

GEOLOGICAL SURVEY OF ALABAMA

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STATUS SURVEY OF THE BLUENOSE SHINER (*Pteronotropis welaka*), WITH NOTES ON THE OCCURRENCE OF THE IRONCOLOR SHINER (*Notropis chalybaeus*), IN ALABAMA, 2007

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By

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Prepared in cooperation with
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Division of Wildlife and Freshwater Fisheries

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ABSTRACT

Fish sampling was conducted at 65 sites across the known global range of the bluenose shiner (*Pteronotropis welaka*) within Alabama to assess the species' current status. Additional sites were sampled in other locations within the range of this species. *Pteronotropis welaka* was encountered at several historic sites in the Cahaba River system, the upper Alabama River drainage, and the upper and lower Tombigbee River drainages, but not in Gulf Slope sites. The upper Tombigbee River sites appeared to have the most robust population. Ironcolor shiner, *Notropis chalybaeus*, populations were encountered in the Escatawpa and lower Tombigbee River drainage, as well as in the Pea River system, and notes on this species are included.

INTRODUCTION

The bluenose shiner, *Pteronotropis welaka*, is endemic to the East Gulf Coastal Plain from the Pearl River drainage in Louisiana and Mississippi eastward to the Apalachicola River Basin, with a major, disjunct population in the St. Johns River drainage in Florida, and other disjunct populations in Mobile Basin river systems below the Fall Line (physiographic terms taken from Sapp and Emplaincourt, 1975). It has never been collected in the 200 miles separating the St. Johns River populations with those in the Apalachicola drainage (Gilbert, 1992). Within the main portion of the range, populations from the Chipola, Choctawhatchee, Yellow, Conecuh, Escambia, Alabama, Cahaba, and Tombigbee Rivers appear to be widely separated.

This species was described by Evermann and Kendall (1898) and named for its type locality of Welaka, Florida. *Pteronotropis welaka* prefers deep, slow-moving

streams of varying clarity, with dense aquatic vegetation, which has been described as “deep dark fetid mire” (Cook, 195). This lentic habitat is difficult to sample with conventional methods, which may explain the species’ fragmented known distribution (Mettee and others, 1996; Boschung and Mayden, 2004). Baker and Ross (1981) studied its spatial and temporal resource utilization and concluded that the species is diurnal and that depth (being usually found in the bottom third of the water column) and the presence of aquatic vegetation are the two most important variables influencing microhabitat preferences.

Little is known about the life history and ecology of this species. Bluenose shiners display dramatic sexual dimorphism, which suggests strong operation of sexual selection mechanisms. It is a relatively small cyprinid, with maximum reported standard length (SL) of 63 mm (2.5 inches) (Tyler, 1993). Males are generally larger than females and nuptial individuals develop bright blue coloration on the snout, although females sometimes faintly exhibit this trait (Douglas, 1974). Nuptial males also develop a wide array of secondary sexual characteristics, or “fitness indicators”—breeding tubercles, greatly expanded dorsal, anal, and pelvic fins, with black interradial membranes of the dorsal fins and white or yellowish bases and borders. The pelvic and anal fins develop white or yellowish overall color with dense melanophores on their rays forming dark black bands across these fins.

Johnston and Knight (1999) report that secondary sexual characteristics, such as degree of tuberculation, length of longest dorsal and anal fin rays, and fin pigmentation develop directly with standard length for males. They also present data suggesting that (in Pearl River, Mississippi) males and females prepare for spawning in April and then undergo a protracted spawning season through September, with two peaks in male activity as evidenced by the variation of both ova size and gonadosomatic index (GSI) with month (where GSI is mass of gonad tissue/mass of eviscerated specimen). While these authors did not observe actual spawning, they did observe aggregations of breeding males and females over longear sunfish (*Lepomis megalotis*) nests and hatched larval *Pteronotropis welaka* from eggs collected from these nests, suggesting that it is a nest associate. They observed males swimming aggressively in circles, performing lateral displays with other males, and chasing away both males and females. However, no male

was seen to fully exclude other males from the area over the sunfish nests. Johnston and Knight (1999) report that while aggregating over sunfish nests, bluenose shiners were observed to consume eggs present in those nests in the absence of the guarding male. This calls into question the assumption of McLane (1955), based on a gut analysis of nine adult females, that this species is herbivorous. During spawning, females release approximately 200 eggs per batch (Johnston and Knight, 1999).

Johnston and Knight (1999) suggest that male bluenose shiners do not exist in reproductively distinct polymorphic forms because secondary sexual traits develop directly with standard length and a range of male secondary sexual trait development was observed in the specimens they examined. They note the additional evidence that the gonadosomatic index increases linearly with length, although the relationship is not a statistically significant one (Johnston and Knight, 1999). They further note that while there seem to exist two distinct reproductive classes (termed secondary and terminal) within *Pteronotropis hubbsi* (Fletcher and Burr, 1992), the sister species to *P. welaka* (Bailey and Robison, 1978; Amemiya and Gold, 1990), such polymorphism is not the case for *P. welaka*.

However, Fletcher (1999) examined intrasexual variation within male bluenose shiners and argued that three classes of males can be identified—initial (smallest), transitional (intermediate), and terminal (largest) males, but that there seems to be a gradual ontogenetic transition among the states. Fletcher (1999) argued that while there seems to be such a gradual development of initial→intermediate→terminal male phenotypes, and while transitional males allocate the same relative amount of body mass to fat storage as do initial and terminal males, testes mass versus standard length suggests transitional males allocate relatively less mass to testes development. In other words, the initial (smallest, least developed fitness indicators) and terminal (largest, most developed fitness indicators) both devote proportionally the same relative amount of body mass toward testes, and thus immediate reproductive activity. Very likely there is an energy and nutrient trade-off in the developing fish in that energy and mass which must be devoted toward growing larger fins and richer coloration is energy unavailable for reproductive output. However, this gives rise to the question of why initial males devote as much relative mass to testes mass as do terminal males if the whole reason why males

develop such fitness indicators in the first place is to attract more females. Further studies are needed to determine if initial males function as “sneakers”—an example of reproductive polymorphism seen in bluegill sunfish and other fishes (Gross, 1982).

After spawning, larvae hatch time is seven days at an average water temperature of 18.5°C (Heufelder and Fuiman, 1982). Longevity is thought to be about 1 to 1.5 years based on length frequency data and the absence of adults in the fall/winter (Johnston and Knight, 1996; Johnston and Knight, 1999), but Boschung and Mayden (2004) suggests that they can live 2 to 3 years in the wild and 4 years in captivity, spawning every year.

Since reproductive behavior may affect the timing of and the extent to which bluenose shiners form breeding aggregations, future research attempts to collect this species in the wild should consider possible seasonal breeding congregation before collecting attempts are made (i.e., that specimens might be highly localized within a habitat). Also, as discussed above, since longevity may be as little as 1 to 1.5 years, researchers sampling in late fall or winter might dismiss small juvenile bluenose shiners.

Aside from recent collections of bluenose shiners from Lightsey’s Mill in Bibb County, and several records from the early 1990s, most previous records of *Pteronotropis welaka* in Alabama are from the 1960s and 1970s and earlier. Specimens from the Lubub Creek system (upper Tombigbee) were last collected in 1983 and one Sipsey River record is from 1979. From the lower Tombigbee all records are from 1948-64. With the exception of two records from the 1980s and 1990s, most records from the lower Alabama River are from the 1960s and 1970s. In the Big Swamp Creek tributary to the Alabama River, all records are from 1972-73 with one record in 1993. In Houston County, the Cowarts Creek system was last found to contain bluenose shiners in 1993 and 1989, with other records from the 1950s through the 1970s. The one record from the Chattahoochee River drainage is from 1951. From Five Runs Creek, a single record exists from 1969. Given the lack of recent records and the highly disjunct and uncommon distribution, *Pteronotropis welaka* was given “high conservation concern” (Priority 2) conservation status by Mirarchi (2004).

The ironcolor shiner, *Notropis chalybaeus*, is generally found in streams of the lower Coastal Plain within the Atlantic and Gulf slopes, with disjunct populations well into the upper Mississippi River Valley. It is sympatric with the bluenose shiner over

much of its southern range and prefers similar habitat. Unlike the bluenose shiner, this species is known to occur in the Escatawpa and Perdido Rivers. Because it is typically observed in small, widely scattered populations, *N. chalybaeus* was assigned “highest conservation concern” (Priority 1) conservation status by Mirarchi (2004). Additional life history information can be found in Mettee and others (1996) and Boschung and Mayden (2004). Additional information on distribution and collection records is found in a status survey of *N. chalybaeus* and other coastal species of conservation concern in O’Neil and others (2007).

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STUDY AREA

Sampling was conducted in Lubbub Creek, the Cahaba River, Big Swamp Creek, lower Alabama River tributaries, lower Tombigbee tributaries, the Escatawpa River system in Mobile County and Mobile Bay tributaries, as well as multiple sites across the Gulf Slope drainages, including the Conecuh, Yellow, Choctawhatchee, and Chipola River systems. All historical sites were sampled with the following exceptions: Bryans Creek in Houston County was dry at the time of our visit; Choctaw Creek in Clarke County near Gosport is an ephemeral/intermittent stream and probably was mistaken by Tulane personnel for nearby Pigeon Creek (which we did sample); Bear Creek at U.S. Hwy. 82 was unwadeable at the time of our visit.

