (ca. rkm 311-284); Lower Gorge (ca. rkm 283-266); Inner Piedmont (ca. rkm 265-197); Fault Basin (ca. rkm 196-112); and Piedmont Lowlands (ca. rkm 111-0). The number of species recorded per river section by us and from the literature, respectively, are 17, 36, 26, 49, 60, and 48. Fifty-one fish species are native, 24 are introduced, two species are native, but their populations have been augmented by stocking, and five are of undetermined origin. The Piedmont Lowlands has the greatest number of introduced species (19; 39.5%) and the Lower Gorge has the least number of introduced species (3; 11.5%). We present data on five VA/NC-listed species of concern.

INTRODUCTION

The Dan River is located in the Blue Ridge/Piedmont provinces of VA and NC and forms the large southern division of the Roanoke River drainage. From its origin to its junction with the Roanoke (Staunton) River, near the upstream end of the John H. Kerr Reservoir, the Dan River is some 320 rkm (river kilometers) long and it drains some 6,600 sq km.

We studied the Dan River because it is relatively pristine in the upper reaches, is of moderate size, is ichthyologically rich, and contains five state-listed species of concern (Rohde et al., 1998). The study area was described in detail by Rohde et al. (2001). This paper supplements and complements our previous report by addressing the status of individual species known from the Dan River.

METHODS

For quantitative evaluation as presented later in Tables 1 and 2, we used data from a total of 306 collections (298 collections made at 42 sites (Fig. 2) from 1968-2000 as per Rohde et al. (2001), as well as 8 additional collections made in 2001). Sources of these collections are as follows: 32 collections made at 23 sites by Rohde and Arndt during 1992-98; 120 collections made by the VA Department of Game and Inland Fisheries (VDGIF) in 1992-98; three by Paul L. Angermeier of VA Polytechnic Institute and State University (VPI) in 1989-90; one by the NC Wildlife Resources Commission (NCWRC) in 1990; 134 by biologists of Duke Energy (DE) during 1977-2001; 13 by Edward F. Menhinick of the University of NC-Charlotte from 1968-85; and three by the NC Division of Environmental Management in 1986. Additional collections have also been made in Virginia and in North Carolina, and these records have been plotted by Jenkins and Burkhead (1994) and Menhinick (1991).

Collections were made with seines, backpack electroshockers, and/or boat electroshockers from near the headwaters at rkm 317 downstream to rkm 23; only three sites were sampled in the lower 98 rkm of the river from Danville, VA to Kerr Reservoir (Fig. 1). All sites were chosen on the basis of ease of access (bridge crossings or

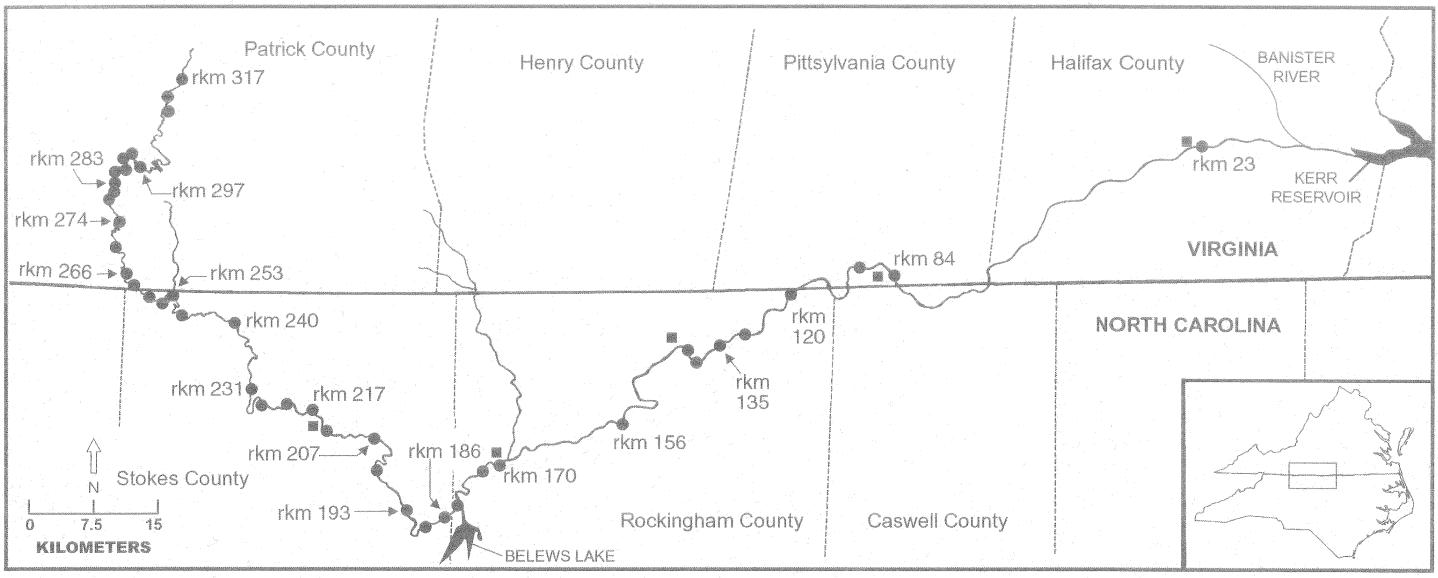

Figure 1. The Dan River in Virginia and North Carolina, showing sites sampled and selected river kilometer (rkm) locations.

boat ramps). Overall, from 1 to 36 collections were made at a given site. We deposited preserved specimens in the NC State Museum of Natural Sciences in Raleigh.

Seventeen sites were scored during low water conditions for eight physicochemical characteristics: water temperature, dissolved oxygen concentration, conductivity, pH, river width, river depth, current speed, and substrate composition. Techniques used are given in Rohde et al. (2001).

RESULTS AND DISCUSSION

Species Occurrence and Abundance

Sampling by us and others yielded 47,526 fish specimens of 68 species recorded from rkm 317 to 23 (Table 1). Eleven additional species have been reported from the Dan River by Jenkins and Burkhead (1994), Menhinick (1991), and from personal communications with others (Rohde et al., 2001). We record here three more species on the basis of additional and more recent personal communications. Thus, a total of 82 species of fishes is known from the Dan River. The brown bullhead, *Ameiurus nebulosus*, had in fact been collected during the study reported upon by Rohde et al. (2001) and in tables in that paper it was correctly included as having been caught by them, but it was incorrectly referred to as "....an additional species..." in the text of that paper.

The relative representation of families and species in the samples remained as reported by Rohde et al. (2001) with the exception that the Ictaluridae comprised 13.2% of the total species, not 16.2%, and the numbers of speci-

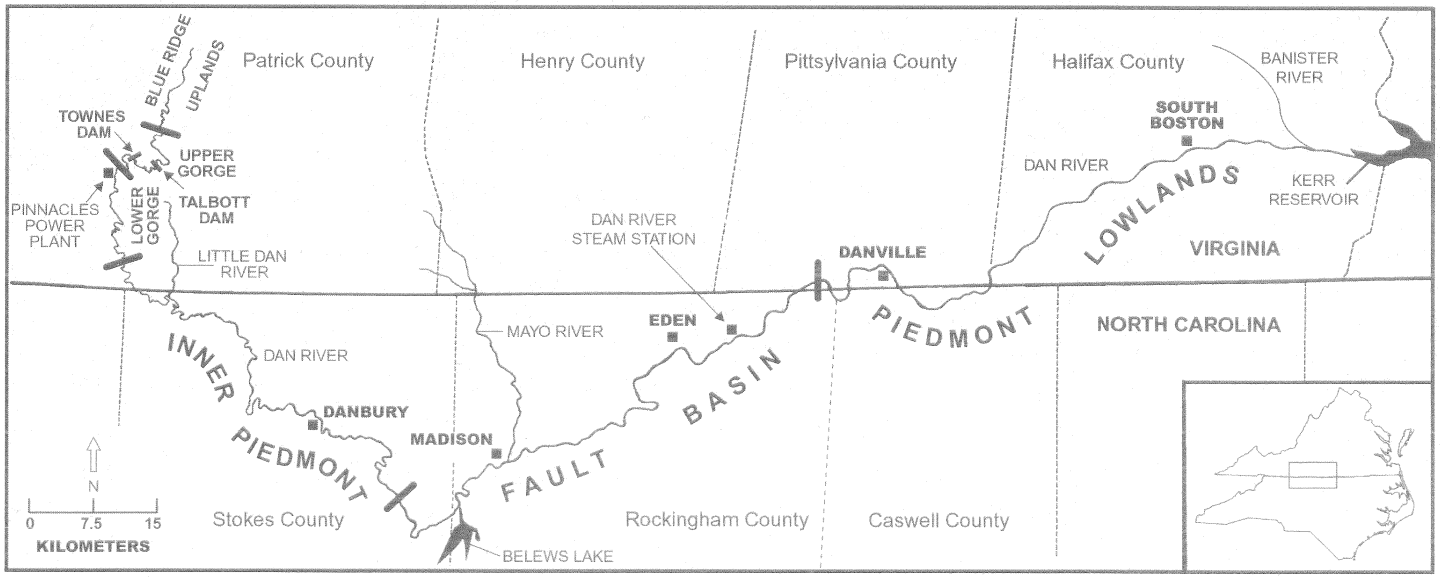

Figure 2. The Dan River in Virginia and North Carolina, showing physiographic provinces and other features mentioned in the text.

mens reported for some taxa has increased (Table 1).

To evaluate longitudinal species distributions, we divided the river into six physiographic sections, based on substrate, gradient, current, and river width (Fig. 2, Table 2). Seventeen species were recorded in the Uplands section of the river (ca. rkm 320-rkm 312). The river in this reach is narrow (mean width 6.8 m) and shallow (mean depth 25.2 cm) and is characterized by a moderate gradient (11 m/rkm) and current (0.17 m/sec) over a substrate of gravel, rubble, and sand. Thirty-six species were taken in the Upper Gorge section (ca. rkm 311-rkm 284), a reach with high gradient (13 m/rkm), moderate current (0.19 m/sec), narrow width (7.7 m), shallow depth (22.3 cm), and a substrate of gravel, rubble, and boulders. In the Lower Gorge section (ca. rkm 283-rkm 266), we recorded 26 species. The river here is wider (14.7 m) and deeper (31.8 cm) with a lower gradient (5 m/rkm), stronger current (0.38 m/sec), and a substrate of rubble, gravel, and boulders. Richness increased in the Inner Piedmont section (ca. rkm 265-rkm 197) to 49 species as the river continued to increase in width (30.8 m) and depth (32.6 cm); the gradient (2 m/rkm) decreased while the current increased (0.40 m/sec) over a predominantly gravel and rubble substrate. The Fault Basin section (ca. rkm 196-112) was the most diverse, with 60 species. As the river widened (49.4 m) and deepened (63.4 cm) in this reach, the gradient (ca. 0.5 m/rkm) and current (0.29 m/sec) decreased over a sand and gravel substrate. In the Piedmont Lowlands section (ca. rkm 111-rkm 0), we recorded 48 species. The river is at its widest in this portion (mean 72 m) and has the lowest gradient (ca. 0.3 m/rkm); no other measurements were made in this section. These last two sections were included in the Fault Basin section in Rohde et al. (2001).

Table 1. Phylogenetic list of fishes captured in the Dan River, 1968-2001, and number of each taken.

	TOTAL	% of TOTAL
Lepisosteidae		>0.1
Lepisosteus osseus	2	
Clupeidae		0.3
Dorosoma cepedianum	157	
Cyprinidae		62.2
Campostoma anomalum	188	
Carassius auratus	4	
Clinostomus funduloides	8509	
Cyprinella analostana	2611	
Cyprinella lutrensis	13	
Cyprinus carpio	104	
Exoglossum maxillingua	245	
Luxilus albeolus	1225	
Luxilus cerasinus	2905	
Lythrurus ardens	2168	
Nocomis leptocephalus	4850	
Nocomis raneyi	893	
Notemigonus crysoleucas	77	
Notropis amoenus	190	
Notropis chiliticus	2504	
Notropis hudsonius	391	
Notropis procne	76	
Phoxinus oreas	1890	
Rhinichthys atratulus	357	
Rhinichthys cataractae	1	
Semotilus atromaculatus	361	
Catostomidae		6.7
Carpiodes cyprinus	41	
Catostomus commersonii	430	
Hypentelium nigricans	157	
Hypentelium roanokense	233	
Moxostoma collapsum	131	
Moxostoma erythrurum	1550	
Moxostoma macrolepidotum	21	
Moxostoma pappillosum	294	
Scartomyzon ariommus	40	
Scartomyzon cervinus	295	
Thoburnia hamiltoni	6	
Ictaluridae		6.5
Ameiurus brunneus	703	
Ameiurus catus	30	
Ameiurus melas	4	
Ameiurus natalis	2	
Ameiurus nebulosus	26	
Ameiurus platycephalus	185	
Ictalurus punctatus	149	
Noturus gilberti	20	
Noturus insignis	1977	
Esocidae		>0.1
Esox americanus	2	
Salmonidae		3.4
Oncorhynchus mykiss	435	
Salmo trutta	1005	
Salvelinus fontinalis	154	
Poeciliidae		>0.1
Gambusia holbrooki	3	
Cottidae		2.8
Cottus caeruleomentum	1313	
Centrarchidae		10.9
Ambloplites cavifrons	7	
Ambloplites rupestris	5	
Lepomis auritus	3384	
Lepomis cyanellus	161	
Lepomis gibbosus	38	
Lepomis gulosus	8	
Lepomis macrochirus	911	
Lepomis microlophus	137	
Micropterus dolomieu	25	
Micropterus salmoides	382	
Pomoxis annularis	20	
Pomoxis nigromaculatus	90	
Percidae		
Etheostoma flabellare	1260	7.2
Etheostoma nigrum	33	
Etheostoma podostemone	590	
Etheostoma vitreum	53	
Percina nevisense	55	
Percina roanoka	1439	
Sander vitreus	1	
Number of species	68	
Number of specimens	47,526	

Annotated List of Species

Species accounts are presented in phylogenetic order. Localities of collections made in this study are listed following the species name and refer to Figure 1. All species are considered native unless otherwise indicated.

Lepisosteidae

Lepisosteus osseus. One longnose gar was taken by VPI biologists with a boat shocker at rkm 23 and one was taken by DE biologists at rkm 131. Jenkins and Burkhead (1994) show one additional locality at ca. rkm 50. Menhinick (1991) recorded it from lower County Line Creek, Caswell County, NC, near its junction with the Dan River near rkm 51.

Amiidae

Amia calva. Several specimens of bowfin have been collected in Kerr Reservoir as well as in the Roanoke River (VDGIF data).