In general, additional sampling sites were selected based on two main criteria: proximity to historic sites and quality of habitat. Given that the global range of bluenose shiners extends from the Gulf Coast northward up the Tombigbee River drainage to near the Alabama/Mississippi state line, upstream in the Alabama River drainage to the Fall

Line, and east-west along the Alabama/Florida state line—a vast area—limitations of time and resources restricted sampling efforts to areas mostly within a comparatively short distance of historic sites. However, bluenose shiner habitat is often fragmented by large reaches of lotic conditions not associated with this species. Thus, while some lotic sites were chosen due to proximity to historic sites, within systems known to have records of bluenose shiners, most additional sites were chosen based on lentic conditions and presence of aquatic vegetation and not with regards to distance from historic occurrence.

METHODS

For the majority of stations, sampling was conducted using a 6-, 8-, or 10-foot, 3/16-inch mesh seine. Techniques included seining pools in and around aquatic vegetation and occasionally setting the seine below slow runs while kicking through the upstream rubble and overturning the substrate. Two sites on the lower Lubbub Creek were sampled using an electrofishing boat.

RESULTS AND DISCUSSION

We made 66 collections at 62 sites for the presence and abundance of bluenose shiners, including 22 of 25 historic sites (table 1). For this study, bluenose shiners were collected at 7 of these 22 historical sites, all within the Mobile Basin (table 2). No populations were observed in Gulf Slope drainages outside the Mobile Basin. Significant *Pteronotropis welaka* populations were confirmed in the Lubbub, Bear, and Little Bear Creek systems in the Upper Tombigbee River drainage in Pickens County, and one specimen was captured in the Lower Tombigbee River drainage in Gaines Creek in Washington County. Several individuals of *P. welaka* were collected in Big Swamp Creek, tributary to the Alabama River, in Dallas County, and in Lightsey's Mill Pond in the Cahaba River system in Bibb County—a site long known to harbor a stable population (figure 1).

The ironcolor shiner, *Notropis chalybaeus*, was collected from three systems in south Alabama during the 2007 sampling season (figure 1). In the Escatawpa River system, 31 specimens were collected from Franklin Creek at U.S. Hwy. 90 near the Alabama/Mississippi state line where 34 specimens of *N. chalybaeus* had been collected

Table 1. Locations of fish sampling sites in Alabama, 2006-07.

Site no.	GSA no.	Site name	Section, Township, Range	Lat.	Long.	Date	Sample time	Method
T1	2376	Bates Creek @ U.S. Hwy. 43	sec. 46, T. 3 N., R. 1 E.	31.2041 N	88.0156 W	9/27/2007	1000-1030	Seine
T2	2308	Bilbo Creek @ U.S. Hwy. 43	sec. 30, T. 3 N., R. 1 E.	31.2353 N	88.0213 W	8/10/2007	0845-0945	Seine
T3	2373	Armstrong Creek @ Cortelyou	sec. 10, T. 5 N., R. 1 E.	31.4276 N	88.0108 W	8/10/2007	1230-1310	Seine
T4	2374	Armstrong Creek @ U.S. Hwy. 43	sec. 1, T. 5 N., R. 1 W.	31.4292 N	88.0266 W	8/10/2007	1135-1205	Seine
T5	2306	Gaines Creek @ Gravel Rd.	sec. 32, T. 6 N., R. 1 E.	31.4656 N	88.0023 W	8/9/2007	1600-1630	Seine
T6	2372	Tributary to Bassett's Creek @ Gravel Rd.	sec. 11, T. 6 N., R. 1 W.	31.4996 N	88.0528 W	8/10/2007	1050-1105	Seine
T7	2375	Tributary to Bassett's Creek	sec. 10, T. 6 N., R. 1 W.	31.5040 N	88.0729 W	9/27/2007	1130-1200	Seine
T8	2371	Wetland @ Tombigbee River Power Plant Rd.	sec. 24, T. 6 N., R. 1 E.	31.4842 N	87.9350 W	8/9/2007	1650-1700	Seine
T9	2309	Sipsey River overflow channel @ Co. Rd. 21	sec. 1, T. 20 S., R. 12 W.	33.3353 N	87.7540 W	6/1/2007	0930-0950	Seine
T10	2310	Sipsey River @ Co. Rd. 21	sec. 1, T. 20 S., R. 12 W.	33.3319 N	87.7621 W	6/1/2007	1215-1315	Seine
T11	2370	Sipsey River overflow channel @ Co. Rd. 21	sec. 1, T. 20 S., R. 12 W.	33.3325 N	87.7630 W	8/15/2007	1430-1500	Seine
T12	2369	Sipsey River overflow channel @ Brownville Rd.	sec. 22, T. 19 S., R. 12 W.	33.3896 N	87.7589 W	6/1/2007	1130-1200	Seine
T13	2328	Lubbub Creek #2 Boat Site	sec. 10, T. 24 N., R. 2 W.	33.0738 N	88.1788 W	8/3/2007	1430-1530	Electroboat
T14	2330	Lubbub Creek #1 Boat Site	sec. 11, T. 24 N., R. 2 W.	33.0794 N	88.1689 W	8/3/2007	1300-1400	Electroboat
T15	2304	Blubber Creek @ Ala. Hwy 14	sec. 13, T. 22 S., R. 16 W.	33.1472 N	88.1705 W	7/19/2007	0930-1230	Seine/BP
T16	2337	Sneads Creek @ Co. Rd. 22	sec. 36, T. 21 S., R. 14 W.	33.1783 N	87.9431 W	7/24/2007	1320-1400	Seine
T17	2467	Bear Creek @ Ala. Hwy 86	sec. 19, T. 20 S., R. 13 W.	33.2922 N	87.9253 W	10/20/2006	1230-1330	Seine
	2333		sec. 19, T. 20 S., R. 13 W.	33.2922 N	87.9253 W	5/16/2007	0925-1055	Seine
T18	2468	Little Bear Creek @ Co. Rd. 9	sec. 20, T. 20 S., R. 13 W.	33.2958 N	87.9197 W	10/20/2006	1130-1200	Seine
	2334		sec. 20, T. 20 S., R. 13 W.	33.2958 N	87.9197 W	5/16/2007	1130-1245	Seine
T19	2329	Little Bear Creek @ U.S. Hwy. 82	sec. 9, T. 20 S., R. 13 W.	33.3147 N	87.8982 W	9/6/2007	1415-1430	Seine
T20	2332	Bear Creek @ Co. Rd. 30	sec. 5, T. 20 S., R. 13 W.	33.3432 N	87.9174 W	7/24/2007	1650-1735	Seine
T21	2303	Bear Creek @ Co. Rd 38	sec. 28, T. 19 S., R. 13 W.	33.3700 N	87.9038 W	7/19/2007	1410-1540	Seine/BP
T22	2343	Little Lubbub Creek @ unmarked Co. Rd.	sec. 33, T. 20 S., R. 14 W.	33.2637 N	88.0090 W	9/6/2007	1300-1330	Seine
T23	2367	Lubbub Creek @ Co. Rd. 22	sec. 10, T. 21 S., R. 15 W.	33.2464 N	88.0814 W	7/24/2007	1115-1200	Seine
T24	2331	Lubbub Creek @ Stansel	sec. 8, T. 20 S., R. 14 W.	33.3277 N	88.0234 W	7/24/2007	0930-1015	Seine
T25	2469	Lubbub Creek @ Ala. Hwy 82	sec. 28, T. 19 S., R. 14 W.	33.3739 N	88.0039 W	10/20/2006	1400-1430	Seine
	2335		sec. 28, T. 19 S., R. 14 W.	33.3739 N	88.0039 W	5/16/2007	1340-1440	Seine
T26	2345	Coal Fire Creek @ Co. Rd. 27	sec. 1, T. 19 S., R. 15 W.	33.4357 N	88.0580 W	9/6/2007	0930-1100	Seine
A1	2363	Mill Creek @ Co. Hwy. 19	sec. 1, T. 4 N., R 2 E.	31.3466 N	87.8219 W	9/26/2007	1335-1350	Seine
A2	2361	Sand Hill Creek @ Co. Hwy. 19	sec. 29, T. 5 N., R. 3 E.	31.3630 N	87.7912 W	8/10/2007	1000-1030	Seine
A3	2307	Reedy Creek @ Co. Hwy. 19	sec. 22, T. 5 N., R. 3 E.	31.3867 N	87.7617 W	8/10/2007	0840-0920	Seine

Table 1. Locations of fish sampling sites in Alabama, 2006-07.

Site no.	GSA no.	Site name	Section, Township, Range	Lat.	Long.	Date	Sample time	Method
A4	2336	Reedy Creek @ Oregon Rd.	sec. 9, T. 5 N., R. 3 E.	31.4126 N	87.7769 W	9/26/2007	1145-1215	Seine
A5	2338	Sizemore Creek Trib. @ Co. Rd. 19	sec. 14, T. 5 N., R. 3 E.	31.4021 N	87.7461 W	9/25/2007	1535-1615	Seine
A6	2362	Little Reedy Creek @ Co. Rd. 2	sec. 2, T. 5 N., R 3 E.	31.4314 N	87.7443 W	9/26/2007	1510-1605	Seine
A7	2353	Pigeon Creek @ U.S. Hwy. 84	sec. 7, T. 7 N., R. 5 E.	31.5857 N	87.6032 W	8/28/2007	1050-1140	Seine
A8	2327	Foster Creek @ Strother Rd.	sec. 21, T. 13 N., R. 8 E.	32.0955 N	87.2819 W	8/16/2007	1430-1455	Seine
A9	2341	Big Swamp Creek @ Gravel Rd. @ Tasso	sec. 32, T. 15 N., T. 9 E.	32.2210 N	87.1629 W	5/31/2007	1105-1200	Seine
A10	2340	Big Swamp Creek @ Gravel Rd.	sec. 24, T. 15 N., R. 8 E.	32.2521 N	87.2225 W	5/17/2007	1405-1515	Seine/BP
A11	2342	Spring Fed Beaver Pond @ Cow Pasture	sec. 30, T. 15 N., R. 9 E.	32.2586 N	87.2077 W	5/31/2007	0935-1020	Seine
A12	2346	Big Swamp Creek @ Co. Rd. 2	sec. 8, T. 15 N., R. 9 E.	32.2521 N	87.2232 W	5/17/2007	1030-1230	Seine/BP
	2349		sec. 8, T. 15 N., R. 9 E.	32.2521 N	87.2232 W	5/31/2007	1405-1500	Seine
A13	2364	Borrow Pit Wetland adjacent @ Ala. Hwy. 41	sec. 32, T. 16 N., R. 11 E.	32.3664 N	87.0047 W	8/2/2007	1130-1150	Seine
A14	2368	Wetland @ Ala. Hwy. 219	sec. 6, T. 21 N., R. 10 E.	32.8181 N	87.1130 W	8/2/2007	1300-1320	Seine
A15	2359	Affonee Creek marsh @ FR 731	sec. 18, T. 23 N., R 8 E.	32.9678 N	87.3177 W	8/2/2007	1440-1510	Seine
A16	2344	Lightsey's Mill Pond @ Ala. Hwy. 219	sec. 1, T. 22 N., R. 9 E.	32.9098 N	87.1214 W	7/25/2007	1300-1400	Seine
A17	2360	Tributary to Lightsey's Mill Pond @ Stallings Rd.	sec. 6, T. 22 N., R. 10 E.	32.9119 N	87.1133 W	8/2/2007	1345-1355	Seine
E1	2317	Franklin Creek @ U.S. Hwy. 90	sec. 4, T. 7 S., R. 4 W.	30.4706 N	88.3927 W	9/25/2007	1620-1640	Seine
E2	2312	Franklin Creek @ Hall Road	sec. 4, T. 7 S., R. 4 W.	30.4711 N	88.3858 W	9/26/2007	1500-1535	Seine
E3	2318	Franklin Creek @ Ala. Hwy. 188	sec. 25, T. 6 N., R 4 W.	30.4929 N	88.3376 W	9/25/2007	1500-1545	Seine
E4	2315	Jackson Creek @ Old Pascagoula Rd.	sec. 17, T. 6 S., R. 3 W.	30.5272 N	88.2949 W	9/26/2007	0920-1020	Seine
E5	2313	Miller Creek @ Co. Hwy. 11	sec. 14, T. 5 S., R. 4 W.	30.6048 N	88.3523 W	9/26/2007	1245-1315	Seine
E6	2314	Miller Creek @ Seven Hills	sec. 5, T. 5 S., R. 3 W.	30.6426 N	88.2961 W	9/26/2007	1115-1140	Seine
M1	2316	Fowl River @ Halfmile Rd.	sec. 22, T. 6 S., R. 2 W	30.5009 N	88.1823 W	9/26/2007	0820-0845	Seine
G1	2339	Irwin Mill Creek @ AL Hwy 95	sec. 17, T. 7 N., R. 8 W.	31.0043 N	85.0410 W	8/29/2007	1045-1145	Seine
G2	2366	Bryans Creek @ AL Hwy 95	sec. 9, T. 1 N., R. 30 E.	31.0692 N	85.0450 W	8/29/2007	stream dry	Seine
G3	2355	Cowarts Creek @ AL Hwy 53	sec. 10, T. 7 N., R. 10 W.	31.0167 N	85.2229 W	8/29/2007	1300-1345	Seine
G4	2354	Cowarts Creek @ Hickory Grove Church Rd.	sec. 14, T. 1 N., R. 28 E.	31.0539 N	85.2020 W	8/29/2007	1430-1510	Seine
G5	2358	Cowarts Creek @ Prevatt Rd.	sec. 1, T. 2 N., R. 27 E.	31.1764 N	85.2977 W	8/29/2007	1620-1645	Seine
G6	2365	Limestone Branch @ Co. Rd. 4	sec. 22, T. 1 N., R. 21 E.	31.0363 N	85.9338 W	8/30/2007	1145-1200	Seine
G7	2356	Tributary to Pea River @ Ala. Hwy. 87	sec. 25, T. 6 N., R 18 W.	30.9930 N	85.9984 W	8/30/2007	0940-1020	Seine
G8	2348	East Fork of Choctawhatchee River @ AL Hwy 10	sec. 9, T. 7 N., R. 27 E.	31.6054 N	85.3469 W	8/29/2007	0845-0915	Seine
G9	2352	Five Runs Creek @ U.S. Hwy. 84	sec. 14, T. 4 N., R. 16 E.	31.3195 N	86.4348 W	8/28/2007	1615-1645	Seine
G10	2337	Big Escambia Creek @ Co. Rd. 5	sec. 16, T. 4 N., R. 7 E.	31.3112 N	87.3734 W	9/25/2007	1125-1205	Seine
G11	2350	Escambia Creek @ US Hwy 84	sec. 8, T. 5 N., R. 8 E.	31.4206 N	87.2771 W	8/28/2007	1245-1340	Seine
G12	2351	Murder Creek @ Co. Rd. 6	sec. 24, T. 4 N., R. 10 E	31.3018 N	87.0124 W	8/30/2007	1350-1420	Seine

Table 2. Historic and recent collection records for bluenose shiners in Alabama.

Location	County	section, township, range	Historic collections				Recent collections			
			Museum	Catalog no. ¹	Date	No.	Musuem	Catalog no.	Date	No.
Lightseys Pond @ Ala. Hwy. 219	Bibb	sec. 1, T. 22 N., R. 9 E.	UAIC	10931	24-Jun-94	8	GSA	2344	25-Jun-07	15
			UAIC	12545	29-Jun-00	5				
			UAIC	12931	30-Apr-00	10				
			CUMV	89711						
			UAIC	2317	9-Jul-66	13				
Unnamed tributary to Drummer Creek	Clarke	sec. 15, T. 5 N., R. 3 E.	UAIC	34014	1-Jul-64	1				
Sand Hill Creek @ Co. Hwy. 19	Clarke	sec. 29, T. 5 N., R. 3 E.	TU	32533	29-May-64	3				
Mill Creek @ Co. Hwy. 19	Clarke	sec. 1, T. 4 N., R 2 E.	TU	32516	28-May-64	11				
Big Reedy Creek @ gravel rd. ~7 mi. NE Carlton.	Clarke	sec. 9, T. 5 N., R. 3 E.	TU	163239	11-May-92	2				
Big Reddy Creek @ Co. Hwy. 19	Clarke	sec. 22, T. 5 N., R. 3 E.	TU	125372	14-May-82	1				
			AU	6275	8-Apr-72	22				
Choctaw Creek, 0.2 mi W Gosport on U.S. Hwy. 84	Clarke	sec. 9, T. 7 N., R. 5 E.	UKNMH	17380	15-Jun-77	4				
Tributary Of Escambia River, 5.8 mi E of Excel on U.S. Hwy. 84	Conecuh	sec. 10, T. 5 N., R. 11 E.	CUMV	16155						
Five Runs Creek, 2 mi E of Andalusia, at U.S. Hwy. 84	Covington	sec. 14, T. 4 N., R. 16 E.	UAIC	3553	2-Jun-69	2				
Big Swamp Creek @ Co. Hwy. 2	Dallas	sec. 8, T. 15 N., R. 9 E.	AU	7520	4-Apr-72	5	GSA	2349	31-May-07	8
			AU	7750	13-Jul-72	1				
			AU	7920	20-Feb-73	3				
Big Swamp Creek ~4.0 air mi SSE of Orrville	Dallas	sec. 24, T. 15 N., R. 8 E.	AU	7539	4-Apr-72	1				
			AU	7871	18-Oct-72	2				
			AU	11355	13-Jul-93	1				
Choctawhatchee River, 5 mi W of Graball on U.S. Hwy. 10	Henry	sec. 9, T. 7 N., R. 27 E.	CUMV	17148						
Cowarts Creek @ Hickory Grove Church Rd.	Houston	sec. 14, T. 1 N., R. 28 E.	UAIC	10857	16-Jul-93	1				
			AU	14971	24-Jul-77	4				
			TU	2392	30-May-51	10				
Cowarts Creek @ Ala. Hwy. 53	Houston	sec. 9, T. 7 N., R. 27 E.	CUMV	17669						
			AU	25947	22-Apr-89	1				
			TU	3321	31-May-51	1				
Bryans Creek @ Ala. Hwy. 95	Houston	sec. 9, T. 1 N., R. 30 E.	FMNH	66338	13-Apr-68	4				
Unknown Location	Houston		UAIC	888	11-Nov-62	1				
Bear Creek @ U.S. Hwy. 82	Pickens	sec. 6, T. 20 S., R. 13 W.	UAIC	2021	26-May-66	4	GSA	2333	16-May-07	48
Bear Creek @ Ala. Hwy. 86	Pickens	sec. 19, T. 20 S., R. 13. W	UAIC	77032	3-Apr-72	13	GSA	2332	24-Jul-07	28
Bear Creek @ Co. Hwy. 30	Pickens	sec. 5, T. 20 S., R. 13. W	TU	4409	28-Jun-72	7	GSA	2334	16-May-07	2
Little Bear Creek @ Co. Hwy. 9	Pickens	sec. 20, T. 20 S., R. 13. W	UAIC	5728	3-Aug-79	4				
			UAIC	7017	3-Jun-83	1				
			UAIC	2183	18-Aug-66	1	GSA	2335	16-May-07	1
Lubbub Creek @ U.S. Hwy. 82	Pickens	sec. 28, T. 19 S., R. 14 W.	UAIC	7082	16-Aug-83	1				
Beaver pond 0.2 mi W of Sipsey River, just N of Co. Hwy. 21	Tuscaloosa	sec. 1, T. 20 S., R. 12 W.	UAIC	5961	11-Aug-79	1				
Bilboa Creek, 12.6 mi. S Wagarville, U.S. Hwy. 43	Washington	sec. 30, T. 3 N., R. 1 E.	TU	1813	4-Jun-51	3				
Gaines Creek at gravel road ~2.8 mi S of Leroy	Washington	sec. 32, T. 6 N., R. 1 E.	CU	16166	14-Jun-49	1	GSA	2306	9-Aug-07	1
Armstrong Creek @ U.S. Hwy. 43	Washington	sec. 1, T. 5 N., R. 1 W.	CU	16161	14-Jun-48	1				