Anguillidae

Anguilla rostrata. There are scattered records of the catadromous American eel from Dan River tributaries in VA (Jenkins and Burkhead, 1994) and NC (Menhinick, 1991). Large individuals are known to have been present in the Dan River system above Kerr Reservoir until the mid-1970s (Jenkins and Burkhead, 1994). This migratory fish is now presumed to be extirpated in the Dan River system due to the barriers to migration presented by three large dams (Kerr, Gaston, and Roanoke Rapids) constructed on the lower Roanoke River.

Clupeidae

Alosa aestivalis. Introduced. A landlocked population of the blueback herring occurs in Kerr Reservoir from fish transplanted from the Nottoway River (Jenkins and Burkhead, 1994). It is the only self-sustaining inland population of this species in VA. The species makes spawning runs up the Dan River as far as the base of the lowermost dam (at rkm 83) in Danville (Dan Wilson, VDGIF, pers. comm.). *Alosa pseudoharengus*. Probably introduced. The alewife is currently present in Kerr Reservoir and the Dan River according to VDGIF data. Jenkins and Burkhead (1994) reported a single record of the alewife from near rkm 118, near the NC/VA border southwest of Danville, VA.

Dorosoma cepedianum, sites (rkm) 23, 84, 98, 120, 131, 135. Naturally-occurring gizzard shad may have been entrapped after construction of the three lower dams on the Roanoke River, but the species was also stocked in Kerr Reservoir by VDGIF and first collected there in 1962 (Jenkins and Burkhead, 1994).

Dorosoma petenense. Introduced. The threadfin shad was introduced into Kerr Reservoir by VDGIF in the late 1980s and is now common to abundant there. It is recorded from the lower portion of a tributary, the Banister River, in Halifax County, VA (Jenkins and Burkhead, 1994; Dan Wilson, VDGIF, pers. comm.).

Cyprinidae

Campostoma anomalum, sites 135, 156, 199, 207, 214, 217, 221, 224, 231, 240, 249, 257, 259, 261, 266, 286, 290, 313. The central stoneroller was found primarily below the gorge between rkm 199 and rkm 266. Two specimens taken at rkm 135 and 156 are presumed waifs.

Carassius auratus, sites 120, 135, 193. Introduced.

Clinostomus funduloides, sites 214, 224, 231, 240, 249, 257, 259, 261, 266, 270, 274, 280, 282, 283, 284, 286, 287, 290, 297, 312, 313, 317. The rosyside dace was the most abundant species taken upstream in the Uplands and in the Upper Gorge, and the second-most abundant species in the Lower Gorge (Table 2).

Cyprinella analostana, sites 23, 84, 98, 120, 131, 135, 138, 139, 156, 170, 174, 183, 186, 190, 193, 199, 207, 214, 217, 221, 224, 231, 240, 249, 259, 287. The satinfin shiner was the second-most abundant species taken in the Fault Basin (Table 2).

Cyprinella lutrensis, sites 120, 138, 139, 174, 193. Introduced. In 1976 one adult red shiner was captured by DE biologists in a tributary to the Dan River in Stokes County, NC above Belews Lake. The species was subsequently taken in 1984 in the Dan River proper. The introductions may stem from a fish hatchery located in Forsyth County, NC where it was raised as an aquarium fish (Jenkins and Burkhead, 1994). While this invasive species has become firmly established in the Yadkin (Pee Dee) River drainage in NC, not well-established in the Dan River. In contrast to the Dan River, the Yadkin River fish fauna is primarily composed of introduced species (F.C. Rohde, pers. obs.).

Cyprinus carpio, sites 23, 84, 120, 131, 135, 138, 139, 174, 214. Introduced. The common carp was most abundant in the Piedmont Lowlands (Table 2).

Exoglossum maxillingua, sites 240, 249, 257, 259, 261, 266, 270, 274, 280, 283, 284, 286. The cutlips minnow was most abundant in the Lower Gorge (Table 2). We recorded it only in areas of fast-flowing runs and pools near large rocks or boulders over clean sand and gravel in the upper 46 rkm. The cutlips minnow is a NC-listed endangered species because the population there is peripheral, located at the southernmost portion of its range.

Luxilus albeolus, sites 120, 131, 135, 138, 139, 156, 170, 174, 186, 190, 193, 199, 207, 214, 221, 224, 231, 240, 249, 257, 259, 266, 270, 274, 282, 284. The white shiner was abundant in the Fault Basin, but uncommon upstream of rkm 259 in the Inner Piedmont (Table 2). Jenkins and Burkhead (1994) recorded it from the Piedmont Lowlands section of the river.

Luxilus cerasinus, sites 120, 131, 135, 138, 139, 186, 190, 193, 199, 207, 214, 217, 221, 224, 231, 240, 249, 253, 257, 259, 261, 266, 270, 274, 280, 282, 283, 284, 286, 287, 290, 297, 312, 313, 317. The crescent shiner was a dominant species in the Uplands, in the Lower Gorge, and in the Inner Piedmont (Table 2). Although not recorded by us in the Piedmont Lowlands section, the crescent shiner is present there according to Jenkins and Burkhead (1994).

Lythrurus ardens, sites 120, 131, 135, 138, 139, 156, 183,

Table 2. Relative abundance (number of specimens/number of collections) of fishes taken in this Dan River study,1968-2001, for each individual river region. Species that in total comprise the top 75% most-abundant species/region are identified in bold type.

SPECIES	UPLANDS	UPPER GORGE	LOWER GORGE	INNER PIEDMONT	FAULT BASIN	PIEDMONT LOWLANDS
Campostoma anomalum	1.60	0.02	0.12	5.47	0.02	
Clinostomus funduloides	**389.40**	**49.31**	**72.25**	2.09		
Luxilus cerasinus	**130.40**	7.99	**28.50**	**30.31**	0.67	
Nocomis leptocephalus	**37.80**	**22.05**	**24.25**	**47.31**	2.17	
Notropis chiliticus	20.60	5.06	**27.00**	**39.59**	2.21	
Phoxinus oreas	17.60	**14.28**	6.88	1.00	0.02	
Rhinichthys atratulus	1.80	2.76	2.12			
Semotilus atromaculatus	11.00	2.30	2.88	0.19	0.01	
Catostomus commersonii	6.20	2.57	1.38	0.81	0.38	
Hypentelium nigricans	0.40	0.09	1.75	1.06	0.68	
Hypentelium roanokense	7.00	0.37	5.38	3.31	0.04	
Noturus insignis	2.80	5.92	1.75	**37.53**	0.26	
Oncorhynchus mykiss	0.60	3.51	0.62	0.19		
Salvelinus fontinalis	0.60	1.25	0.12			
Salmo trutta	2.20	**8.13**	1.38	0.16	0.02	
Lepomis auritus	0.20	0.06		3.00	**23.57**	**9.00**
Etheostoma flabellare	32.20	4.17	22.88	12.47	0.12	
Cyprinella analostana		0.01		9.72	**17.16**	**4.67**
Exoglossum maxillingua		1.46	5.25	0.88		
Luxilus albeolus		0.01	1.50	7.34	**6.93**	
Rhinichthys cataractae		0.01				
Scartomyzon cervinus		0.52	6.88	4.97	0.12	
Thoburnia hamiltoni		0.02	0.38			
Noturus gilberti		0.01	1.12	0.31		
Cottus caeruleomentum		1.85	**124.88**	2.88		
Ambloplites cavifrons		0.02			0.04	
Etheostoma podostemone		0.29	0.75	**15.22**	0.44	
Lythrurus ardens			2.38	**47.00**	4.57	
Etheostoma nigrum			2.00	0.47	0.02	
Percina roanoka			4.00	**41.53**	0.56	
Cyprinus carpio				0.03	0.68	3.33
Nocomis raneyi				3.47	5.82	1.33
Notropis amoenus				0.03	1.34	
Notropis procne				0.81	0.36	
Moxostoma erythrurum				0.97	**10.51**	2.33
Moxostoma pappillosum				1.34	1.79	1.33
Scartomyzon ariommus				1.00	0.06	
Ameiurus brunneus				1.56	4.55	**8.33**
Ameiurus melas				0.03	0.02	
Ameiurus platycephalus				1.94	0.87	
Micropterus salmoides				0.09	2.56	2.33
Micropterus dolomieu				0.12	0.12	0.33
Etheostoma vitreum				1.62	0.01	
Percina nevisense				1.03	0.09	
Lepisosteus osseus					0.01	0.33
Dorosoma cepedianum					0.55	**26.70**
Carassius auratus					0.03	
Cyprinella lutrensis					0.09	
Notemigonus crysoleucas					0.55	
Notropis hudsonius					2.76	1.00
Carpiodes cyprinus					0.22	**3.67**
Moxostoma collapsum					0.85	**4.67**
Moxostoma macrolepidotum					0.04	**5.33**
Ameiurus catus					0.13	4.00
Ameiurus natalis					0.02	
Ameiurus nebulosus					0.16	0.33
Ictalurus punctatus					1.00	4.00
Esox americanus					0.02	
Gambusia holbrooki					0.02	
Ambloplites rupestris					0.05	
Lepomis cyanellus					1.14	
Lepomis gibbosus					0.27	0.33
Lepomis gulosus					0.06	
Lepomis macrochirus					**6.40**	**9.00**
Lepomis microlophus					0.97	
Pomoxis annularis					0.14	0.33
Pomoxis nigromaculatus					0.62	1.33
Sander vitreus						0.33
Number of species	17	27	26	39	58	23
Number of specimens	3,313	16,083	2,787	10,524	14,536	283
Number of collections	5	120	8	32	138	3

186, 190, 193, 207, 214, 217, 221, 224, 231, 240, 249, 253, 257, 259, 261, 266, 270. The rosefin shiner was the second most abundant species collected in the Inner Piedmont (Table 2), and large schools were taken in the slower and deeper waters below riffles and runs. Jenkins and Burkhead (1994) show records from the Piedmont Lowlands.

Nocomis leptocephalus, sites 120, 131, 135, 138, 139, 156, 170, 174, 183, 186, 190, 193, 199, 207, 214, 217, 221, 224, 231, 240, 249, 253, 257, 259, 261, 266, 270, 274, 280, 282, 283, 284, 286, 287, 290, 297, 312, 313, 317. The bluehead chub was one of the most abundant species in all river sections, except in the Fault Basin (Table 2). It has also been recorded from the Piedmont Lowlands (Jenkins and Burkhead, 1994).

Nocomis raneyi, sites 84, 120, 131, 135, 138, 139, 156, 174, 186, 190, 193, 199, 214, 217, 221, 224, 231, 240, 249, 257, 259. The bull chub was taken from the Inner Piedmont to the Piedmont Lowlands.

Notemigonus crysoleucas, sites 120, 131, 135, 138, 139, 174. Probably introduced. We found the golden shiner restricted to the Fault Basin (Table 2). It was uncommon at a site in the Inner Piedmont (rkm 231) in 1991 (C. Smith, pers. comm.). It may also occur downstream in the Piedmont Lowlands, but it seems to avoid montane and most upland areas (Jenkins and Burkhead, 1994). It is a commonly-used bait fish in VA and NC and populations in the Dan are probably derived from bait releases.

Notropis amoenus, sites 120, 131, 135, 138, 139, 186, 217. The comely shiner was most common in the Fault Basin (Table 2). It is also recorded from the Piedmont Lowlands in Virginia by Jenkins and Burkhead (1994).

Notropis chiliticus, sites 138, 183, 186, 190, 193, 199, 207, 214, 217, 221, 224, 231, 240, 249, 253, 257, 259, 261, 266, 270, 274, 280, 282, 283, 284, 286, 312, 313. The redlip shiner was one of the most abundant species in the Lower Gorge and Inner Piedmont (Table 2). Its general absence from the Fault Basin and from the Piedmont Lowlands may reflect a lack of bluehead chub nests there, which apparently are necessary for this shiner to spawn. Hocutt et al. (1986) and Jenkins and Burkhead (1994) consider it to be native to the Dan River, although the latter suggest that it may have been introduced from the Yadkin River.

Notropis hudsonius, sites 84, 120, 131, 135, 138, 139, 156. The spottail shiner was restricted in the river to the Fault Basin and Piedmont Lowlands. Most (199 specimens) were taken at one site (rkm 135). While it may occur in higher-gradient streams in parts of VA, it is more typical of the lower reaches of large rivers and estuaries (Jenkins and Burkhead, 1994).

Notropis procne, sites 120, 131, 135, 138, 139, 156, 257, 259. The swallowtail shiner has a particularly interesting and puzzling distribution in the Dan River. About one-third of the specimens were taken at rkm 257 and 259 near the VA/NC border, an area with a strong current and a rocky substrate. The remainder were taken at six sites from between rkm 120 to rkm 156, in the lower river, in a region of slower current and a sandy substrate. It has also been recorded from the Piedmont Lowlands near Danville, VA (Jenkins and Burkhead, 1994), and it was rare at rkm 231 in 1993 (C. Smith, pers. comm.). We believe that our observed hiatus of 101 rkm in its distribution is significant, but we cannot explain it. It has been suggested that specimens from the Fault Basin may be the mimic shiner, *Notropis volucellus*, but re-examination confirmed their identity as *N. procne*.

Phoxinus oreas, sites 138, 139, 214, 231, 257, 259, 266, 270, 274, 282, 283, 284, 286, 287, 290, 297, 312, 313, 317. The mountain redbelly dace is a typical headwater species and was abundant in the Upper Gorge (Table 2). Downstream occurrences were likely waifs from upstream or tributary creeks.

Rhinichthys atratulus, sites 266, 270, 274, 280, 282, 283, 284, 286, 287, 290, 297, 312, 313, 317. The blacknose dace was restricted to the Uplands and the Gorge.

Rhinichthys cataractae, site 287. Introduced. One specimen of longnose dace taken in the Upper Gorge represents the first record in the Dan River. Jenkins and Burkhead (1994) report that it has been introduced into the upper Roanoke River drainage in and near Tinker Creek, near Roanoke, Roanoke County, VA, and is now expanding its range there.

Semotilus atromaculatus, sites 138, 257, 259, 266, 270, 274, 284, 286, 287, 297, 312, 313, 317. With one exception, the creek chub was restricted to the Uplands and the Gorge. It was abundant at rkm 249 in 1988 (C. Smith, pers. comm.).

Catostomidae

Carpiodes cyprinus, sites 23, 84, 120, 131, 135, 138, 139, 174, 186, 193. The quillback was distributed throughout much of the lower river in the Fault Basin and the Piedmont Lowlands. One specimen was taken at rkm 231 in 1993 (C. Smith, pers. comm.).

Catostomus commersonii, sites 120, 131, 135, 138, 139, 174, 193, 214, 217, 221, 240, 249, 257, 259, 261, 266, 270, 280, 282, 283, 284, 286, 287, 290, 297, 312, 313, 317. The white sucker was widely distributed from the Uplands to the Fault Basin.

Erimyzon oblongus. There are two records of the creek chubsucker, both from the lower Dan River near rkm 50 and rkm 68 upstream of South Boston, VA (Jenkins and Burkhead, 1994).