¹AU—Auburn University Museum; CUMV—Cornell University Museum of Vertabrates; FMNH—Florida Museum of Natural History; GSA—Geological Survey of Alabama; TU—Tulane University; UAIC—University of Alabama Ichthyological Collection.

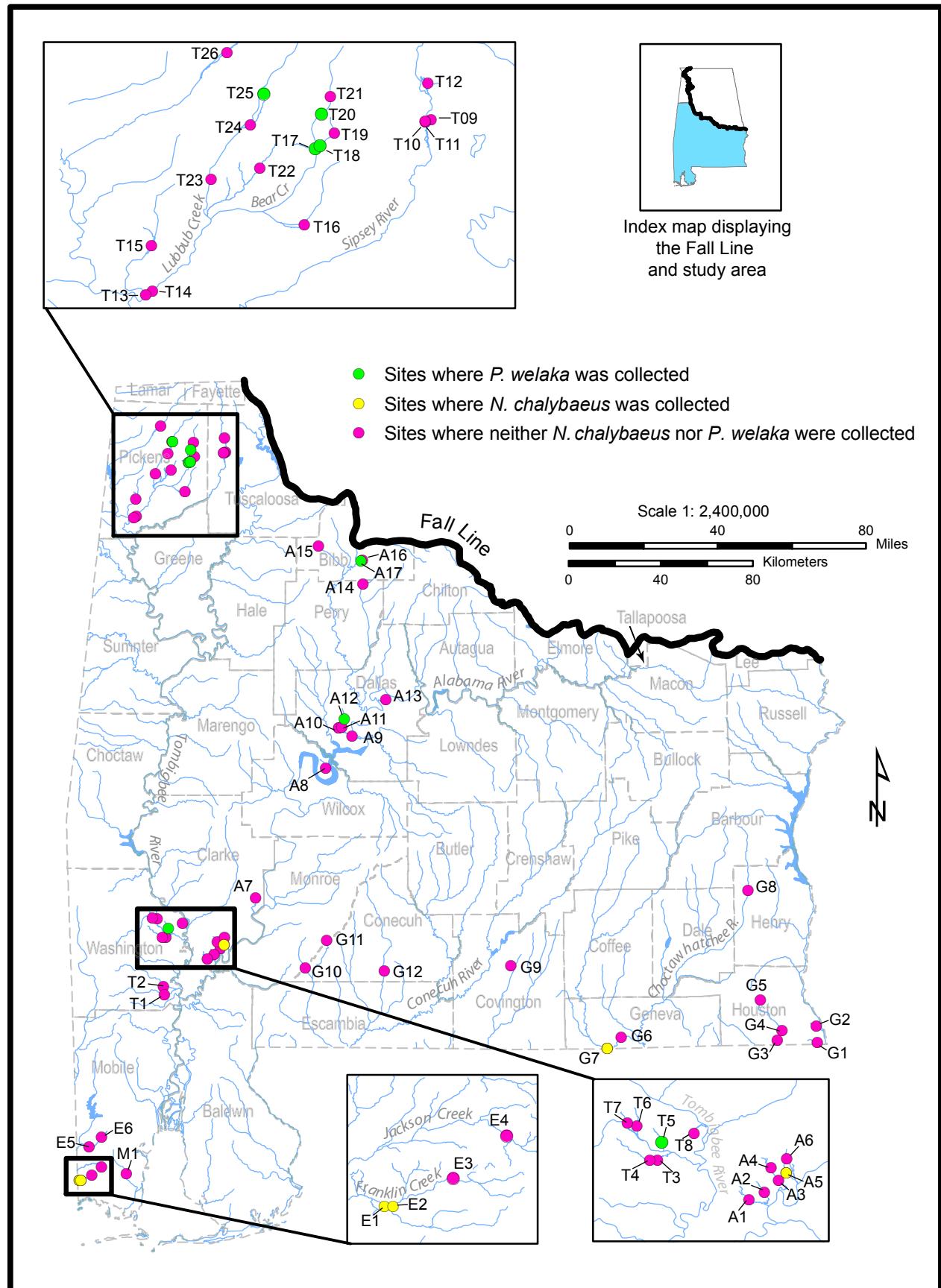


Figure 1. Sites sampled during the 2006-07 field season.

during the 2006 field season (GSA cat. no. 2443), and one additional specimen was captured nearby in Franklin Creek at Hall Road (table 1; GSA cat. no. 2317 and 2312). Nineteen specimens were collected in a tributary to Sizemore Creek, tributary of the lower Alabama River, at Clarke County Road 19 near Choctaw Bluff (table 1; GSA cat. no. 2338). A single specimen was also collected in a tributary to Camp Creek, just upstream of the confluence of Camp Creek and Pea River, immediately west of Alabama Hwy. 87 near the Alabama/Florida state line (table 1; GSA cat. no. 2356).

CONCLUSIONS

Our sampling reaffirms the previously known facts about *Pteronotropis welaka* populations in Alabama—their distribution is spotty and specimens are difficult to collect. Even where we successfully collected bluenose shiners, populations were often highly localized. At two sites we made numerous seine hauls without success, then captured a large spawning aggregation in one seine haul, with perhaps an additional specimen or two on consecutive seine hauls, then continued to sample in nearby areas but captured no more specimens. In both Bear Creek (upper Tombigbee River drainage) and Big Swamp Creek (upper Alabama River drainage) in May we sampled for over an hour and collected 48 and 8 breeding individuals, respectively, and in both cases from two consecutive seine hauls. However, in late June and July, in Bear Creek (upper Tombigbee River drainage) and Lightsey's Mill Pond (Cahaba River system), we consistently collected 1 to 3 individuals per seine haul in channels surrounded by aquatic vegetation. At other sites throughout the season we collected 1 to 2 lone specimens during the overall sampling effort. (It should be noted that in 2007 Alabama experienced a drought of record severity and streams were unusually low.)

While additional sampling would be informative if conducted anywhere within the range of *Pteronotropis welaka*, of particular interest is the Sipsey River system. Personnel from the University of Alabama Biology Department captured one bluenose shiner specimen in 1979 from an overflow pond adjacent to the main channel of the Sipsey River near Echola—the only collection of *P. welaka* recorded for the entire Sipsey River system. Given that there are large expanses of similar habitat in and around the Sipsey River system from the Fall Line near Fayette downstream to the confluence with the Tombigbee River near Aliceville, it is possible that undiscovered populations of *P.*

welaka are present in this system. Time limitations and drought conditions (which dried the overflow ponds) prevented us from including more Sipsey River sites in this study.

Ironcolor shiner (*Notropis chalybaeus*) populations were observed at three sites within the species' range and in good numbers at the lower Alabama River and Escatawpa River sites. Only one adult specimen was collected in the tributary to the Pea River in Geneva County, and this may be the only record of *N. chalybaeus* in the Pea River system. Additional sampling in this system might reveal additional populations.

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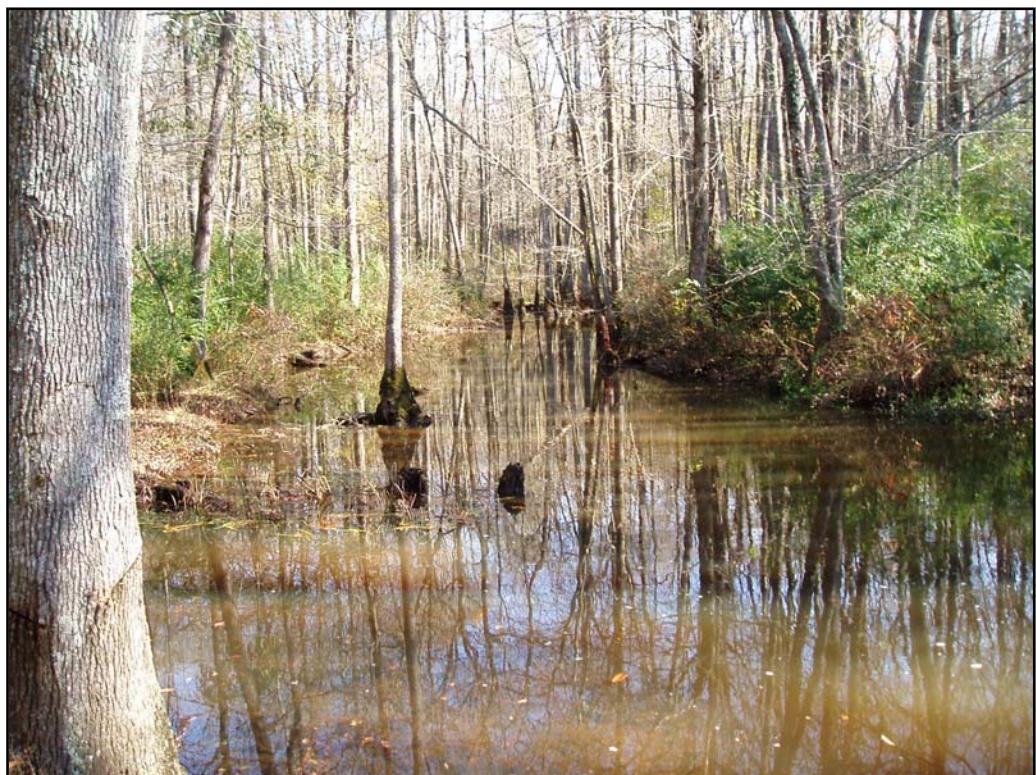
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Appendix A

Photos of miscellaneous *Pteronotropis welaka* habitat in Alabama, 2006-07



Station T17, Bear Creek at Alabama Highway 86, December 3, 2007.



Station T18, Little Bear Creek at Pickens County Highway 9, December 3, 2007.



Station T20, Bear Creek at Pickens County Highway 30, July 24, 2007.



Station T25, Lubbub Creek at Alabama Highway 82, December 3, 2007.



Station A12, Big Swamp Creek at Dallas County Highway 2, May 17, 2007.



Station A16, Lightsey's Mill Pond at Alabama Hwy 219, July 25, 2007.

Appendix B

Summary of species collected at sampling stations in the range of
Pteronotropis welaka in Alabama, 2006-07

GSA collection number

Scientific name	Common name	2344	2359	2360	2307	2361	2353	2338	2336
<i>Lepisosteus oculatus</i>	spotted gar								
<i>Lepisosteus osseus</i>	longnose gar								
<i>Amia calva</i>	bowfin								
<i>Dorosoma cepedianum</i>	gizzard shad								
<i>Campostoma oligolepis</i>	largescale stoneroller				X				
<i>Cyprinella venusta</i>	blacktail shiner						X		
<i>Hybopsis winchelli</i>	clear chub								
<i>Hybopsis sp. cf winchelli</i>									
<i>Luxilus chrysocephalus</i>	striped shiner			X	X	X	X		X
<i>Lythrurus atrapiculus</i>	blacktip shiner								
<i>Lythrurus bellus</i>	pretty shiner						X		
<i>Lythrurus roseipinnis</i>	cherryfin shiner			X			X	X	
<i>Nocomis leptcephalus</i>	bluehead chub			X	X	X			
<i>Notemigonus crysoleucas</i>	golden shiner	X	X						
<i>Notropis ammophilus</i>	orangefin shiner						X		
<i>Notropis amplamata</i>	longjaw minnow								
<i>Notropis baileyi</i>	rough shiner				X		X		X
<i>Notropis chalybaeus</i>	ironcolor shiner							X	
<i>Notropis chrosomus</i>	rainbow shiner		X						
<i>Notropis harperi</i>	redeye chub								
<i>Notropis longirostris</i>	longnose shiner								
<i>Notropis maculatus</i>	taillight shiner								
<i>Notropis petersoni</i>	coastal shiner								
<i>Notropis photogenis</i>	silver minnow								
<i>Notropis texanus</i>	weed shiner	X		X		X	X		
<i>Opsopoeodus emiliae</i>	pugnose minnow								
<i>Pimephales vigilax</i>	bullhead minnow								
<i>Pteronotropis grandipinnis</i>	Apalachee shiner								
<i>Pteronotropis hypselopterus</i>	sailfin shiner				X	X		X	X
<i>Pteronotropis signipinnis</i>	flagfin shiner								
<i>Pteronotropis welaka</i>	bluenose shiner	X							
<i>Erimyzon oblongus</i>	creek chubsucker								
<i>Erimyzon suetta</i>	lake chubsucker						X		
<i>Erimyzon tenuis</i>	sharpfin chubsucker	X			X			X	
<i>Hypentelium etowanum</i>	Alabama hog sucker				X		X		
<i>Ictiobus bubalus</i>	smallmouth buffalo								
<i>Minytrema melanops</i>	spotted sucker								
<i>Moxostoma carinatum</i>	river redhorse								
<i>Moxostoma poecilurum</i>	blacktail redhorse								
<i>Ameiurus melas</i>	black bullhead								
<i>Ameiurus natalis</i>	yellow bullhead								
<i>Noturus funebris</i>	black madtom			X					
<i>Noturus gyrinus</i>	tadpole madtom								
<i>Noturus leptacanthus</i>	speckled madtom								
<i>Noturus nocturnus</i>	freckled madtom								
<i>Pylodictis olivaris</i>	flathead catfish								
<i>Esox americanus</i>	redfin pickerel			X					
<i>Esox niger</i>	chain pickerel	X						X	
<i>Aphredoderus sayanus</i>	pirate perch	X			X		X		
<i>Labidesthes sicculus</i>	brook silverside	X							

GSA collection number

Scientific name	Common name	2344	2359	2360	2307	2361	2353	2338	2336
<i>Fundulus escambiae</i>	russetfin topminnow								
<i>Fundulus notti</i>	bayou topminnow			X		X			
<i>Fundulus olivaceus</i>	blackspotted topminnow						X		
<i>Lucania goodei</i>	bluefin killifish								
<i>Gambusia affinis</i>	western mosquitofish	X		X			X		
<i>Gambusia holbrookii</i>	eastern mosquitofish								
<i>Heterandria formosa</i>	least killifish								
<i>Cottus carolinae</i>	banded sculpin	X			X				
<i>Ambloplites ariommus</i>	shadow bass								
<i>Ambloplites rupestris</i>	rock bass								
<i>Centrarchus macropterus</i>	flier								
<i>Lepomis auritus</i>	redbreast sunfish								
<i>Lepomis cyanellus</i>	green sunfish								
<i>Lepomis gulosus</i>	warmouth								
<i>Lepomis macrochirus</i>	bluegill	X	X					X	
<i>Lepomis marginatus</i>	dollar sunfish								
<i>Lepomis megalotis</i>	longear sunfish				X	X	X		
<i>Lepomis microlophus</i>	redear sunfish								
<i>Lepomis miniatus</i>	redspotted sunfish	X			X	X	X	X	
<i>Micropterus coosae</i>	redeye bass								
<i>Micropterus punctulatus</i>	spotted bass								
<i>Micropterus salmoides</i>	largemouth bass	X							
<i>Pomoxis annularis</i>	white crappie								
<i>Pomoxis nigromaculatus</i>	black crappie								
<i>Ammocrypta beanii</i>	naked sand darter								
<i>Ammocrypta bifascia</i>	Florida sand darter								
<i>Ammocrypta meridiana</i>	southern sand darter								
<i>Etheostoma chlorosomum</i>	bluntnose darter								
<i>Etheostoma colorosum</i>	coastal darter								
<i>Etheostoma davisoni</i>	Choctawhatchee darter								
<i>Etheostoma edwini</i>	brown darter								
<i>Etheostoma fusiforme</i>	swamp darter								
<i>Etheostoma histrio</i>	harlequin darter								
<i>Etheostoma lachneri</i>	Tombigbee darter				X				
<i>Etheostoma nigrum</i>	johnny darter						X		
<i>Etheostoma proeliare</i>	cypress darter								
<i>Etheostoma ramseyi</i>	Alabama darter								
<i>Etheostoma rupestre</i>	rock darter								
<i>Etheostoma stigmaeum</i>	speckled darter								
<i>Etheostoma swaini</i>	gulf darter	X							
<i>Etheostoma zonifer</i>	backwater darter								
<i>Percina kathae</i>	Mobile logperch								
<i>Percina nigrofasciata</i>	blackbanded darter				X	X	X	X	
<i>Percina sciera</i>	dusky darter								
<i>Percina vigil</i>	saddleback darter								
<i>Elassoma zonatum</i>	banded pygmy sunfish	X			X			X	