Hypentelium nigricans, sites 120, 131, 135, 138, 139, 156, 174, 186, 190, 193, 199, 207, 214, 224, 231, 240, 257, 259, 261, 270, 280, 282, 283, 284, 286, 287, 313. The northern hogsucker was most abundant in the Lower Gorge and Inner Piedmont (Table 2).

Hypentelium roanokense, sites 131, 135, 193, 199, 207, 214, 217, 221, 224, 231, 240, 249, 253, 257, 259, 261, 266, 270, 274, 284, 286, 287, 312, 313. As observed for the northern hogsucker, the Roanoke hogsucker was most abundant in the Lower Gorge. The two species were syntopic at 17 sites. The Roanoke hogsucker was much more

common than the northern hogsucker in the swifter waters in the Uplands, the Gorge, and upper Inner Piedmont. Our observations of a greater abundance of the Roanoke hogsucker in smaller-sized waters agree with the observations made by Jenkins and Burkhead (1994).
Moxostoma collapsum, sites 23, 84, 120, 131, 135, 138, 139, 193. The notchlip redhorse was recently elevated from synonymy with the silver redhorse, *M. anisurum* (need original citation). It was found in the Fault Basin and Piedmont Lowlands.
Moxostoma erythrurum, sites 84, 98, 120, 131, 135, 138, 139, 170, 174, 186, 193, 214, 217, 221, 224, 231, 249. The golden redhorse was most abundant in the slower waters in the Fault Basin and Piedmont Lowlands. It also occurred upstream at rkm 249, in that part of the river that runs through Upper Precambrian-Paleozoic rocks (Table 2).
Moxostoma macrolepidotum, sites 23, 84, 138. The shorthead redhorse was taken primarily in the Piedmont Lowlands. Its scarcity in the Dan River is possibly related to a sensitivity to a high silt load and possibly other forms of pollution or perhaps a preference for downstream reservoirs. However, it is often difficult to collect due to its speed and preference for large and deep waters (Jenkins and Burkhead, 1994), and it may be more common in the Dan than our records indicate. *Moxostoma pappillosum*, sites 84, 98, 120, 131, 135, 138, 139, 156, 170, 174, 186, 193, 199, 214, 221. The suckermouth redhorse was widespread between rkm 84 in the Piedmont Lowlands and rkm 221 in the Inner Piedmont. It was almost as widely-distributed as the golden redhorse. While the golden redhorse was five times more abundant overall than the suckermouth redhorse in the Dan River, the suckermouth was relatively more abundant in the more clear waters of the Inner Piedmont (Table 2).
Scartomyzon ariommus, sites 135, 199, 207, 214, 217, 221, 224, 231, 240. The bigeye jumprock is restricted primarily to that reach of river that flows through the southern part of the Upper Precambrian-Paleozoic rocks. Its occurrence there appears correlated with a substrate of boulders and of undercut bedrock. Eight specimens were taken in four of 24 collections made downstream of the dam at the Duke Power Plant in Eden, NC, at rkm 135. Its occurrence there may result from the presence of suitable habitat, a swift current and hard-rock substrate (rock, cobble, and gravel). Because of its limited distribution in NC, its restriction to large streams, and because of a presumed low population density, the bigeye jumprock is considered to be a species of special concern in that state.
Scartomyzon cervinus, sites 135, 138, 139, 193, 199, 207, 214, 217, 221, 224, 231, 240, 249, 253, 257, 259, 261, 266, 270, 274, 280, 282, 283, 284, 286, 287. The black jumprock was most abundant in the faster waters of the Lower Gorge.
Thoburnia hamiltoni, sites 280, 283, 284, 290. The rustyside sucker was taken only in that reach of river from 7 rkm immediately above and 3 rkm below the Pinnacles Power Plant in VA, between rkm 280 and rkm 290. This species is endemic to the upper Dan River system and is extremely rare (Burkhead and Jenkins, 1991). It was first collected in the Dan River proper in 1983, when one specimen was taken (Jenkins and Burkhead, 1994). Based on extralimital collecting, we also record it (one specimen) from NC from one site in the Little Dan River, at a point some 1.5 km above its confluence with the Dan River at rkm 253. Because this is the only locale known for this species in NC, and because the species is sensitive to siltation, the rustyside sucker is NC-listed as endangered.

Ictaluridae
Ameiurus brunneus, sites 84, 98, 120, 131, 135, 138, 139, 156, 174, 183, 186, 193, 199, 207, 214, 217, 221. Probably introduced. The snail bullhead was most abundant in the slower waters of the Piedmont Lowlands (Table 2) and was also common in the Fault Basin between rkm 120 and rkm 139. One specimen was taken in the Upper Gorge at rkm 297 by VDGIF. This species is reported to prefer fast-flowing streams with sand and rock substrates (Mettee et al., 1996). This is contrary to what we observed in the Dan. The snail bullhead was first recorded in the Dan River in 1976, just above Kerr Reservoir. Its absence from the Roanoke River suggests that it was introduced into the Dan River, possibly from the Yadkin River drainage and in a stocking that also introduced *Ameiurus melas* (Burkhead et al., 1980).
Ameiurus catus, sites 23, 84, 135, 138, 139, 193. The white catfish was found only in slower waters in the Fault Basin and Piedmont Lowlands sections. It was also taken (rare) at rkm 231 in 1991 (C. Smith, pers. comm.).
Ameiurus melas, sites 138, 174, 257. Introduced. The black bullhead was reportedly stocked into Belews Lake, Rockingham/Stokes counties, NC, an upper Dan River system impoundment (Burkhead et al., 1980).
Ameiurus natalis, sites 131, 170. Probably introduced. Menhinick (1991) shows one additional locality for the yellow bullhead from the Dan River near rkm 131. It was also taken (rare) at rkm 231 in 1991 (C. Smith, pers. comm.). Jenkins and Burkhead (1994) depict one locality from the Banister River in the Dan River system and several localities from Kerr Reservoir. While these records may represent immigration from the Roanoke River drainage, the latter authors also indicate that the Dan River population may have been introduced.
Ameiurus nebulosus, sites 98, 120, 135, 138, 139, 174, 193. All specimens of the brown bullhead were from the slower waters of the Fault Basin and Piedmont Lowlands sections of the Dan River. C. Smith (pers. comm.) also collected several specimens from farther upstream, from rkm 231 and rkm 249.
Ameiurus platycephalus, sites 120, 131, 135, 138, 139, 156, 174, 190, 193, 199, 214, 221, 224, 240, 249, 257. The flat bullhead was found to be widely distributed. One individual, an apparent introduction, was taken in the Upper Gorge at rkm 297 by VDGIF. It has also been recorded in

Kerr Reservoir (Jenkins and Burkhead, 1994). The native flat bullhead has a wider distribution in the Dan River than that observed by us for *A. brunneus*. This is presumably a consequence of it being widely established prior to the introduction of the snail bullhead (Burkhead et al., 1980), but it could also reflect different habitat requirements of the two species, or both.

Ictalurus furcatus. Introduced. The blue catfish first appeared in Kerr Reservoir and in the lower Dan River in the early 1980s (VDGIF data). It is now common to abundant in the reservoir and uncommon in the river upstream to below Danville. One specimen was taken and released at rkm 249 in NC in 1988 (C. Smith, pers. comm.). The blue catfish has also been widely introduced elsewhere in NC (Menhinick 1991) and VA (Jenkins and Burkhead, 1994).

Ictalurus punctatus, sites 23, 84, 120, 131, 135, 138, 139, 174, 193. Introduced. All channel catfish were taken from the Fault Basin and Piedmont Lowlands. Jenkins and Burkhead (1994) consider it to be have been introduced into the Roanoke River drainage.

Noturus gilberti, sites 214, 253, 257, 259, 266, 270, 284. The orangefin madtom has a limited distribution and is apparently uncommon in the Dan River. All specimens of the orangefin madtom were taken from swift waters. C. Smith (pers. comm.) took one individual at rkm 231 in 1993. Eight specimens were collected in 1985 at four sites between rkm 214 and rkm 257 (T. D. Simonson and R. J. Neves, unpubl. data.). Rohde et al. (1998), after an intensive search, found it to be absent from the historical downstream localities between rkm 214 and rkm 240 (three collections made at this former site). It is listed as endangered in NC because of its low population densities despite the presence of apparently suitable habitat, and as threatened in VA due to a reduced range as a result of siltation.

Noturus insignis, sites 135, 138, 139, 156, 170, 174, 186, 193, 199, 207, 214, 217, 221, 224, 231, 240, 249, 253, 257, 259, 261, 270, 280, 283, 284, 286, 287, 290, 297, 312, 313. The margined madtom was widely distributed and was most common in the moderate currents of the river in the Inner Piedmont (Table 2). Matthews and Jenkins (1979) discovered a distinctive spotted form of *N. insignis* restricted to the Gorge. During our study, spotted individuals were captured in the river in the Uplands, Gorge, and Inner Piedmont downstream to rkm 249.

Pylodictis olivaris. Introduced. Two specimens of the flathead catfish were captured by boat electroshocker at rkm 51, near Milton, Caswell County, NC in 1993 (B. Hammers, NCWRC, pers. comm.). It was stocked, probably by anglers, in the Roanoke drainage in the late 1970s and has since become established and common in the lower reaches of the Dan River as far upstream as below Danville (VDGIF data).

Esocidae

Esox americanus, sites 138, 193. Jenkins and Burkhead (1994) show two localities for the redfin pickerel in the Dan River near rkm 98 and rkm 118. It was also recorded as uncommon at rkm 249 in 1988 (C. Smith, pers. comm.).

Esox niger. Jenkins and Burkhead (1994) indicate at least one locality for the chain pickerel from the Dan River near rkm 68, downstream of Danville, VA. Menhinick (1991) indicates one locality near rkm 193, in the vicinity of Danbury, NC.

Salmonidae

Oncorhynchus mykiss, sites 253, 259, 274, 280, 283, 284, 290, 297, 313. Introduced. Most records of the rainbow trout are from the Upper Gorge (Table 2). It has become naturalized in the Dan River (S.M. Smith, pers. obs.), but it is still stocked below the Townes Dam by VDGIF.

Salmo trutta, sites 120, 135, 253, 257, 259, 270, 274, 280, 282, 283, 284, 286, 287, 290, 297, 312, 313, 317. Introduced. The brown trout was most common in the Upper Gorge (Table 2). Originally stocked in the river, impoundments, and tributaries, virtually all the brown trout in the Dan River now result from spawnings of the naturalized populations (S.M. Smith, pers. obs.). One tiger trout, an apparent wild brown trout x brook trout hybrid, was captured at rkm 286 above the Pinnacles Power Plant.

Salvelinus fontinalis, sites 283, 284, 287, 290, 297, 312, 313, 317. Most specimens of the brook trout were captured below Talbott Dam in the Upper Gorge. Once native to the Dan River, the brook trout was extirpated there as a result of logging operations in the mid-1800s and in the early 1900s. It was re-stocked after World War II and the population is now self-sustaining (VDGIF data).

Poeciliidae

Gambusia holbrooki, sites 120, 183. The eastern mosquitofish captured were most likely waifs from tributary creeks.

Cottidae

Cottus caeruleomentum, sites 253, 257, 259, 261, 266, 270, 274, 280, 282, 283, 284. The Blue Ridge sculpin was the most abundant species in the Lower Gorge (Table 2).

Moronidae

Morone americana. Introduced. The white perch is abundant in Kerr Reservoir (Jenkins and Burkhead, 1994) and in the lower Dan River upstream to Danville. It is indigenous to all coastal drainages in VA, but all populations upstream of the Fall Line, which includes the Dan River, are considered to be introduced (Jenkins and Burkhead, 1994).

Morone chrysops. Introduced. The white bass was stocked in Kerr Reservoir by VDGIF in the 1980s and has since become established (VDGIF data). It makes spawning runs up the Dan River to Danville, and it may also occur there year-round.

Morone saxatilis. A strong reproducing population of the striped bass occurs in Kerr Reservoir. This population

was founded by entrapment (dam building), stocking, or both (Jenkins and Burkhead, 1994). Some individuals regularly migrate upstream in the spring for 60 km to the lowermost dam at Danville (Jenkins and Burkhead, 1994).

Centrarchidae

Ambloplites cavifrons, sites 135, 138, 139, 284, 290. The Roanoke bass taken in the Upper Gorge are believed to be remnants of a native population. Specimens from the Fault Basin may be waifs from the Smith River, a tributary to the Dan, which supports small populations of Roanoke bass (Jenkins and Burkhead, 1994).

Ambloplites rupestris, sites 135, 138, 139. Introduced. Eleven additional specimens were taken in the Dan River between Talbott Dam and Townes Dam (VDGIF data). The species was apparently introduced into the impoundments; the source of these specimens is unknown. The presence of the rock bass was first verified in the Dan River in 1941, but it is impossible to determine when it was first introduced (Jenkins and Burkhead, 1994).

Lepomis auritus, sites 23, 84, 98, 120, 131, 135, 138, 139, 156, 170, 174, 183, 186, 190, 193, 199, 214, 217, 221, 224, 231, 240, 249, 253, 257, 284, 313. The redbreast sunfish was widely distributed and was most abundant in the slower waters of the Fault Basin (Table 2). Native populations in the Dan River have been augmented by stocking, although details are not available. One such stocking was in the upper Dan, over 30 years ago. The specimens taken in the river upstream of the Pinnacles Power Plant were either introductions, or migrants from the native population downstream. One specimen was taken in the Uplands, and is a presumed result of stocking.

Lepomis cyanellus, sites 120, 131, 135, 138, 139, 170, 174, 193. Introduced. The green sunfish was found in the slower waters in the Fault Basin. Two specimens collected by VDGIF just downstream of the impoundments at rkm 286 are the result of apparent angler introductions. It has also been collected at rkm 231 (rare) in 1991 and at rkm 249 (common) in 1988 (C. Smith, pers. comm.) and in the Piedmont Lowlands (Jenkins and Burkhead, 1994).

Lepomis gibbosus, sites 98, 120, 131, 138, 139, 174, 193. The pumpkinseed was taken at rkm 231 (rare) in 1991 and at rkm 249 (common) in 1988 (C. Smith, pers. comm.).

Lepomis gulosus, sites 131, 138, 139. Probably introduced. Although DE has been sampling the NC Fault Basin section of the Dan River since 1977, the warmouth was not collected there until 2000. It has also been recorded from Kerr Reservoir (Jenkins and Burkhead, 1994).

Lepomis macrochirus, sites 23, 84, 98, 120, 131, 135, 138, 139, 174, 190, 193. Introduced. The bluegill was one of the most abundant fishes in the Fault Basin and Piedmont Lowlands (Table 2). Specimens taken upstream of the Pinnacles Power Plant by VDGIF are presumed to be a result of recent introduction, possibly by anglers. It is also known (common) from rkm 231 and rkm 249 (Charles Smith, pers. comm.). The bluegill is presumed to be a nonnative species in the Roanoke River drainage, because the first records for the drainage are from 1947 (Jenkins and Burkhead 1994). Its native range on the Atlantic slope is probably North Carolina southward.