GSA collection number

Scientific name	Common name	2362	2363	2351	2337	2352	2340	2346	2341
<i>Lepisosteus oculatus</i>	spotted gar							X	
<i>Lepisosteus osseus</i>	longnose gar								
<i>Amia calva</i>	bowfin							X	
<i>Dorosoma cepedianum</i>	gizzard shad								
<i>Campostoma oligolepis</i>	largescale stoneroller						X		X
<i>Cyprinella venusta</i>	blacktail shiner			X	X				X
<i>Hybopsis winchelli</i>	clear chub			X					
<i>Hybopsis sp. cf winchelli</i>									
<i>Luxilus chrysocephalus</i>	striped shiner	X	X		X		X		X
<i>Lythrurus atrapiculus</i>	blacktip shiner			X					
<i>Lythrurus bellus</i>	pretty shiner	X					X		X
<i>Lythrurus roseipinnis</i>	cherryfin shiner								
<i>Nocomis leptocephalus</i>	bluehead chub						X		X
<i>Notemigonus crysoleucas</i>	golden shiner						X	X	
<i>Notropis ammophilus</i>	orangefin shiner								
<i>Notropis amplamata</i>	longjaw minnow			X					
<i>Notropis baileyi</i>	rough shiner	X			X		X	X	X
<i>Notropis chalybaeus</i>	ironcolor shiner								
<i>Notropis chrosomus</i>	rainbow shiner								
<i>Notropis harperi</i>	redeye chub								
<i>Notropis longirostris</i>	longnose shiner								
<i>Notropis maculatus</i>	taillight shiner								
<i>Notropis petersoni</i>	coastal shiner								
<i>Notropis photogenis</i>	silver minnow								
<i>Notropis texanus</i>	weed shiner		X		X		X	X	X
<i>Opsopoeodus emiliae</i>	pugnose minnow							X	
<i>Pimephales vigilax</i>	bullhead minnow								
<i>Pteronotropis grandipinnis</i>	Apalachee shiner								
<i>Pteronotropis hypselopterus</i>	sailfin shiner	X	X						
<i>Pteronotropis signipinnis</i>	flagfin shiner		X						
<i>Pteronotropis welaka</i>	bluenose shiner								
<i>Erimyzon oblongus</i>	creek chubsucker								
<i>Erimyzon suetta</i>	lake chubsucker		X				X		
<i>Erimyzon tenuis</i>	sharpfin chubsucker		X				X		
<i>Hypentelium etowanum</i>	Alabama hog sucker								X
<i>Ictiobus bubalus</i>	smallmouth buffalo								
<i>Minytrema melanops</i>	spotted sucker								
<i>Moxostoma carinatum</i>	river redhorse								
<i>Moxostoma poecilurum</i>	blacktail redhorse								X
<i>Ameiurus melas</i>	black bullhead								
<i>Ameiurus natalis</i>	yellow bullhead					X			
<i>Noturus funebris</i>	black madtom								
<i>Noturus gyrinus</i>	tadpole madtom								
<i>Noturus leptacanthus</i>	speckled madtom								
<i>Noturus nocturnus</i>	freckled madtom								
<i>Pylodictis olivaris</i>	flathead catfish								
<i>Esox americanus</i>	redfin pickerel					X		X	
<i>Esox niger</i>	chain pickerel						X	X	
<i>Aphredoderus sayanus</i>	pirate perch							X	X
<i>Labidesthes sicculus</i>	brook silverside				X	X	X		

GSA collection number

Scientific name	Common name	2362	2363	2351	2337	2352	2340	2346	2341
<i>Fundulus escambiae</i>	russetfin topminnow								
<i>Fundulus notti</i>	bayou topminnow								
<i>Fundulus olivaceus</i>	blackspotted topminnow			X	X		X		X
<i>Lucania goodei</i>	bluefin killifish								
<i>Gambusia affinis</i>	western mosquitofish							X	X
<i>Gambusia holbrookii</i>	eastern mosquitofish			X		X	X		
<i>Heterandria formosa</i>	least killifish								
<i>Cottus carolinae</i>	banded sculpin								
<i>Ambloplites ariommus</i>	shadow bass								
<i>Ambloplites rupestris</i>	rock bass								
<i>Centrarchus macropterus</i>	flier							X	
<i>Lepomis auritus</i>	redbreast sunfish								
<i>Lepomis cyanellus</i>	green sunfish								
<i>Lepomis gulosus</i>	warmouth							X	
<i>Lepomis macrochirus</i>	bluegill			X		X	X	X	X
<i>Lepomis marginatus</i>	dollar sunfish								
<i>Lepomis megalotis</i>	longear sunfish					X	X	X	X
<i>Lepomis microlophus</i>	redear sunfish					X			
<i>Lepomis miniatus</i>	redspotted sunfish					X	X	X	
<i>Micropterus coosae</i>	redeye bass								
<i>Micropterus punctulatus</i>	spotted bass			X	X				X
<i>Micropterus salmoides</i>	largemouth bass					X	X		
<i>Pomoxis annularis</i>	white crappie								
<i>Pomoxis nigromaculatus</i>	black crappie								
<i>Ammocrypta beanii</i>	naked sand darter								
<i>Ammocrypta bifascia</i>	Florida sand darter								
<i>Ammocrypta meridiana</i>	southern sand darter								
<i>Etheostoma chlorosomum</i>	bluntnose darter								
<i>Etheostoma colorosum</i>	coastal darter			X					
<i>Etheostoma dawsoni</i>	Choctawhatchee darter								
<i>Etheostoma edwini</i>	brown darter								
<i>Etheostoma fusiforme</i>	swamp darter								
<i>Etheostoma histrio</i>	harlequin darter								
<i>Etheostoma lachneri</i>	Tombigbee darter								
<i>Etheostoma nigrum</i>	johnny darter								
<i>Etheostoma proeliare</i>	cypress darter							X	
<i>Etheostoma ramseyi</i>	Alabama darter					X	X		X
<i>Etheostoma rupestre</i>	rock darter								
<i>Etheostoma stigmaeum</i>	speckled darter			X					X
<i>Etheostoma swaini</i>	gulf darter						X		
<i>Etheostoma zonifer</i>	backwater darter							X	
<i>Percina kathae</i>	Mobile logperch								
<i>Percina nigrofasciata</i>	blackbanded darter	X			X		X		X
<i>Percina sciera</i>	dusky darter								
<i>Percina vigil</i>	saddleback darter								
<i>Elassoma zonatum</i>	banded pygmy sunfish					X	X	X	

GSA collection number

Scientific name	Common name	2349	2342	2364	2356	2365	2348	2354	2355
<i>Lepisosteus oculatus</i>	spotted gar								
<i>Lepisosteus osseus</i>	longnose gar		X						
<i>Amia calva</i>	bowfin								
<i>Dorosoma cepedianum</i>	gizzard shad								
<i>Campostoma oligolepis</i>	largescale stoneroller								
<i>Cyprinella venusta</i>	blacktail shiner				X		X		X
<i>Hybopsis winchelli</i>	clear chub				X				
<i>Hybopsis sp. cf winchelli</i>						X			
<i>Luxilus chrysocephalus</i>	striped shiner								
<i>Lythrurus atrapiculus</i>	blacktip shiner								
<i>Lythrurus bellus</i>	pretty shiner								
<i>Lythrurus roseipinnis</i>	cherryfin shiner								
<i>Nocomis leptcephalus</i>	bluehead chub								
<i>Notemigonus crysoleucas</i>	golden shiner	X	X						
<i>Notropis ammophilus</i>	orangefin shiner								
<i>Notropis amplamata</i>	longjaw minnow				X				
<i>Notropis baileyi</i>	rough shiner								
<i>Notropis chalybaeus</i>	ironcolor shiner				X				
<i>Notropis chrosomus</i>	rainbow shiner								
<i>Notropis harperi</i>	redeye chub				X		X	X	X
<i>Notropis longirostris</i>	longnose shiner				X				
<i>Notropis maculatus</i>	taillight shiner								
<i>Notropis petersoni</i>	coastal shiner								
<i>Notropis photogenis</i>	silver minnow								
<i>Notropis texanus</i>	weed shiner				X		X	X	X
<i>Opsopoeodus emiliae</i>	pugnose minnow								
<i>Pimephales vigilax</i>	bullhead minnow								
<i>Pteronotropis grandipinnis</i>	Apalachee shiner							X	X
<i>Pteronotropis hypselopterus</i>	sailfin shiner				X				
<i>Pteronotropis signipinnis</i>	flagfin shiner								
<i>Pteronotropis welaka</i>	bluenose shiner	X							
<i>Erimyzon oblongus</i>	creek chubsucker								
<i>Erimyzon suetta</i>	lake chubsucker	X	X						
<i>Erimyzon tenuis</i>	sharpfin chubsucker								
<i>Hypentelium etowanum</i>	Alabama hog sucker								
<i>Ictiobus bubalus</i>	smallmouth buffalo								
<i>Minytrema melanops</i>	spotted sucker							X	
<i>Moxostoma carinatum</i>	river redhorse								
<i>Moxostoma poecilurum</i>	blacktail redhorse					X			
<i>Ameiurus melas</i>	black bullhead								
<i>Ameiurus natalis</i>	yellow bullhead								
<i>Noturus funebris</i>	black madtom								
<i>Noturus gyrinus</i>	tadpole madtom								
<i>Noturus leptacanthus</i>	speckled madtom							X	X
<i>Noturus nocturnus</i>	freckled madtom								
<i>Pylodictis olivaris</i>	flathead catfish								
<i>Esox americanus</i>	redfin pickerel	X	X		X			X	X
<i>Esox niger</i>	chain pickerel								
<i>Aphredoderus sayanus</i>	pirate perch	X			X		X		X
<i>Labidesthes sicculus</i>	brook silverside					X	X	X	

GSA collection number

Scientific name	Common name	2349	2342	2364	2356	2365	2348	2354	2355
<i>Fundulus escambiae</i>	russetfin topminnow								
<i>Fundulus notti</i>	bayou topminnow								
<i>Fundulus olivaceus</i>	blackspotted topminnow						X		
<i>Lucania goodei</i>	bluefin killifish								
<i>Gambusia affinis</i>	western mosquitofish	X	X	X	X			X	
<i>Gambusia holbrookii</i>	eastern mosquitofish						X		
<i>Heterandria formosa</i>	least killifish								
<i>Cottus carolinae</i>	banded sculpin								
<i>Ambloplites ariommus</i>	shadow bass								
<i>Ambloplites rupestris</i>	rock bass								
<i>Centrarchus macropterus</i>	flier	X	X						
<i>Lepomis auritus</i>	redbreast sunfish					X	X	X	
<i>Lepomis cyanellus</i>	green sunfish								
<i>Lepomis gulosus</i>	warmouth	X	X						
<i>Lepomis macrochirus</i>	bluegill	X			X	X	X	X	
<i>Lepomis marginatus</i>	dollar sunfish	X							
<i>Lepomis megalotis</i>	longear sunfish				X		X	X	
<i>Lepomis microlophus</i>	redear sunfish								
<i>Lepomis miniatus</i>	redspotted sunfish	X			X		X	X	X
<i>Micropterus coosae</i>	redeye bass								
<i>Micropterus punctulatus</i>	spotted bass				X		X		
<i>Micropterus salmoides</i>	largemouth bass						X	X	X
<i>Pomoxis annularis</i>	white crappie	X							
<i>Pomoxis nigromaculatus</i>	black crappie	X							
<i>Ammocrypta beanii</i>	naked sand darter								
<i>Ammocrypta bifascia</i>	Florida sand darter				X		X		
<i>Ammocrypta meridiana</i>	southern sand darter								
<i>Etheostoma chlorosomum</i>	bluntnose darter						X		
<i>Etheostoma colorosum</i>	coastal darter				X				
<i>Etheostoma davisoni</i>	Choctawhatchee darter				X				
<i>Etheostoma edwini</i>	brown darter				X				
<i>Etheostoma fusiforme</i>	swamp darter								
<i>Etheostoma histrio</i>	harlequin darter								
<i>Etheostoma lachneri</i>	Tombigbee darter								
<i>Etheostoma nigrum</i>	johnny darter								
<i>Etheostoma proeliare</i>	cypress darter								
<i>Etheostoma ramseyi</i>	Alabama darter								
<i>Etheostoma rupestre</i>	rock darter								
<i>Etheostoma stigmaeum</i>	speckled darter								
<i>Etheostoma swaini</i>	gulf darter							X	X
<i>Etheostoma zonifer</i>	backwater darter	X							
<i>Percina kathae</i>	Mobile logperch								
<i>Percina nigrofasciata</i>	blackbanded darter	X			X		X	X	X
<i>Percina sciera</i>	dusky darter								
<i>Percina vigil</i>	saddleback darter								
<i>Elassoma zonatum</i>	banded pygmy sunfish		X						

GSA collection number

Scientific name	Common name	2358	2366	2317	2318	2312	2314	2313	2315
<i>Lepisosteus oculatus</i>	spotted gar								
<i>Lepisosteus osseus</i>	longnose gar								
<i>Amia calva</i>	bowfin								
<i>Dorosoma cepedianum</i>	gizzard shad								
<i>Campostoma oligolepis</i>	largescale stoneroller								
<i>Cyprinella venusta</i>	blacktail shiner					X			
<i>Hybopsis winchelli</i>	clear chub	X		X					
<i>Hybopsis sp. cf winchelli</i>									
<i>Luxilus chrysocephalus</i>	striped shiner								
<i>Lythrurus atrapiculus</i>	blacktip shiner								
<i>Lythrurus bellus</i>	pretty shiner								
<i>Lythrurus roseipinnis</i>	cherryfin shiner			X	X	X	X	X	
<i>Nocomis leptcephalus</i>	bluehead chub								
<i>Notemigonus crysoleucas</i>	golden shiner								
<i>Notropis ammophilus</i>	orangefin shiner								
<i>Notropis amplamata</i>	longjaw minnow								
<i>Notropis baileyi</i>	rough shiner								
<i>Notropis chalybaeus</i>	ironcolor shiner			X		X			
<i>Notropis chrosomus</i>	rainbow shiner								
<i>Notropis harperi</i>	redeye chub		X						
<i>Notropis longirostris</i>	longnose shiner								
<i>Notropis maculatus</i>	taillight shiner								
<i>Notropis petersoni</i>	coastal shiner		X						
<i>Notropis photogenis</i>	silver minnow								
<i>Notropis texanus</i>	weed shiner	X		X	X		X	X	X
<i>Opsopoeodus emiliae</i>	pugnose minnow				X	X	X		
<i>Pimephales vigilax</i>	bullhead minnow								
<i>Pteronotropis grandipinnis</i>	Apalachee shiner	X	X						
<i>Pteronotropis hypselopterus</i>	sailfin shiner								
<i>Pteronotropis signipinnis</i>	flagfin shiner						X		
<i>Pteronotropis welaka</i>	bluenose shiner								
<i>Erimyzon oblongus</i>	creek chubsucker								
<i>Erimyzon suetta</i>	lake chubsucker		X						
<i>Erimyzon tenuis</i>	sharpfin chubsucker			X	X	X		X	X
<i>Hypentelium etowanum</i>	Alabama hog sucker								
<i>Ictiobus bubalus</i>	smallmouth buffalo								
<i>Minytrema melanops</i>	spotted sucker								
<i>Moxostoma carinatum</i>	river redhorse								
<i>Moxostoma poecilurum</i>	blacktail redhorse								
<i>Ameiurus melas</i>	black bullhead								
<i>Ameiurus natalis</i>	yellow bullhead								
<i>Noturus funebris</i>	black madtom					X		X	
<i>Noturus gyrinus</i>	tadpole madtom			X					
<i>Noturus leptacanthus</i>	speckled madtom				X	X		X	
<i>Noturus nocturnus</i>	freckled madtom								
<i>Pylodictis olivaris</i>	flathead catfish								
<i>Esox americanus</i>	redfin pickerel	X							X
<i>Esox niger</i>	chain pickerel								
<i>Aphredoderus sayanus</i>	pirate perch		X						
<i>Labidesthes sicculus</i>	brook silverside	X	X	X	X	X	X		

GSA collection number

Scientific name	Common name	2358	2366	2317	2318	2312	2314	2313	2315
<i>Fundulus escambiae</i>	russetfin topminnow								
<i>Fundulus notti</i>	bayou topminnow				X				X
<i>Fundulus olivaceus</i>	blackspotted topminnow								
<i>Lucania goodei</i>	bluefin killifish			X					
<i>Gambusia affinis</i>	western mosquitofish								
<i>Gambusia holbrookii</i>	eastern mosquitofish	X	X	X					X
<i>Heterandria formosa</i>	least killifish		X						
<i>Cottus carolinae</i>	banded sculpin								
<i>Ambloplites ariommus</i>	shadow bass					X	X	X	X
<i>Ambloplites rupestris</i>	rock bass								
<i>Centrarchus macropterus</i>	flier								
<i>Lepomis auritus</i>	redbreast sunfish								
<i>Lepomis cyanellus</i>	green sunfish								
<i>Lepomis gulosus</i>	warmouth		X						
<i>Lepomis macrochirus</i>	bluegill		X		X	X		X	X
<i>Lepomis marginatus</i>	dollar sunfish								
<i>Lepomis megalotis</i>	longear sunfish				X	X	X	X	
<i>Lepomis microlophus</i>	redear sunfish		X		X				
<i>Lepomis miniatus</i>	redspotted sunfish	X	X	X	X	X	X		X
<i>Micropterus coosae</i>	redeye bass								
<i>Micropterus punctulatus</i>	spotted bass								
<i>Micropterus salmoides</i>	largemouth bass	X						X	
<i>Pomoxis annularis</i>	white crappie								
<i>Pomoxis nigromaculatus</i>	black crappie								
<i>Ammocrypta beanii</i>	naked sand darter								
<i>Ammocrypta bifascia</i>	Florida sand darter								
<i>Ammocrypta meridiana</i>	southern sand darter								
<i>Etheostoma chlorosomum</i>	bluntnose darter								
<i>Etheostoma colorosum</i>	coastal darter								
<i>Etheostoma davisoni</i>	Choctawhatchee darter								
<i>Etheostoma edwini</i>	brown darter	X	X						
<i>Etheostoma fusiforme</i>	swamp darter					X			
<i>Etheostoma histrio</i>	harlequin darter								
<i>Etheostoma lachneri</i>	Tombigbee darter								
<i>Etheostoma nigrum</i>	johnny darter								
<i>Etheostoma proeliare</i>	cypress darter								
<i>Etheostoma ramseyi</i>	Alabama darter								
<i>Etheostoma rupestre</i>	rock darter								
<i>Etheostoma stigmaeum</i>	speckled darter							X	
<i>Etheostoma swaini</i>	gulf darter	X			X	X	X	X	X
<i>Etheostoma zonifer</i>	backwater darter								
<i>Percina kathae</i>	Mobile logperch								
<i>Percina nigrofasciata</i>	blackbanded darter	X	X	X	X	X	X	X	X
<i>Percina sciera</i>	dusky darter								
<i>Percina vigil</i>	saddleback darter								
<i>Elassoma zonatum</i>	banded pygmy sunfish		X		X				X