Lepomis microlophus, sites 120, 131, 135, 138, 139, 193. Introduced. The redear sunfish captured at rkm 290 by VDGIF is presumed to be a waif from an impoundment. All VA populations of this species have been recently established by introduction, and it was not known from the Roanoke River drainage prior to 1971 (Jenkins and Burkhead, 1994).

Micropterus dolomieu, sites 84, 131, 135, 138, 156, 186, 214, 257, 259. Introduced. The smallmouth bass was most common in the turbid waters of the Fault Basin. One specimen was captured in the river above the Pinnacles Power Plant by VDGIF, and is presumed to be a waif from an impoundment. It is not native in any Atlantic slope drainage of Virginia (Jenkins and Burkhead, 1994). By the late 1800s nearly all the principal streams in VA had been stocked with it, primarily by the Virginia Fish Commission. Jenkins and Burkhead (1994) reported that it was virtually absent from the moderately to heavily silted middle and lower portions of the Dan River system.

Micropterus salmoides, sites 23, 84, 98, 120, 131, 135, 138, 139, 156, 174, 193, 214, 224, 249. Introduced. The largemouth bass was most abundant in the lower reaches of the river. Specimens taken in the gorge are the result of recent introduction (VDGIF data). The northern limit of natural populations of the largemouth bass is the Tar River drainage in NC, located just south of the Roanoke River (Jenkins and Burkhead, 1994).

Pomoxis annularis, sites 84, 131, 135, 138, 139, 174, 193. Introduced. One white crappie was taken at rkm 231 in 1993 (C. Smith, pers. comm.). The white crappie is considered to be an introduction to the Virginia and North Carolina portions of the Atlantic slope (Jenkins and Burkhead, 1994).

Pomoxis nigromaculatus, sites 84, 120, 131, 135, 138, 139, 193. Probably introduced. While the black crappie is native to the Roanoke River drainage, it is probably not indigenous to its upper portion and all Dan River records may represent transplants from Coastal Plain populations.

Percidae

Etheostoma flabellare, sites 135, 156, 183, 186, 190, 193, 207, 214, 217, 221, 224, 231, 240, 249, 253, 257, 259, 261, 266, 270, 274, 280, 282, 283, 284, 286, 287, 290, 297, 312, 313. The fantail darter was most abundant in the Uplands and Lower Gorge (Table 2).

Etheostoma nigrum, sites 131, 138, 257, 259, 266, 270. Most johnny darters were found in the 14 rkm between rkm 257 and rkm 270. However, a few individuals were taken near rkm 283 around the Pinnacles Power Plant in 1983 (R. E. Jenkins, pers. comm.). The two specimens taken in the Fault Basin are presumed to be waifs from nearby tributary creeks.

Etheostoma podostemone, sites 135, 156, 183, 186, 190, 193, 199, 207, 214, 217, 221, 224, 231, 240, 249, 253, 257,

259, 261, 270, 274, 280, 284, 290. The riverweed darter was most abundant in the Inner Piedmont between rkm 207 and rkm 259 (Table 2). It is a species of special concern in NC because it is endemic to the upper and middle Roanoke drainage, primarily in VA, and its range extends into NC only in the Dan system.

Etheostoma vitreum, sites 135, 214, 221, 231, 240, 249, 253, 257, 259. The glassy darter was most abundant in the Inner Piedmont (Table 2). The record from the Fault Basin is probably a waif from a tributary stream.

Perca flavescens. The yellow perch is abundant in the Dan River below Danville (VDGIF data). It is recorded from Kerr Reservoir and from several tributaries to the Dan in VA (Jenkins and Burkhead, 1994) and NC (Menhinick, 1991). It is native to the Atlantic slope.

Percina nevisense, sites 120, 131, 135, 139, 193, 214, 221, 231, 240, 259. The chainback darter was recently resurrected from synonymy with the shield darter, *P. peltata* (Goodin et al., 1998). It was found sporadically in the Inner Piedmont and Fault Basin.

Percina roanoka, sites 120, 135, 186, 193, 199, 207, 214, 217, 221, 224, 231, 240, 249, 253, 257, 259, 261, 266, 270, 274, 280. The Roanoke darter was most abundant in the lower portion of the Upper Precambrian-Paleozoic Inner Piedmont section of river (Table 2).

Sander vitreus. Introduced. One walleye was collected in the Dan River by boat electroshocker at rkm 84. It may have been a "live-well transplant" from specimens known to have been stocked in Kerr Reservoir. Jenkins and Burkhead (1994) depict a locality record on the lower Dan River downstream of South Boston, VA, near rkm 19, and one on the lower Banister River, Halifax County, VA, a Dan River tributary. Prior to the formation of Kerr Reservoir, spawning runs extended from the Roanoke River into the Dan River and some of its tributaries (Jenkins and Burkhead, 1994). All central Atlantic slope populations of the walleye are considered to be introduced (Jenkins and Burkhead, 1994).

Sciaenidae

Aplodinotus grunniens. Introduced. The freshwater drum has been present in Kerr Reservoir since the late 1980s, and the species there is derived from stocking either by VDGIF or anglers. A reproducing population now exists in low numbers as multiple age classes occur, and their numbers appear to be increasing. It could potentially move up into the Dan River, although its preferred habitat of deep water does not appear to be abundant (Dan Wilson, VDGIF, pers. comm.).

ACKNOWLEDGMENTS

For assistance in field work we thank our colleagues at Duke Energy and Virginia Department of Game and Inland Fisheries and numerous students from The Richard Stockton College of New Jersey (TRSCNJ) and the University of North Carolina at Wilmington. The Graphics Production Department of TRSCNJ, especially J. Bowen and R. Schocklin, helped to prepare the figures. This research was supported in part by a grant from the North Carolina Wildlife Resources Commission, Nongame and Endangered Wildlife Program, and by travel funds and vehicles support provided by faculty committees and the administration of TRSCNJ. We thank Charles Smith of Guilford College for sharing information on his collections in the Dan River.

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MINUTES
Business Meeting
28th Annual Meeting • Southeastern Fishes Council

The 2002 meeting of the Southeastern Fishes Council (SFC) was called to order by Chairperson Mary Freeman at 5:18 PM on 23 February 2002. The meeting was held at the Doubletree Hotel, Little Rock, Arkansas. Executive Committee members attending were Mary Freeman (Chair), Chris Skelton (Secretary), and Hank Bart (Chair-elect).

SECRETARY'S REPORT

Minutes from the 2001 SFC business meeting held in the Radisson Hotel in New Orleans, Louisiana, were distributed by Secretary Skelton for review. A motion was made to accept the minutes as written, and was carried by voice vote. Chairperson Freeman acknowledged Gerry's efforts during his tenure as secretary.

TREASURER'S REPORT

The treasurer's report was distributed by Chairperson Freeman for review. Chairperson Freeman reminded everyone to check their membership status and to send outstanding dues checks to Peggy Shute. A motion was made to accept the treasurer's report as printed, which was carried by voice vote. Chairperson Freeman acknowledged Peggy's efforts as treasurer for the recent term.

COMMITTEE REPORTS

Nominating Committee
No Report.

Editorial Committee
Frank Pezold initiated a discussion concerning the status of the *Southeastern Fishes Council Proceedings*. He said that the next issue, which would feature one article and a book review, would be out pending receipt of the regional reports. As always, the question of how to get more submissions was discussed. One idea was for SFC to sponsor a symposium and then publish the proceedings. There was also discussion as to whether the *Proceedings* should be distributed electronically. There was consensus that the *Proceedings* is a good outlet and that the manuscripts go through a stringent review process. Two papers were rejected last year. The cost of printing the *Proceedings* has been reduced from about $1600 per issue to around $700 per issue. Chairperson Freeman indicated that George Sedberry has been Associate Editor of the *Proceedings* for several years and would like to step down. Possible replacements proposed were a student chapter of the American Fisheries Society (AFS) or the Nongame Aquatics Committee of the Southern Division AFS.

Technical Advisory Committee
No Report

Resolutions Committee
No report.

NEW BUSINESS

Chairperson Freeman acknowledged Kelly Bibb as co-chair of the Southeastern Imperiled Fishes Organization (SIF). Chairperson Freeman then recapped the history of the organization and opened a discussion as to what the role of SFC might be with this initiative. We talked about publishing the SIF strategy and the possible development of a condensed version that could be sent to decision makers. The discussion then turned to the change of venue for the SFC meeting. The general consensus was that midyear meeting of the Southern Division AFS was a good venue for SFC.

J.R. Shute informed the meeting participants of a plan to develop a 750 acre retirement community, complete with a golf course, on a parcel of land currently owned by the Tennessee Valley Authority. The development, which is to be located below Wilson Dam near Muscle Shoals, AL, is apparently being "fast tracked" for development. He noted that there was opposition in the neighboring community and wondered if SFC should write a letter supporting the opposition. Interested persons were advised to follow-up with Peggy Shute. Chairperson Freeman provided information on a forthcoming Tennessee Department of Environment and Conservation lifetime ecology achievement award.

Dave Etnier mentioned a proposed water withdrawal project being considered on the upper Buffalo River. He also announced that he and his graduate student Ben Keck were organizing a large scale collecting effort on the Hatchie River (Hatchiefest) for early June. Hank Bart entered the meeting at 6:10 pm. After five more minutes of discussion about the *Proceedings*, Chairperson Freeman moved to adjourn. The meeting was so adjourned at 6:15 pm.

Respectfully submitted,

Christopher E. Skelton

Southeastern Fishes Council

TREASURER'S REPORT
February 2002

Checking Account Balance, 19 February 2002:
$3,458.63

Dues and Contributions, 3 April 2001 through 19 February 2002:

Dues: $934.50
Button sales (old & new buttons) $180.00
TOTAL: $1,114.50

Expenditures, 3 April 2001 through 19 February 2002:

2001 Buttons $230.00
Proceedings # 42, printing cost $695.50
Proceedings # 42, postage $228.06
TN Secretary of State (annual report) $20.00
TOTAL: $1,173.56

Checking Account Balance as of 3 April 2001:
$3,517.69

Paine Webber Cash Fund as of 31 December 2001:
$3,379.98
Reported Fund, 31 December 2000: $3,250.37
Earned interest and adjustments: $129.61

TOTAL ASSETS: $6,838.61

Notes:
Membership on 21 March 2000 was 170 individuals or organizations, and distributed as follows:
Paid through 1997: 7
Paid through 1998: 14
Paid through 1999: 28
Paid through 2000: 64
Paid through 2001: 52
Paid through 2002 & lifetime members: 8

Membership on 19 February 2002 was 180 individuals or organizations, and distributed as follows:
Paid through 1997: 5
Paid through 1998: 14
Paid through 1999: 21
Paid through 2000: 61
Paid through 2001: 66
Paid through 2002 & lifetime members: 13

Respectfully submitted,
Peggy W. Shute

REGIONAL SFC REPORTS

REGION I – Northeast

For the northeast, we might as well start big... that is, with a big fish, the Robust Redhorse and the status of surveys in the Pee Dee River of NC & SC. Between 2000 and 2002, there were three surveys during the April-May spawning season of 3-4 days duration each. These efforts featured an armada of electroshocking boats (6-10) plying the Pee Dee from just below Tillery Dam in the Piedmont area of NC and extending well down into the upper coastal plain in SC. A smaller effort (2-4 boats) was mounted in October of 2002 during extremely low flows. This effort also was aimed at identifying and GPSing gravel shoal spawning habitats to target in future spring efforts and, also, included numerous seine hauls in slacker water habitats in hopes of locating young-of-year. In addition to these targeted surveys, Progress Energy (formerly Carolina Power & Light) biologists (John Crutchfield, Mike Swing, Vann Stancil and others) have conducted quarterly surveys (electroshocking, gill netting) on this reach of the Pee Dee for the past five years in connection with dam relicensing.

It is a testament to the rarity of this fish that all of these efforts have yielded a grand total of only five individuals—one on each of the four targeted surveys plus one taken in quarterly sampling in 2001. The latter specimen unfortunately perished in a gill net and now resides at NCSM. Others were worked up according to protocol (data-taking, tissue for DNA studies, photos) and released in good condition. All specimens were taken at or below the fall line area in the reach of the Pee Dee below Blewett Falls dam, the lowermost dam in the basin. Despite the extremely low numbers, it is encouraging that three were relatively young individuals (2-3 yrs.) and the largest, a 692 mm TL running ripe female, from May 2001, gave indications some reproduction might persist. However the Pee Dee fish community appears to be heavily impacted by nonnatives, with predation from Flathead Catfish perhaps the major factor. Biomass of Smallmouth Buffalo and Blue Catfish is enormous and perhaps limiting to native species. Native catfish species are essentially eliminated and redhorse of all species are much reduced in numbers.

The above finds, plus a single specimen from 1985, constitute the rediscovery of the "type" population of *Moxostoma robustum*, described from the Yadkin River by Cope in 1870 but subsequently lost to science for about 120 years until its rediscovery in Georgia over a decade ago. The prognosis for the survival of the species in the Pee Dee is difficult to assess. A technical working group, including John Crutchfield (Progress Energy), Danielle Pender (NCWRC), Wayne Starnes (NCSM) and others has been formed as a subunit of the overall Robust Redhorse Conservation Committee. This com-

mittee will devise further surveys to assess the status of the Pee Dee population and to study possibilities for recovery. It promises to be a long road.

Our second rare redhorse, the undescribed "Carolina Redhorse" (a distinctive *erythrurum*-like form), discovered only a few years ago to occur in the Pee Dee and Cape Fear basins, perhaps has a more promising future. Infrequent specimens continue to turn up in Progress Energy's sampling of Blewett Falls reservoir and tailwaters plus a most recent find in Tillery Reservoir which extends the range of extant populations, however small, further up the Pee Dee. A good population remains in the lower Deep River albeit the species may be nearly extirpated from the remainder of the Cape Fear basin. Flathead Catfish may again be suspected, especially in the main Cape Fear where redhorses of all species are sparse. Unfortunately, it appears flatheads have been established for a time in the lower Deep as well. So far, it seems they have not to have impacted the Carolina Redhorse population, but only time will tell. Perhaps these predators are more limited in smaller river habitats. Studies of this fish by Bob Jenkins, Wayne Starnes, and others continue. These projects recently received a shot in the arm via funding from Progress Energy to Wayne Starnes which will be used to expand surveys and conduct genetic studies aimed at both conservation and studies of relationships. NCSM has established a molecular lab in collaboration with the NCSU College of Veterinary Medicine and several studies of fishes and freshwater mollusks are underway. Morgan Raley, formerly with NCSM's fishes unit, is conducting these projects. Bob Jenkins has also received funding from FWS to support morphological studies of the Carolina Redhorse necessary for its description.

While on the topic of suckers, NCSM presented a workshop entitled "Lips" to the South Carolina chapter of the American Fisheries Society (AFS) at Congaree Swamp National Monument in November. With the rise in importance of suckers in their region, such as Robust and Carolina redhorses and undescribed and geographically limited carpsuckers, biologists from various South Carolina agencies realized the time had come to try to improve identification skills. Many of the chapter's members were quite enthusiastic and appreciative of lip lore. Gabriela Hogue of the NCSM fish unit helped assemble a dynamite Powerpoint presentation and handout. With these materials, and experiences at the workshop, it seems certain SC catostomids are now more appreciated and will be better accounted. However, as a consequence, Gabriela is now hopelessly hooked on lips and there appears to be no twelve-step program yet devised! To its credit, the SC chapter's members also wanted to take on minnow identification. Fritz Rohde led a workshop on minnows in conjunction with the sucker workshop.

For NCSM, much of the upcoming season's fieldwork will be driven by funding. A second season of sampling fish communities in streams inhabited by the endangered Carolina Heelsplitter mussel (Pee Dee, Catawba, Savannah basins) will be conducted in efforts to learn more about their composition and the most likely hosts for the mussel (funded by FWS). Surveys of fish gills for glochidia are being conducted and attempts will be made to associate these with adult mussels via DNA sequencing. Unfortunately, other species of mussels outnumber Heelsplitters by hundreds at each locality, probably drastically reducing the odds of successfully locating the endangered mussel's glochidia *in host*. NCSM will also collaborate with USGS on urban intensity studies of streams in the heavily populated Triangle-Triad region of NC. Other work will include the above mentioned surveys for Carolina and Robust redhorses and perhaps a revisit to the area of the rediscovery of the Bridle Shiner in the lower Neuse in 2001 and perhaps a foray to Region VI to team up with Henry Robison on the usual once-per-decade investigations of the aberrant *Lythrurus umbratilis*-like form in the upper Ouachita basin. We hope to expand past studies of breeding color and morphology to include DNA investigations of populations above and below the fall line and possible hybridization in the vicinity of the fall line.

In South Carolina, the vast Santee-Cooper complex of dams, reservoirs, and diversions is currently up for relicensing. A workshop, hosted by Santee-Cooper Power and Normandeau Associates, was recently held in consultation with Fritz Rohde and Wayne Starnes with the aim of reconstructing the native complement of fishes in the lower Santee. Modeling of relative habitat dominance under different flow regimes, masterminded by Piotr Parasiewicz of Cornell University, will be conducted in an effort to determine the best blend of habitats to maintain a greater diversity of these native species in the future. These results will ultimately influence instream-flow requirements for a 37-mile reach of the Santee that has experienced drastically reduced flows in the 50 or so years since initial construction of the project due to diversion of flows from Lake Marion into Lake Moultrie and beyond.

Similar efforts to restore native faunal complements are being considered in the Pigeon River of western NC which has endured nearly a century of severe degradation from paper mill effluents at Canton. After decades of battles, measures to reduce these effects have been successful and the recolonization of the river by a number of fish species may be possible. A workshop will be held in Canton, NC, in February to study the possibilities. Steve Fraley (NCWRC), Wayne Starnes (NCSM), John Crutchfield (Progress Energy), and Bryn Tracy (NC Div. Water Quality) will participate along with various stakeholders. A similar workshop, organized by Mark Cantrell (FWS-Asheville) was held over a year ago to study the feasibility of reestablishing several native species in the Cheoah River, tributary to the Little Tennessee in western NC, as well as a portion of the Little Tennessee near

Calderwood where most flow has been diverted for much of a century. Dams on these streams are in relicensing phase and future flow requirements may make these reestablishments possible, particularly in the Cheoah.

The Southern Division of AFS met in Wilmington, NC, February 13-16. Among its symposia was an excellent session organized by Danielle Pender of the NCWRC entitled "Southern Dirt". Speakers from throughout the southeast presented ten papers addressing problems of stream sedimentation in the region headlined by Charles Rabeni, one of the foremost experts on the subject. Other presenters that may be familiar to many SFC members are Noel Burkhead and Howard Jelks (USGS-Gainesville), Donald Orth (VPI), and Stuart Welsh (UWVA Coop Unit).

The NCSM fishes unit is happy to currently have the services of two excellent technicians, both currently graduate students at NCSU. Mandy Howard (formerly working with Carole Johnston and Elise Irwin at Auburn) and David Hewitt have been splitting the temporary position we were fortunate enough to obtain after the loss of both our permanent and temp tech positions to budget shortfalls last year. Working with collection manager Gabriela Hogue, these two have enabled us to make great strides in data basing of backlog collections, especially the NC Div. Water Quality IBI voucher materials. Data based lots are approaching 8000, leaving only perhaps 80,000 yet to go! Mandy (student of Tom Kwak of the NCSU coop unit) has just completed a thesis on aspects of the ecology, population levels, and toxicology studies on the Cape Fear Shiner, *Notropis mekistocholas*. Dave (student of Joe Hightower) is writing his thesis on a study of certain aspects of anadromy in Roanoke River fishes. Dave and Mandy are engaged to be married which has made coordination of schedules quite easy! We will be sad to see them go as they move on to the next step in their careers.

Speaking of the NC DWQ's voucher materials, that division has been aggressively conducting a fish community assessment program in wadeable streams (< 100 square mile drainage areas) since the early 1990s. Since 1996, the program has assessed approximately 80 sites per year using backpack electrofishing techniques (http://www.esb.enr.state.nc.us/BAUwww/IBI Methods 2001.pdf). Many sites are sampled on a five-year rotation so changes in the biological integrity of the fish community can be tracked over time. The raw data are available in Excel spreadsheet form (http://www.esb.enr.state.nc.us/NCIBI.htm). Voucher specimens and large series of many species have been deposited with the North Carolina Museum of Natural Sciences. The program has contributed many new distributional records, especially of native cyprinids and suckers (*Moxostoma* and *Scartomyzon*) and recently introduced species throughout the state and will provide a wealth of material for a future book on the fishes of North Carolina. For more information about this program, please contact Bryn Tracy (mailto:bryn.tracy@ncmail.net).

Wayne Starnes is attempting to put finishing touches on the current, and hopefully final, draft of the fishes section of the USGS vertebrate checklist for the U.S., U.S. territories, and Canada. This is an updated version of the erstwhile USFWS Checklist of Vertebrates last published in 1987. Former editions did not include fishes. Wayne is grateful for the patience of all the SFC members that he has bugged for information in connection with constructing and updating the list over the past seven years. He will be even more grateful if the compilation is finally published pending completion of updates of other vertebrate groups by co-authors with the USGS contingent at the Smithsonian.

Finally, the only new species that comes to mind to report in our region is quite a ringer! Progress Energy biologists John Crutchfield and Vann Stancil discovered an established population of the South American loracariid catfish, *Pterygoplichthys pardalis*, in Lake Julian, a thermally polluted reservoir near Asheville, NC. Wayne Starnes and Jon Armbruster of Auburn collaborated to confirm the identification. The reservoir drains to the adjacent French Broad River. It is assumed and hoped that escapees to the river will perish in winter water temperatures and that the population will remain a localized curiosity.

– Wayne Starnes

REGION III - North-Central

Status surveys and other interesting finds

Charlie Saylor and Amy Wales report several interesting discoveries from the Tennessee Valley TVA's 2002 monitoring. Perhaps the most significant was the collection of *Noturus stanauli* from the Duck River near Centerville, Tennessee. The collection at Centerville (Duck RM 89) was 57 stream miles upstream from the nearest known population (the Duck River at I-40). Previously, the madtom was known only from a 12-mile segment of the Clinch River and a 16-mile segment of the Duck. This new record represents more than a 200% increase in known habitat for the species.

Other TVA finds include: *Centrarchus macropterus* from the lower Duck River, first record on the eastern side of the lower Tennessee River; *Percina tanasi* from the lower Paint Rock River (not seen in the Paint Rock since the early 1980s); and *Percina burtoni* from the Tuckaseegee River, first record from the Little Tennessee River watershed in North Carolina and only remaining population known for that watershed.

Tremendous efforts by several agencies, organizations, and individuals over the recent decade to find

Erimystax cahni had led many to believe that the species might be extinct. However, in October 2002, David Etnier, Pat Rakes, J.R. Shute, and a crew of volunteers finally found one individual at Grissom Island on the Clinch River. This individual is alive and well in a tank at Conservation Fisheries, Inc. (CFI). Rakes and Shute are hoping to find sex partners for this individual during 2003.

Mike Ryon (Oak Ridge National Lab) reported that biologists with the ORNL bio-monitoring program located a single spotfin chub (*Erimonax monachus*) in East Fork Poplar Creek. The fish was taken in mid-September, about 19 kilometers upstream from the confluence with Poplar Creek at a site that has been sampled annually for more than 15 years. This observation may indicate migratory behavior, into small tributaries, as reported (see below) by Bill McLarney in the upper Little Tennessee River system. However, the distance traveled to reach the spot where it was collected in East Fork Poplar Creek is much greater, and there is no known source population downstream in Poplar Creek or nearby Clinch River. The closest known population is in the Emory River, around 50 river kilometers downstream. Because East Fork is the receiving stream for discharges from a Department of Energy facility, the presence of the spotfin chub has generated local interest. Further sampling will take place in the Poplar Creek watershed to determine whether a local population might exist.

The ORNL bio-monitoring group has also been tracking local populations of *Phoxinus tennesseensis* in three small tributaries on the ORNL Reservation, Mill Branch, Ish Creek, and Bear Creek. Ish Creek drains an undeveloped section of the Oak Ridge Reservation and is not slated for any development, but the other two watersheds are affected by land clearing and construction activities. So far, dace populations have remained robust, with the density at sampling sites in these systems ranging from 0.03- 0.21 fish/m^2.

Pat Rakes and J. R. Shute (CFI) reported several notable observations from their 2002 field surveys in the Clinch and Powell river systems. A young of year *Noturus stanauli* was observed at a new site in the Clinch River, about a half mile below Frost Ford (Hancock Co., TN). At a site near the TN/VA state line (also Hancock Co.), *Percina burtoni* was observed. Several *Etheostoma percnurum* and *Noturus flavipinnis* were observed in snorkel surveys of Copper Creek (Scott Co., VA). An adult male *N. flavipinnis* (and his nest) found in the Powell River ~ three miles upstream of Fletcher Ford (Lee Co., VA) represents a new upstream record. The species is now known in the Powell River from several sites over a reach of 25 river miles. At this same Fletcher Ford site, they also collected five *Ammocrypta clara*.

Rakes and Shute report the results of surveys in the Big South Fork system have failed to reveal any additional sites for *Etheostoma percnurum*. They did, however collect fin clips for genetic analyses from a relatively robust population at the Station Camp Creek locality in the Big South Fork (Scott Co., TN). Four individuals of *Percina squamata*, one of the survey subjects, were observed at two sites in the system. However, they comment that, because of the habitat they are found in, collecting or observing this fish is difficult. Their survey results might under-represent the distribution and abundance of the species.

Rakes and Shute also report that, a large effort to find Chucky madtom (*Noturus* sp.) in Little Chucky Creek (Greene Co., TN), especially at sites where they had previously been found. However, none were collected.

CFI is also conducting snorkel surveys of fish communities in the Great Smoky Mountains National Park for the All Taxa Biotic Inventory effort. This effort will allow the NPS to fill in gaps in their GIS database.

Bill McLarney (Little Tennessee Watershed Association) documented the migration of *Erimonax monachus* into at least 12 tributary streams in the upper Little Tennessee River system. Until recently, spotfin chubs were thought of as exclusively mainstem fish. Some of the small streams where the chubs were found drain watershed areas as small as 2.5 square miles. McLarney noted that the chubs were observed, in mass, off creek mouths in late August and early September, and upstream movement was observed in mid-September. This movement into the small streams was accompanied or preceded by larger numbers of the *Cyprinella galactura*. As of mid-November both species were still well represented in the tributaries.

Bill McLarney has continued his investigations of this species in tributaries to the Little T downstream of Porters Bend Dam, including the Needmore Tract. This fall, with the aid of University of North Carolina student Deb McCown, as part of the Carolina Environmental Program at Highlands Biological Station.

Bill McLarney and John Fridell report that through the collaborative efforts of
federal, state, and private agencies and organizations, and local governments, an agreement has been reached with Crescent Resources, LLC for the acquisition and protection of a 4,600-acre land parcel along the Little Tennessee River in Swain and northern Macon Counties, the Needmore Tract. The Needmore Tract, 27 miles of the Little Tennessee River (including the last 13 free flowing miles of the river upstream of Fontana Reservoir), and 37 miles of tributaries that course through the tract are renowned for their biological diversity and ecological, cultural, and environmental significance. The Little Tennessee River in North Carolina supports populations of two federally listed endangered mussels—the Appalachian elktoe and littlewing pearly-mussel, one threatened fish—the spotfin chub, one endangered plant—Virginia spiraea, and 12 state-listed

species, several of which are also species of Federal concern. The Tract will be turned over to the North Carolina Wildlife Resources Commission for management as Game Lands. This designation will protect what is, so far as we know, the only fully intact aquatic biota in the southern Blue Ridge. While it seemed to take forever to iron out the details of this conservation land acquisition, one of the unique things about this particular project is that there has been no organized opposition – sportsmen, biologists, environmentalists, leaseholders, and local government have all been supportive. A particularly positive factor has been the strong and unanimous support of the acquisition by county governments.

Macon County followed this action by passage of the "Clean Water Amendment" to their Watershed Ordinance, prohibiting all point sources anywhere in the watershed downstream of Porters Bend Dam at Franklin, NC (there are presently no functioning discharging facilities) – this amounts to nearly half the county. It is hoped that Swain County will follow suit.

In both cases, the counties based part of their argument for conservation on biodiversity and biotic integrity data flowing from monitoring of the watershed by the Little Tennessee Watershed Association and TVA. They even borrowed the phrase "Excellent Quality Waters" from Index of Biotic Integrity (IBI) bioclass ratings.

The Southern Appalachian Information Network (SAIN) this year selected the Little Tennessee Watershed Association/TVA biomonitoring project in the upper Little Tennessee watershed as a pilot for inclusion in a database (part of the National Biological Information Infrastructure). The project hopes to eventually include comprehensive species occurrence data and other biological information for the Southern Appalachian region. Rick Bivens of the Tennessee Wildlife Resources Agency (TWRA) reported that a comprehensive survey of streams on or near the TWRA's Royal Blue Wildlife Management Area in 2002 produced some new records for *Phoxinus cumberlandensis*, including the first collection of this species from the New River/Big South Fork Cumberland River system in Tennessee. This federally threatened species was collected in Straight Fork and three of its tributaries (Jake Branch, Cross Branch, and one unnamed tributary). Straight Fork is a direct tributary to the New River, headwaters of the Big South Fork. A significant population was found in Straight Fork itself, and one of its tributaries (Jake Branch) produced 121 specimens. A new collection in the Elk Fork drainage (Hudson Branch) represents a new record for the Clear Fork drainage. A significant population of *Phoxinus erythrogaster* was also found in the upper Elk Fork. Other species of interest included several collections of *Etheostoma sagitta*. *Etheostoma cinereum*, *E. baileyi*, and *E. sanguifluum* were collected in Montgomery Fork. This represents a new record for *E. cinereum*. Bivens also reported that their 2002 stream survey in the TWRA Foothills Management Area, Blount County, TN, resulted in two new localities for *Phoxinus tennesseensis* that probably represent new records.

Stuart McGregor and Marlon Cook (Geological Survey of Alabama, GSA) reported the completion of long-term biological studies on Mulberry Fork of Black Warrior River (bioassessment and water quality). Ongoing field projects include sonic tracking of blue suckers and paddlefish in the Alabama River mainstem, a mussel survey in the Tombigbee River mainstem, water quality and population monitoring in Bobcat Cave on the U.S. Army's Redstone Arsenal. The cave contains one of only two populations of the federally threatened Alabama cave shrimp (*Palaemonias alabamae*). GSA biologists also monitored populations of *Etheostoma tuscumbia* on the Arsenal, and assisted TVA with fish bioassessments. New or recently initiated field studies include a Mobile Delta aquatic species inventory, fish bypass of Millers Ferry Lock and Dam on the Alabama River, bioassessment in Terrapin Creek of the Coosa River drainage, a mussel and snail survey in the tailwaters downstream of Coosa River dams, and a threat analysis of the mussel fauna in Bear Creek of the Tennessee River drainage.

Chris Skelton (Georgia College & State University) and Rex Strange (Southwest Missouri State University) completed a status survey for *Phoxinus cumberlandensis* in the North Fork Powell River system in July. TVA had first collected the species in Cox Creek in 1995. They report that the dace are persisting in Cox Creek, but apparently in very low numbers. In the Jones Creek system, a North Fork Powell tributary just downstream of Cox Creek, they are widespread. Mitochondrial DNA analysis and breeding coloration of nuptial males indicate these populations are introduced. This possibility was substantiated by a local fisherman putting out minnow traps at the Cox Creek location. He said "yeah, I know where to get those yellerfin minners…they aren't very good bait though." Skelton and Strange, with Brian Evans (now of FWS-Abingdon), also found three new populations of *Phoxinus* sp. cf. *saylori* in the upper Clinch River system in Russell County, VA. With three populations discovered by Ed Scott (TVA) the total number of known populations of this taxon is now seven. Genetic and nuptial coloration differences between topotypic *P. saylori* and the upper Clinch form warrant a close examination of the latter, and its possible elevation to the species level.

Ron Cicerello (Kentucky State Nature Preserves Commission) reported surveys for five USFWS fish "species of concern" in the Green River. *Ammocrypta pellucida* was not collected in 2002, but it could be present in the lower Green River, where the last basin record was collected in 1965. Recent collections elsewhere in Kentucky revealed that *A. pellucida* is relatively common and widely distributed throughout its historic range. Also not found was the *Crystallaria asprella*, last collected from the basin and state in 1929, and perhaps

most likely to be re-found in the Green River in Mammoth Cave National Park (MCNP). Adult and young of year *Etheostoma maculatum* inhabit the Green River and several tributaries extending from MCNP upstream nearly to Green River Lake and a short segment of the river immediately upstream from the lake. In the Barren River, it is found below Lock and Dam 1 and in limited segments of West Fork Drakes Creek and Gasper River. Three *Percina macrocephala* populations remain in the basin, all geographically isolated from one another. They are located in the Barren River immediately upstream from Barren River Lake; in Trammel Creek, a tributary to Drakes Creek, which discharges into Barren River downstream from Barren River Lake Dam; and in the Green River from Green River Lake Dam downstream to and including the lower ca. 50 miles of Russell Creek. Finally, *Etheostoma tecumsehi*, a Pond River endemic, is broadly distributed and relatively abundant in the upper half of the basin.

The Hydrogeology Section of GSA's Watershed Investigations Program is responsible for evaluating the surface- and ground-water resources of the State of Alabama. Assessments of several watersheds have either recently been completed or are currently ongoing. These include evaluations of water quality, quantity, and biological habitat for seven streams across southeast and south-central Alabama. The purpose of these evaluations is to collect and interpret hydrogeologic and biologic data to guide the formulation of plans for future water use, water resource protection, and future remedial actions.

The National Monitoring Program Project for the Lightwood Knot Creek Watershed in Covington County (southcentral Alabama) has recently been completed. The purpose of this project was to determine the impact of nonpoint source pollutants on water quality of streams in the watershed and to evaluate the effectiveness of a Best Management Practices (BMPs) program implemented in selected watersheds. Results of the project indicated excessive nutrient and sediment loads associated with cattle and poultry production in project streams. This project also demonstrated water quality improvement with a 71% reduction in nitrate and a 92% reduction in bedload sediment after BMP implementation.

GSA's method of accurately quantifying bedload sediment transport in streams is being used to determine the impact of sedimentation on water quality and impoundments and to evaluate the effectiveness of remedial actions to be employed in selected subwatersheds in the Conecuh River Watershed (south central Alabama).

Publications and Reports

GSA personnel published several manuscripts dealing with natural resource issues during the past year. These include rare fishes in the Tennessee Valley (GSA Bulletin 171), status surveys of the Cahaba shiner, coal darter, and Tuskaloosa darter (GSA Circular 201), a non-technical article on the mussels of Muscle Shoals (Alabama Heritage Magazine, Spring 2002), freshwater mussels of the Cahaba River (Walkerana, v. 11, no. 26, a University of Michigan journal), and ground water levels for water years 1997-2001 (GSA Circular 112Q). Water in Alabama (GSA Circular 122O) is now available online, as are other items. You may visit the GSA webpage (www.gsa.state.al.us) for lists of publications, including new, old and out of print reports and other products. Other GSA manuscripts are in various stages of the publication process. These include water quality and bioassessment studies in Choccolocco Creek of the Coosa River drainage and Locust Fork of the Black Warrior drainage, mussel studies in Bear Creek of Tennessee River drainage and Sipsey River of Tombigbee River drainage (both American Malacological Bulletin), mussels in upper Tombigbee River tributaries (GSA), and mussels in Choctawhatchee/Pea river system (Bulletin Alabama Museum of Natural History).

Also, GSA staff is assisting with the fish and mussel sections for a publication on conservation status of Alabama species. They have also attended a preliminary meeting to discuss the feasibility of organizing a task force to address the issue of invasive aquatic nuisance species.

Jim Herrig (U.S. Forest Service, Cherokee National Forest) and Peggy Shute (TVA) co-authored a chapter on aquatic species in the recently released Southern Resource Assessment. This can be found at (http://www.srs.fs.usda.gov/sustain/)

John Fridell (FWS) reported that the Service has published a final critical habitat designation for the Appalachian elktoe mussel (*Alasmidonta raveneliana*) in the Federal Register on September 27, 2002 (Federal Register Vol. 67, No. 188: 61016 -61040). The critical habitat designation includes portions of the Little Tennessee River in Swain and Macon Counties, North Carolina; Tuckasegee River in Jackson and Swain Counties, North Carolina; Cheoah River in Graham County, North Carolina; Little River in Transylvania County, North Carolina; West Fork Pigeon River and Pigeon River in Haywood County, North Carolina; South Toe River and Cane River in Yancey County, North Carolina; North Toe River and Toe River in Yancey and Mitchell Counties, North Carolina; and Nolichucky River in Yancey and Mitchell Counties, North Carolina, and Unicoi County, Tennessee. The Cookeville Field Office is currently in the process of preparing a proposal to designate critical habitat for several other listed mussels, including the Cumberland elktoe (*Alasmidonta atropurpurea*), oyster mussel (*Epioblasma capsaeformis*), Cumberlandian combshell (*E. brevidens*), purple bean (*Villosa trabalis*), and rough rabbitsfoot (*Quadrula cylindrica strigillata*). Rob Tawes is the contact for information about this proposal.

Bob Butler (USFWS) recently completed two reports on the imperiled fishes of the Service's Lower Tennessee

Cumberland and Southern Appalachian Ecosystems. The reports are intended to provide a broad overview of the jeopardized fish faunas of these highly diverse and endemic ecosystems and to put the more critically imperiled taxa on the radar screen of resource managers throughout the Southeast. He also did similar reports for crayfishes in these ecosystems. Contact him for e-copies.

Mussels & other aquatic critters of interest

Rick Bivens also reported TWRA surveys of Tennessee distribution of the Big South Fork Crayfish (*Cambarus bouchardi*) in April 2002. *Cambarus bouchardi* is one of nine crayfish species recently listed as endangered by the Tennessee Wildlife Resources Commission. Their surveys resulted in specimens of *C. bouchardi* at all three of the original sites reported by H.H. Hobbs Jr. (1970), and three additional streams - Isham Creek, Jones Branch, and Otter Creek (all in the Roaring Paunch Creek watershed, Scott Co., TN). They noted the direct relationship of population densities to the amount of cover habitat, large flat rocks, present. To a lesser extent, the amount of siltation present apparently affected population densities. Perkins Creek was clearly the most productive site for adult (taxonomically preferred) specimens. Many large flat rocks were available and, although siltation was moderately heavy and evidence of organic enrichment was obvious, the crayfish were easily collected. Otter Creek, on the other hand, was the most heavily impacted stream encountered, with historical strip-mine activities and logging presently occurring in the drainage. Although much of the Roaring Paunch Creek watershed has been adversely affected, Bivens indicated an optimistic outlook for the continued existence of *C. bouchardi*.

Captive propagation, reintroduction, and other management activities

As reported in previous years, improvements in the water quality of the Pigeon River (French Broad watershed, Sevier Co., TN), prompted Tennessee Department of Environment & Conservation (TDEC) biologists (and cooperators from TWRA, TVA, USGS, & UT) to begin a long-term project to restore native fishes to the Pigeon River. Jonathan Burr (TDEC) and Joyce Coombs (University of Tennessee) reported additional releases of the gilt darters (*Percina evides*), bluebreast darters (*Etheostoma camurum*), and blueside darters (*E. jessiae*) in 2002. In addition, stargazing minnows (*Phenacobius uranops*) and mountain madtoms (*Noturus eleutherus*) were added to the project. To date, 878 gilt darters, 331 bluebreast darters, 504 blueside darters, 231 stargazing minnows, and 192 mountain madtoms have been released. All fish were tagged by injection of small amounts of fluorescent elastomer dye in the dorsal area before release in the Pigeon River. Electroshocking and snorkeling surveys begun in late summer of 2001 will continue to document the success of the reintroductions. Longer-term goals still include propagating some of the more rare species that cannott be collected in large enough numbers for reintroduction.

Ed Scott (TVA) reported some apparent indications of success for the ongoing efforts to reintroduce lake sturgeon into the French Broad River downstream of Douglas Dam (Sevier and Knox counties, TN). Two individuals were caught and released by fishermen in the lower section of the river in early 2003.

Steve Moore and Matt Culp and others, Great Smoky Mountains National Park, have completed the initial effort to eliminate rainbow trout and restore native brook trout in the Park using the ichthyocide Antimycin A. The pilot attempt was conducted on Sams Creek, a Little River tributary along the Blount/Sevier county (TN) line. This creek is too large for complete removal of rainbows using backpack electroshockers. Steve and Matt indicate that all rainbows have been eliminated and that natural barrier falls at the lower end of the reach will prevent their natural reinvasion. An overriding concern associated with the project was the possible negative impact on other aquatic life in the creek. Dave Etnier, Craig Walker and other benthologists sampled aquatic invertebrates during early fall, winter, and late spring at three sites in the treatment area and six control sites just outside the treatment area. Treatment occurred in late September and early October 2001. All nine sites were resampled for benthos immediately before and after the Antimycin application, and during regular sample times in winter and late spring in 2002. Brook trout originally in the treatment reach were reintroduced after the treatment, and appear to be doing well. Benthos species diversity and abundance was reduced (30-50%) in the three treatment sites immediately after the treatment. The February and June 2002 samples indicated that benthic community structure was unchanged in abundance, diversity, relative abundance of common and moderately common taxa, number of rare taxa, and numbers of EPT taxa to that prevailing prior to the treatment. Aquatic salamanders do not appear to be affected by the chemical. A second restoration effort is underway on Bear Creek, tributary to Forney Creek, in the North Carolina side of the Park, with treatment scheduled for fall 2003.

Jim Herrig (USFS) reported that efforts in re-establishing four federally listed fishes into the Tellico River were initiated in October 2002 when CFI stocked about 2800 captively propagated spotfin chubs into the reach of the Tellico River newly designated as Nonessential Experimental Population area for spotfin chubs, duskytail darters, and yellowfin and smoky madtoms. Stocking of the other three fishes is planned for 2003.

The project to restore these same four fishes into Abrams Creek continues to indicate reproductive success of smoky and yellowfin madtoms and the duskytail darter. Record numbers of the three fishes were observed during 2002 surveys, and a large proportion of

the madtoms observed were young of year, indicating rapid population growth. The abundance indices for these three fishes are similar to those from the source populations in Citico Creek. No evidence has been collected, however, to indicate that the spotfin chub stocking has been successful. Although several individuals have been collected or observed to date, there has been no evidence of reproduction. The first successful madtom captive spawning for CFI (in 2002) resulted in almost zero mortality for a smoky madtom nest. The source populations (Citico Creek) for both madtoms and the duskytail darter remain robust, rebounding from earlier declines.

Pat & J.R. report that efforts continue to restore populations of *Fundulus julisia* to portions of their former range. Nine sites have been stocked with a total of 800 captively reared individuals. In addition to CFI, several private landowners, the Natural Resources Conservation Service, the USFWS, (including the Cookeville office and the Dale Hollow and Wolf Creek National Fish hatcheries), and the Tennessee Aquarium are cooperators in this project. These efforts will continue in 2003, with expansion to sites in the Duck and the Elk River systems.

Other CFI work includes continued propagation of *Etheostoma wapiti*. Until the proposed Nonessential Experimental Population designation for Shoal Creek is finalized, all individuals propagated are used to augment the Elk River population. It is still too early to determine if stocking efforts and habitat augmentation has produced positive results in the Elk River. CFI projects outside this region include attempts to propagate yellowcheek darters (*E. moorei*), Etowah darter (*E. etowahae*), vermilion darter (*E. chermocki*), Conasauga logperch (*Percina jenkinsi*), and pearl darter (*P. aurora*).

Lastly, CFI has moved into a 5000 square foot facility, 3424 Division Street, Knoxville, TN 37919-3261. Their new phone number is (865) 521-6665.

– Peggy W. Shute and David A. Etnier

REGION IV – South-Central

Steve Walsh of the U.S. Geological Survey Center for Aquatic Resource Studies in Gainesville, Florida completed status surveys for *Crystallaria asprella*, *Moxostoma carinatum*, and *Hybognathus hayi* in the Escambia River drainage of Florida with support from the Florida Fish and Wildlife Conservation Commission. Over 17,000 specimens representing 86 species were collected. Of the target species only one *H. hayi* was taken, *C. asprella* and *M. carinatum* records from Florida are extremely rare and it appears that these species may be extirpated from the state if they ever actually had established populations. Additional status surveys are needed for the Escambia and Conecuh rivers in Alabama. Extensive environmental threats continue unabated in this area, including mining, sedimentation, and contaminants. On the positive side, there are restoration efforts underway for Big Escambia Creek to mitigate the effects of long-term gravel mining operations near Century. During the survey one *Atractosteus spatula* was collected and released in an oxbow lake, and a healthy population of *Etheostoma histrio* was found in Big Escambia Creek. The undescribed Florida chub, *Macrhybopsis* sp. cf. *aestivalis*, is very uncommon in the upper reaches of the drainage within Florida and merits future monitoring.

Noel Burkhead, also with USGS in Gainesville, reports that he has been heavily involved with research on *Cyprinella lutrensis* in the upper Coosa River System, which was first noticed above Weiss Reservoir in 1993. As in other introduced populations of *C. lutrensis*, it has negatively interacted with the native Coosa River fishes, most notably causing a massive hybrid swarm with *C. venusta stigmatura*. Noel and Brady Porter have a proposal pending with the USFWS to examine the genetics of the hybrid swarm, and are writing a manuscript describing the swarm, an update of *Cyprinella* species with which *C. lutrensis* has hybridized, and a morphological analysis of this hybrid. Noel and Dane Huge spent an intense spring and summer videotaping potential behavioral interactions between spawning *C. lutrensis* and the federally threatened *C. caerulea*. Observations were made in four tanks with current generated by a trolling motor and housed in a closed observation room where photo-period and water temperature were regulated. After overcoming issues with stress-related diseases from handling *C. caerulea*, a generalized ethogram was developed, which Noel is willing to share with interested parties. Many differences between the spawning behaviors of *C. lutrensis* and *C. caerulea* were observed, particularly in courtship action patterns, and in agonistic behavior between alpha (crevice defending) and beta (rival) males. In *C. lutrensis*, satellite males intermittently engage in spawns, and the species has a protracted spawning period when kept at 20-22 C (late June-early July to present). This coming summer, Noel and Dane plan to obtain the "complete" behavioral story for *C. caerulea*. Although they observed male *C. lutrensis* hybridizing with female *C. caerulea*, it occurred in the absence of an alpha-male *C. caerulea*. Limited observations indicate when one-on-one, a crevice-defending alpha male *C. caerulea* can dissuade an approaching male *C. lutrensis*, but is driven off when outnumbered. Larvae are being raised from the hybrid cross and preserved at various developmental stages; this will lead to a manuscript describing diagnostic characters for larvae of both species, their hybrids, and *C. trichroistia* (with Howard Jelks, Pat Rakes, and J. R. Shute). Lastly, Noel will make his last photographic tour of *Etheostoma brevirostrum* populations to insure getting all putative "forms" in peak chromatic pigmentation.

Frank Parauka of the Panama City Field Office, U.S. Fish & Wildlife Service, conducted investigations on

Acipenser oxyrinchus desotoi in the Escambia/Conecuh River during June and July 2002. The purpose of the study was to collect fish for a database that would be used to calculate the population in the system. Thirty-nine Gulf sturgeon were collected with sinking and drift gill nets in the Conecuh River below Brewton, Alabama. All fish were weighed, measured, and tagged. The fish weighed from 1 to 75 kg. One fish was previously tagged in the Choctawhatchee River in 1994. Eighty-nine fish were collected in the lower Escambia River, near FL Hwy 184 bridge, during the same period. The fish weighed from 1.5 to 86 kg. Seven of the fish had been previously tagged in the Yellow and Choctawhatchee rivers from 1994 through 2001. Attempts to collect fish during the fall out migration and calculate the population was unsuccessful due to several high water events during the period (October) that prohibited any netting. Frank also reports that eight Gulf sturgeon were equipped in 2001 with pop-up archival tags programmed to record depth, temperature and light. Information was collected from two of the tags and this consisted of pop-up location data only. However, one of the tags was found by a beach walker and was sent back to the manufacturer for data retrieval. This fish was tagged in the Yellow River and the tag was found along Mexico Beach. Temperature, depth and longitude information has the fish moving along the Florida coast from Pensacola to Apalachicola. The latitude data points are not very accurate with readings recorded in Ohio, Indiana and the Florida Keys. Some of this information may be able to be further interpreted for a more reliable account of the fish's movement. Furthermore, the fish that was tagged in the Yellow River in October 2001 and was located in the Gulf of Mexico near Mexico Beach during February 2002 was relocated in the lower Choctawhatchee River in July 2002 and was again located in the Gulf of Mexico near Tyndall AFB in January 2003. All relocation sites in the Gulf of Mexico were within 4 km from shore and at depths under 5 m.

Todd Slack of the Mississippi Museum of Natural Science (MMNS) in Jackson reports that MMNS acquired the Mississippi State University Ichthyology Collection (9,220 lots). Staff is beginning to slowly incorporate the collection into the current MMNS collection (28,000+ lots), and in the process are georeferencing and computerizing the collection and converting all material to 70% ethanol. During 2001, Todd and Steve Ross at the University of Southern Mississippi (USM) conducted a second survey for *Etheostoma rubrum* in lower Bayou Pierre. One hundred riffles were documented with 28 sampled for bayou darters. A total of 20 species were collected from all riffles, and *E. rubrum* was the second most abundant species. The population remains stable and the location and quality of riffle habitat within this reach is consistent with a 1997 survey. They are presently compiling the data into a manuscript. In collaboration with Mark Peterson and students at the USM Gulf Coast Research Lab, Todd recently completed a 2-year project assessing the distribution and potential interaction of non-indigenous tilapia and native fishes in coastal watersheds of Mississippi. Partial funding has been secured to begin the second phase of the project to assess seasonal movement patterns using telemetry and to identify potential thermal refugia within the lower Pascagoula drainage. In addition, Mark's lab will be conducting laboratory experiments to assess thermal and salinity tolerances and survivorship. Research activities on *Acipenser oxyrinchus desotoi* in the Pascagoula drainage continues with the collaborative efforts of the USM crew –Steve Ross, Mark Dugo, Ryan Heise, Brian Kreiser and Bryant Bowen. The project began in 1997 and since then we have captured and processed 251 individuals, including 179 individuals that had not been previously tagged. Through the use of telemetry, annual movement of individuals has been tracked throughout the drainage and along the barrier islands in the Mississippi Sound. In addition, one spawning area has been confirmed on the Bouie River near Hattiesburg. Along with Paul Hartfield and Daniel Drennen of the U.S. Fish and Wildlife Service in Jackson, Todd has been involved in trawling activities on the Mississippi River for *Scaphirhynchus albus*. The majority of their efforts have been in the Vicksburg vicinity focusing on main channel and secondary channel habitats. These efforts are part of a multi-agency initiative to assess the distribution, management and recovery of the pallid sturgeon in the Lower Mississippi Basin (Pallid Sturgeon Lower Basin Work Group). Other members of the Work Group include Bernie Kuhajda (University of Alabama), Jan Hoover, Jack Killgore and Catherine Murphy (Waterways Experiment Station, Vicksburg). Todd also reports that the Lower Mississippi River Conservation Committee (LMRCC) met in Memphis to address the status, management and the potential for reintroduction/stocking of *Atractosteus spatula* in the Lower Mississippi River Basin. As a result of the concerns expressed during the meeting, a working group was formed with Bobby Reed (Louisiana Department of Wildlife and Fisheries) as the chair of the working group. Brian Kreiser (USM) and Todd are spearheading a project to address the genetic diversity of alligator gar from across its range in order to determine appropriate sources for obtaining broodstock within the Lower Basin. In January 2003, a focus meeting was held in Jackson at MMNS to discuss the status of *Percina aurora*. This species was formally recognized as a Candidate species in 1999. It was last collected in the Pearl drainage in 1974 and is believed extirpated from that system. The only remaining populations occur in the Pascagoula drainage. During the meeting Hank Bart (Tulane University), Steve Ross and Todd summarized the results of their respective research on *P. aurora*, a general discussion on historic and current range, natural history, current threats and captive propagation with regard to conservation of the species followed suit. The

following tasks were considered highest priority. (1) Develop protocols for captive rearing and establish thermal tolerances and survivorship utilizing captive reared individuals. Developmental series will be preserved for comparison and verification of "wild caught" larvae. (2) Conduct intensive sampling within the upper Pascagoula drainage (Leaf and Chickasawhay watersheds) to assess distribution, diel movement patterns, demographics, and length-at-age. These data may be compared to data obtained from earlier efforts in the lower Pascagoula drainage by Todd to assess drainage-wide patterns. (3) Assess movement/dispersal patterns throughout the system utilizing latex markers, unique bio-signatures and/or larval drift.

Steve Ross at the University of Southern Mississippi Museum of Ichthyology in Hattiesburg reports that he is continuing studies of *Acipenser oxyrinchus desotoi* in the Pascagoula River watershed, including marine habitat use. The work is being done in collaboration with Todd Slack (see above). Brian Kreiser, who joined the USM Biological Sciences faculty several years ago, has added critical expertise on molecular genetics. Ryan Heise is completing his dissertation on the migratory patterns of Gulf sturgeon within the Pascagoula River drainage and Mississippi Sound and potential influences on its behavior. He will soon be employed with the North Carolina Wildlife Resource Commission and will be focusing on the conservation of aquatic non-game species in the Piedmont region. Mark Dugo will be finishing his master's thesis on the application of microsatellite markers for delineating population structure and diversity of Gulf sturgeon in the Pascagoula River drainage of Mississippi this coming summer. Bryant Bowen is beginning his master's research on population structure of *Alosa alabamae*, with emphasis on the Pascagoula River. Tanya Darden is completing her doctoral dissertation on the evolutionary and ecological processes within dystrophic blackwater habitats by examining speciation and historic biogeography in Enneacanthini sunfishes and potential factors influencing their local distributions. Pamela Schofield is completing her doctoral dissertation on the importance of competition and physiological tolerance for two gobies (*Microgobius gulosus* and *Gobiosoma robustum*) in a lagoonal estuarine system in Florida Bay, Florida. Marisa Weber is beginning her master's research on a modeling approach to integrate watershed mapping and growth analysis of estuarine dependent species using *Micropogonias undulatus* in the Pascagoula River estuary, Mississippi. Funding to Steve and Mark Peterson through the Coastal Impact Assistance Program supports this work.

Mark Peterson at the Gulf Coast Research Lab in Ocean Springs, Mississippi has a recent publication with Todd Slack and others on the occurrence of the non-indigenous prawn, *Macrobrachium rosenbergii* in Simmons Bayou, Mississippi, and the influence of invasive, non-native tilapiine fishes on freshwater recreational fishes in south Mississippi. Mark also has a paper on measuring responses to simulated predation threat using behavioral and physiological metrics relative to the role of aquatic vegetation. He is also the Managing Editor for a special symposium issue of Gulf and Caribbean Research addressing practical approaches to achieve economic and conservation goals in Caribbean Marine Protected Areas. Current research includes the use of otolith microchemistry to determine the importance of specific habitats and regions for juvenile *Sciaenops ocellatus*. He is also involved in the production of a Field Guide to Aquatic Habitats and common fauna of the Northern Gulf of Mexico from Chandeleur Islands, Louisiana to St. Joseph's Bay, Florida which, in conjunction with Dauphin Island Sea Lab, will be used for summer teaching programs.

Mel Warren, Susie Adams, and Wendell Haag of the Center for Bottomland Hardwoods Research, Southern Research Station, USDA Forest Service in Oxford, Mississippi, report several research projects completed, underway, or beginning in the coming year. Susie and Mel are completing analyses and manuscript preparation for a study of fish re-colonization of 1st to 3rd order streams in north Mississippi that dried up during the 2000 drought. Susie is also continuing study of annulus validation (via otoliths), growth, and fecundity in a group of darters in the Sipsey Fork and Brushy Creek, Bankhead National Forest, Alabama, with funding from Alabama National Forests. Susie continues a collaborative study with Steve Ross, USM, in documenting the distribution and habitat use of *Acipenser oxyrinchus desotoi*, *Alosa alabamae*, and *Anguilla rostrata* in Black and Red creeks, De Soto National Forest, Mississippi. Amy Commens recently joined the staff as a Biological Technician (Fisheries) and with Mel and Wendell is currently comparing life history of *Notropis rafinesquei* in three northern Mississippi stream systems. Wendell and Mel completed year four of a detailed study of the population dynamics of mussels in the Sipsey River in Alabama and the Little Tallahatchie River in Mississippi. Wendell also completed a manuscript documenting sex ratios and length- and age-fecundity relationships for multiple populations of several mussel species in these rivers. Wendell and Mel have a paper in press documenting host fishes for seven mussels in large Mobile Basin streams. These research activities were funded by the Mississippi Museum of Natural Science and the National Fish and Wildlife Foundation. Wendell and Mel (with Chuck Lydeard and Jen Buhay at the University of Alabama) continue progress on a study of patterns of host fish use and genetic variation across the range of three congeneric and ostensibly closely related mussel species: *Villosa vanuxemensis*, *V. lienosa*, and *V. ortmanni*. They also have funds from Alabama National Forests to complete a survey of Shoal Creek, Talladega National Forest, to obtain population estimates of feder-

ally endangered mussels in that system. They finished up the fifth summer of fish and fish habitat surveys in Mississippi National Forests, and pending funding, may continue that effort for summer 2003. To date, about 250 reaches have been sampled yielding about 110 fish species (over half the freshwater fish fauna of Mississippi). Mississippi National Forests and the Southern Research Station of the Forest Service provided funding for the survey.

Pat Rakes reports that he and J. R. Shute of Conservation Fisheries Inc. (CFI) continued work refining propagation techniques for *Percina aurolineata* last year, funded by USFWS Daphne Field Office. They raised about 110 F2 juveniles, and still have about 100 F1 adults. They need to dispose of these and will provide specimens to those in need. Even though goldline darters may be one of the 'easiest' of the *Percina* to spawn and rear due to large size and rapid growth of early pelagic larvae, they are still extremely difficult, with consistent high survivorship yet to be attained. CFI is also still maintaining a small ark group of about 60 *Notropis cahabae*. Annual surveys continue in the Conasauga River, and surveys within the Cherokee and Chattahoochee National Forests for *Cyprinella caerulea*, *Etheostoma brevirostrum*, *Percina* sp. cf. *macrocephala*, and *P. jenkinsi* indicate that these species appear to be doing well. CFI has begun work with three new species of logperch from the south-central region, including *P. jenkinsi*. Four specimens were collected in August to begin efforts to develop propagation protocols, funded by USFWS Athens Field Office. This office also funded the same work with *E. etowahae*, 12 specimens were collected from the Etowah River at Hightower Bridge in August; the population appeared robust. Both species are currently being winter conditioned in preparation for breeding efforts this spring. CFI has been awarded one of the first Southeastern Imperiled Fishes National Fish and Wildlife Federation grants to develop propagation protocols and establish an ark population for *E. chermocki*. They intend to collect about a dozen before breeding season this spring. At an ad hoc Pearl Darter Recovery Working Group meeting in January it was decided to try to answer some questions about the species through use of propagated fish. CFI awaits funding, but they have a total of five specimens to make the first attempts. The main question: do pearl darters all move upstream as adults, especially as larger, older individuals (as Hank Bart's data suggests) after larval drift? Or is survivorship of older fish negligible in warmer downstream reaches/much higher in cooler, upper reaches? This has important implications for where the most significant reproductive reaches are in the remaining Pascagoula River population, and the potential ability of the species to recolonize protected/recovered river and tributary reaches. Propagated fish can be used to test thermal effects on survivorship in the lab, or fish can be marked and released to study movements. Finally, Susie Adams at the Southern Forest Research Station in Oxford, Mississippi has contracted CFI to propagate *E. stigmaeum*, *E. artesiae*, and *E. douglasi* from the Sipsey Fork for a growth study of otoliths (using oxytetracycline marking). This year limited numbers of all three species were produced due to late collection of *E. artesiae* and small size and numbers of the other two species, but efforts will be repeated this year.

Sara Chubb of the U.S. Forest Service in Montgomery, Alabama reminds everyone that the National Forests in Alabama play an important role in the conservation of native southeastern fishes and aquatic ecosystems. At least 40% of the State's aquatic species of concern inhabit the National Forests, and yet these public lands represent less than 4% of the Alabama land base. Within the last year, Sara's primary activities have been Forest planning, monitoring of forest health related activities, participation in several FERC hydropower relicensing processes, and ongoing cooperative research with Auburn University, University of Alabama, and the U.S. Forest Service Research Station of Oxford, Mississippi. Research topics have ranged from endemic fish population viability to crayfish distributions and mussel ecology. In the coming year, Sara's office expects to continue emphasis on FERC re-licensing and completion of the Forest Plan revision while also investigating fish passage conditions, assessing the effects of lake fertilization, and developing a long-term aquatic monitoring program. However, she is currently operating under budgetary uncertainty for the coming year. Sara notes that your input is requested with respect to the "Forest Plan," which will determine the goals, objectives, desired condition, appropriate mix of land management activities, and standards for management activities over the next 10-20 years. Riparian corridors and variable width streamside management zones will be delineated and special management activity standards will be applied within these areas. The draft Plan and EIS will be available for public and inter-agency review in March. There will be a 90-day comment period during April-May and the final Plan and EIS will be issued in fall 2003. For more information, contact the National Forests in Alabama or Sara (s.chubb@fs.fed.us; general number (334) 832-4470).

Carol Johnston at Auburn University reports that she and her students will be doing some more work in Coldwater Spring, Calhoun County, Alabama, this time examining potential competition between crayfish and *Cottus paulus*. They are continuing to track fish assemblage changes in the Tuskegee Beaver Swamp and to survey fish biodiversity of Alabama National Forest streams. New this year is a fish survey of coastal national parks, from North Carolina to Florida. As ever, work with sound production in freshwater fishes (especially *Cyprinella* and *Etheostoma*) continues. Check out the website to hear some amazing signals at http://www.ag.auburn.edu/faa/ichthyology/sound.html.

Mike Howell at Samford University in Birmingham, Alabama reports that last fall a local Birmingham geologist, Randy Tipton of US Infrastructure, informed him of the discovery of an unmarked spring ("Seven Springs"). The spring is within the city limits of Birmingham, Jefferson County, Alabama within Sec 17, T18S, R3W. Mr. Tipton estimated the flow of the spring creek as 3,800 gpm. On 29 October 2002, Mr. Tipton, along with Mike and Larry Davenport visited Seven Springs and spring run. There, they dipnetted a single specimen of the endangered watercress darter, *Etheostoma nuchale*. After notifying Daniel Drennan of the USFWS and obtaining permission to survey Seven Springs, Mike and Larry returned on 14 November 2002. They found darters all along the one-mile spring run and up to 50 meters downstream from the spring run's confluence with Nabors Branch, a tributary to Valley Creek, which flows into the Black Warrior River. This constitutes only the third natural population of watercress darters: one at Glen Springs/Thomas Spring in Bessemer (also a tributary of Valley Creek), and the other at Roebuck Springs, Roebuck, a tributary of Village Creek of the Locust Fork. One transplant population occurs at the Tapawingo Spring/Penny Plunge area along Turkey Creek near Pinson.

Scott Mettee of the Geological Survey of Alabama in Tuscaloosa (including Pat O'Neil, Stuart McGregor, Tom Shepard, and Brett Smith) reports that the Biological Section of GSA is now within the Water Investigations Program (WIP), which will be led by Pat O'Neil. During the past year GSA completed long term studies on Mulberry Fork of Black Warrior River (bioassessment and water quality). Ongoing field projects include sonic tracking of *Cycleptus meridionalis* and *Polyodon spathula* in the Alabama River mainstem, mussel population survey of the Tombigbee River mainstem, water quality and cave shrimp population monitoring in Bobcat Cave on the U.S. Army's Redstone Arsenal (RSA), *Etheostoma tuscumbia* population monitoring on RSA, a threat analysis of the mussel fauna in Bear Creek of the Tennessee River drainage, and assisting TVA with fish bioassessments. New or recently initiated field studies include a Mobile Delta aquatic species inventory, fish bypass of Millers Ferry Lock and Dam on the Alabama River, bioassessment in Terrapin Creek of the Coosa River Drainage, and a mussel and snail survey in the tailwaters of Coosa River dams. The Hydrogeology Section of the WIP is responsible for evaluating the surface- and groundwater resources of the State of Alabama. Assessments of several watersheds have either recently been completed or are currently ongoing. These include evaluations of water quality, quantity, and biological habitat for seven streams across southeast and southcentral Alabama. The purpose of these evaluations is to collect and interpret hydrogeologic and biologic data to guide the formulation of plans for future water use, water resource protection, and future remedial actions. Scott also reports that the National Monitoring Program Project for the Lightwood Knot Creek Watershed in Covington County (south central Alabama) has recently been completed. The purpose of this project was to determine the impact of nonpoint source pollutants on water quality of streams in the watershed and to evaluate the effectiveness of Best Management Practices (BMPs). Results determined that the project streams transport excessive nutrient and sediment loads associated with cattle and poultry production. After BMP installation water quality improved with a 71% reduction in nitrate and a 92% reduction in bedload sediment. The GSA has developed a method to accurately quantify bedload sediment transport in streams. This methodology is being utilized in the Conecuh River Watershed (south central Alabama) to determine the impact of sedimentation on water quality and impoundments and to evaluate the effectiveness of remedial actions to be employed in selected subwatersheds. GSA personnel published several manuscripts during the past year including rare fishes in the Tennessee Valley (GSA Bulletin 171), status surveys of *Notropis cahabae*, *Percina brevicauda*, and *E. douglasi* (GSA Circular 201), a non-technical article on the mussels of Muscle Shoals (Alabama Heritage Magazine, Spring 2002), freshwater mussels of the Cahaba River (Walkerana), and ground water levels for water years 1997-2001 (GSA Circular 112Q). Water in Alabama (GSA Circular 122O) is now available online, as are other items. You may visit the GSA webpage (www.gsa.state.al.us) for lists of publications, including new, old and out of print reports and other products. Other manuscripts are in various stages of the publication process. These include water quality and bioassessment studies in Choccolocco Creek of the Coosa River Drainage and Locust Fork of the Black Warrior Drainage (both GSA), mussel studies in Bear Creek of Tennessee River Drainage and Sipsey River of Tombigbee River Drainage (both American Malacological Bulletin), mussels in upper Tombigbee River tributaries (GSA), and mussels in Choctawhatchee/Pea river system (Bulletin Alabama Museum of Natural History).

Scott Mettee and Pat O'Neil were co-chairs of a conference in Auburn, Alabama last summer, where ichthyologists and fisheries biologists from Alabama and adjacent states met to discuss the conservation status of around 300 fish species known to inhabit Alabama's freshwater rivers and streams. One hundred-fifteen species were considered deserving of some level of conservation concern, a substantial increase over the 18 ranked fish species during the first non-game conference held in 1983 (4 endangered, 5 threatened, 6 special concern, 3 poorly known). The 2002 conference designated 22 species as Highest Conservation Concern, 26 as High Conservation Concern, 33 as Moderate Conservation Concern, and 35 as Low Conservation Concern. The remaining 185 species received a Lowest Conservation Concern ranking although committee members reserved

the right to review and modify the status of these species pending the outcome of future research and environmental change across Alabama. Species of low to highest concern were distributed relatively evenly across Alabama, with 42 in the Tennessee River Drainage, 50 in Mobile Basin rivers, and 30 in coastal drainages.

Steve Powers at the University of Alabama in Tuscaloosa reports that the description of the Chickasaw darter (*Etheostoma* sp. cf. *pyrrhogaster*) co-authored with Rick Mayden, now at Saint Louis University, has been accepted for publication in Copeia and is currently in press. This new species is endemic to the Forked Deer River drainage in western Tennessee. The description will include color illustrations by Joe Tomelleri. Steve and Mel Warren (Southern Research Station, Forest Service) are conducting a preliminary study of genetic differentiation in the Yocona, Little Tallahatchie, and Tippah river populations of *E. raneyi*, a range-restricted endemic.

The book "Fishes of Alabama" by Herb Boschung and Rick Mayden, with illustrations by Joe Tomelleri, is now with the Smithsonian Press and is scheduled to be out in November 2003.

Phil Harris was hired as the new Curator of the University of Alabama Ichthyological Collection last summer. Phil was the manager of the shared molecular facility at the University of Alabama before his appointment as Curator.

– Bernie Kuhajda

REGION VI – Southwest

Clark Hubbs, University of Texas, is studying the fishes that inhabit Texas springs. He notes that poeciliid, cyprinid, centrarchid or percid species can occur in pairs as spring-dwelling and stream-dwelling forms. He has associated the phenomenon primarily with thermal stability of the springs, secondarily with low pH, and in one case with ammonia levels. Clark also writes that he has captured 950,000 fish so far but expected to top the one-million specimen mark after another weekend of spirited collecting.

Hank Bart, Tulane University, and Frank Pezold, University of Louisiana at Monroe, were contracted by the Louisiana Natural Heritage Program (LNHP) to update that agency's database on protected fishes in Louisiana. The LNHP database is used by researchers, the general public, private industry, and state, federal, and local governments in their conservation planning efforts. Hank and his crew are surveying the Florida Parishes and parts of the state south of the Red River; Frank and his crew are surveying the northern part of the state. Project will be completed June 2003.

The Waterways Experiment Station (WES) Fish Team, U.S. Army Engineer Research and Development Center, is active in population- and in ecosystem-level studies throughout the region. Surveys of pallid and shovelnose sturgeon in the lower and middle Mississippi River, funded by Mississippi Valley Division and St. Louis District Corps of Engineers, are now in their third consecutive year. One notable find last year is a pallid sturgeon captured near Greenville, MS, released four years earlier, and 362 miles upriver near New Madrid, MO. Also, in its third consecutive year, is a study sponsored by the Ecosystem Management and Restoration Research Program (EMRRP) of fish and amphibian communities inhabiting small floodplain pools. A comprehensive study of the White River, Arkansas is underway for the Memphis District Corps of Engineers and is being done in collaboration with Henry Robison (Arkansas State University). The WES Fish Team is also sponsored by the MS Department of Environmental Quality to survey some Mississippi Delta streams sampled previously for other Corps projects. This is being done so that widespread changes in fish habitat may be detected, fish-habitat relationships better-defined, and criteria for total maximum daily loads (TMDLs) developed. The WES Fish Team is actively evaluating habitat restoration projects planned by Vicksburg District and Fort Worth District Corps of Engineers for several rivers including, Bayou Macon, Bayou Desiard, Boeuf River, and the San Antonio River. At one site on the San Antonio River, the team collected several South American sailfin catfishes (*Pterygoplichthys* spp.) which appear to represent three different species.

Biologists at WES and members of the North American Native Fishes Association (NANFA) also hosted a hands-on ichthyology workshop for kids in Clinton, MS. A "lab practical" format was used so that visitors could not only observe, but experience fully many aspects of ichthyology, including taxonomy, functional morphology, external and internal anatomy, diet and age determination. A photo-essay of the workshop (now planned as an annual event) can be seen at the NANFA web site:
www.nanfa.org/NANFAregions/miss/fabfishes/fabulous_fishes.htm.

– Jan Hoover

Southeastern Fishes Council Proceedings

INFORMATION FOR CONTRIBUTORS

The primary purpose of the *Proceedings* is to publish peer-reviewed research papers and critical reviews of activities; regional reports and notes; and other pertinent information pertaining to the biology and conservation of southeastern fishes. The *Proceedings* is also an outlet for range extensions, distributions, and status papers, covering ecology and conservation ichthyology. Life history studies, faunal surveys, management issues, behavior, genetics and taxonomy of southeastern fishes are appropriate topics for papers in the *Proceedings*. Review papers or information on imperiled waters or fishes are particularly appropriate.

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The entire manuscript including the Abstract (required for longer articles), Introduction, Methods, Results, Discussion, Acknowledgments, Literature Cited, Appendices, Tables, and Figure Legends must be double-spaced. The title, author's name and author's address (including fax number and email address for corresponding author) should be centered on the first page. Indicate a suggested running head of less than ten words at the bottom of the first page. An Abstract (if necessary) will be placed at the beginning of the text. Acknowledgments will be cited in the text immediately before the Literature Cited. All references cited in the paper will follow the standard format of using the last name of the author(s) followed by the year of publication of the paper. In the Literature Cited, the references will be alphabetical by the author's last name and chronological under a single authorship. Literature cited should be standardized and abbreviated, using the *World List of Aquatic Sciences And Fisheries Serial Titles* or guidelines in *CBE Manual for Authors, Editors, and Publishers* 6^{th} *ed.* for journals not included in the *World List.*

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Regional reports, news notes and other short communications will also be edited and included when possible in the next number.

Only manuscripts from members of The Southeastern Fishes Council will be considered for publication. There is no charge for publishing in the *Proceedings*. All manuscripts and short communications should be sent to the editor:

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