GSA collection number

Scientific name	Common name	2316	2350	2368	2468	2467	2469	2333	2334
<i>Lepisosteus oculatus</i>	spotted gar								
<i>Lepisosteus osseus</i>	longnose gar								
<i>Amia calva</i>	bowfin					X			
<i>Dorosoma cepedianum</i>	gizzard shad								
<i>Campostoma oligolepis</i>	largescale stoneroller								
<i>Cyprinella venusta</i>	blacktail shiner							X	X
<i>Hybopsis winchelli</i>	clear chub								
<i>Hybopsis sp. cf winchelli</i>									
<i>Luxilus chrysocephalus</i>	striped shiner								
<i>Lythrurus atrapiculus</i>	blacktip shiner								
<i>Lythrurus bellus</i>	pretty shiner							X	X
<i>Lythrurus roseipinnis</i>	cherryfin shiner								
<i>Nocomis leptcephalus</i>	bluehead chub								
<i>Notemigonus crysoleucas</i>	golden shiner								
<i>Notropis ammophilus</i>	orangefin shiner								
<i>Notropis amplamata</i>	longjaw minnow								
<i>Notropis baileyi</i>	rough shiner								
<i>Notropis chalybaeus</i>	ironcolor shiner								
<i>Notropis chrosomus</i>	rainbow shiner								
<i>Notropis harperi</i>	redeye chub								
<i>Notropis longirostris</i>	longnose shiner								
<i>Notropis maculatus</i>	taillight shiner								
<i>Notropis petersoni</i>	coastal shiner								
<i>Notropis photogenis</i>	silver minnow								
<i>Notropis texanus</i>	weed shiner					X			X
<i>Opsopoeodus emiliae</i>	pugnose minnow					X	X		X
<i>Pimephales vigilax</i>	bullhead minnow								
<i>Pteronotropis grandipinnis</i>	Apalachee shiner								
<i>Pteronotropis hypselopterus</i>	sailfin shiner	X	X						
<i>Pteronotropis signipinnis</i>	flagfin shiner		X						
<i>Pteronotropis welaka</i>	bluenose shiner							X	X
<i>Erimyzon oblongus</i>	creek chubsucker								
<i>Erimyzon suetta</i>	lake chubsucker		X						
<i>Erimyzon tenuis</i>	sharpfin chubsucker	X	X						
<i>Hypentelium etowanum</i>	Alabama hog sucker								
<i>Ictiobus bubalus</i>	smallmouth buffalo								
<i>Minytrema melanops</i>	spotted sucker								
<i>Moxostoma carinatum</i>	river redhorse								
<i>Moxostoma poecilurum</i>	blacktail redhorse								
<i>Ameiurus melas</i>	black bullhead								
<i>Ameiurus natalis</i>	yellow bullhead							X	
<i>Noturus funebris</i>	black madtom					X			X
<i>Noturus gyrinus</i>	tadpole madtom								
<i>Noturus leptacanthus</i>	speckled madtom								X
<i>Noturus nocturnus</i>	freckled madtom								X
<i>Pylodictis olivaris</i>	flathead catfish								
<i>Esox americanus</i>	redfin pickerel							X	X
<i>Esox niger</i>	chain pickerel								
<i>Aphredoderus sayanus</i>	pirate perch						X	X	X
<i>Labidesthes sicculus</i>	brook silverside		X				X		X

GSA collection number

Scientific name	Common name	2316	2350	2368	2468	2467	2469	2333	2334
<i>Fundulus escambiae</i>	russetfin topminnow		X						
<i>Fundulus notti</i>	bayou topminnow								
<i>Fundulus olivaceus</i>	blackspotted topminnow						X		
<i>Lucania goodei</i>	bluefin killifish								
<i>Gambusia affinis</i>	western mosquitofish					X		X	X
<i>Gambusia holbrookii</i>	eastern mosquitofish	X	X						
<i>Heterandria formosa</i>	least killifish								
<i>Cottus carolinae</i>	banded sculpin								
<i>Ambloplites ariommus</i>	shadow bass					X			
<i>Ambloplites rupestris</i>	rock bass								
<i>Centrarchus macropterus</i>	flier								
<i>Lepomis auritus</i>	redbreast sunfish								
<i>Lepomis cyanellus</i>	green sunfish							X	
<i>Lepomis gulosus</i>	warmouth			X		X	X	X	
<i>Lepomis macrochirus</i>	bluegill	X		X	X	X			X
<i>Lepomis marginatus</i>	dollar sunfish		X						
<i>Lepomis megalotis</i>	longear sunfish		X	X	X	X	X	X	X
<i>Lepomis microlophus</i>	redear sunfish								
<i>Lepomis miniatus</i>	redspotted sunfish	X	X				X	X	X
<i>Micropterus coosae</i>	redeye bass								
<i>Micropterus punctulatus</i>	spotted bass								
<i>Micropterus salmoides</i>	largemouth bass								
<i>Pomoxis annularis</i>	white crappie								
<i>Pomoxis nigromaculatus</i>	black crappie								
<i>Ammocrypta beanii</i>	naked sand darter								
<i>Ammocrypta bifascia</i>	Florida sand darter								
<i>Ammocrypta meridiana</i>	southern sand darter								
<i>Etheostoma chlorosomum</i>	bluntnose darter								
<i>Etheostoma colorosum</i>	coastal darter								
<i>Etheostoma davisoni</i>	Choctawhatchee darter								
<i>Etheostoma edwini</i>	brown darter		X						
<i>Etheostoma fusiforme</i>	swamp darter	X							
<i>Etheostoma histrio</i>	harlequin darter								
<i>Etheostoma lachneri</i>	Tombigbee darter							X	
<i>Etheostoma nigrum</i>	johnny darter				X	X			
<i>Etheostoma proeliare</i>	cypress darter					X		X	X
<i>Etheostoma ramseyi</i>	Alabama darter								
<i>Etheostoma rupestre</i>	rock darter								
<i>Etheostoma stigmaeum</i>	speckled darter								
<i>Etheostoma swaini</i>	gulf darter							X	X
<i>Etheostoma zonifer</i>	backwater darter								
<i>Percina kathae</i>	Mobile logperch								
<i>Percina nigrofasciata</i>	blackbanded darter	X			X			X	X
<i>Percina sciera</i>	dusky darter								
<i>Percina vigil</i>	saddleback darter								
<i>Elassoma zonatum</i>	banded pygmy sunfish		X					X	X

GSA collection number

Scientific name	Common name	2335	2303	2304	2337	2331	2367	2332	2330
<i>Lepisosteus oculatus</i>	spotted gar								
<i>Lepisosteus osseus</i>	longnose gar								
<i>Amia calva</i>	bowfin							X	
<i>Dorosoma cepedianum</i>	gizzard shad								
<i>Campostoma oligolepis</i>	largescale stoneroller								
<i>Cyprinella venusta</i>	blacktail shiner					X	X	X	X
<i>Hybopsis winchelli</i>	clear chub								
<i>Hybopsis sp. cf winchelli</i>									
<i>Luxilus chrysocephalus</i>	striped shiner								
<i>Lythrurus atrapiculus</i>	blacktip shiner								
<i>Lythrurus bellus</i>	pretty shiner	X				X	X		
<i>Lythrurus roseipinnis</i>	cherryfin shiner								
<i>Nocomis leptcephalus</i>	bluehead chub					X			
<i>Notemigonus crysoleucas</i>	golden shiner				X				
<i>Notropis ammophilus</i>	orangefin shiner								
<i>Notropis amplamata</i>	longjaw minnow								
<i>Notropis baileyi</i>	rough shiner								
<i>Notropis chalybaeus</i>	ironcolor shiner								
<i>Notropis chrosomus</i>	rainbow shiner								
<i>Notropis harperi</i>	redeye chub								
<i>Notropis longirostris</i>	longnose shiner								
<i>Notropis maculatus</i>	taillight shiner								
<i>Notropis petersoni</i>	coastal shiner								
<i>Notropis photogenis</i>	silver minnow								
<i>Notropis texanus</i>	weed shiner				X	X	X	X	
<i>Opsopoeodus emiliae</i>	pugnose minnow					X	X	X	
<i>Pimephales vigilax</i>	bullhead minnow							X	
<i>Pteronotropis grandipinnis</i>	Apalachee shiner								
<i>Pteronotropis hypselopterus</i>	sailfin shiner								
<i>Pteronotropis signipinnis</i>	flagfin shiner								
<i>Pteronotropis welaka</i>	bluenose shiner	X						X	
<i>Erimyzon oblongus</i>	creek chubsucker		X	X					
<i>Erimyzon suetta</i>	lake chubsucker							X	
<i>Erimyzon tenuis</i>	sharpfin chubsucker								
<i>Hypentelium etowanum</i>	Alabama hog sucker								
<i>Ictiobus bubalus</i>	smallmouth buffalo							X	
<i>Minytrema melanops</i>	spotted sucker					X		X	
<i>Moxostoma carinatum</i>	river redhorse								
<i>Moxostoma poecilurum</i>	blacktail redhorse							X	X
<i>Ameiurus melas</i>	black bullhead								
<i>Ameiurus natalis</i>	yellow bullhead								
<i>Noturus funebris</i>	black madtom								
<i>Noturus gyrinus</i>	tadpole madtom								
<i>Noturus leptacanthus</i>	speckled madtom								
<i>Noturus nocturnus</i>	freckled madtom								
<i>Pylodictis olivaris</i>	flathead catfish								
<i>Esox americanus</i>	redfin pickerel	X							
<i>Esox niger</i>	chain pickerel				X	X			
<i>Aphredoderus sayanus</i>	pirate perch	X			X				
<i>Labidesthes sicculus</i>	brook silverside	X			X		X	X	X

GSA collection number

Scientific name	Common name	2335	2303	2304	2337	2331	2367	2332	2330
<i>Fundulus escambiae</i>	russetfin topminnow								
<i>Fundulus notti</i>	bayou topminnow								
<i>Fundulus olivaceus</i>	blackspotted topminnow	X				X	X		
<i>Lucania goodei</i>	bluefin killifish								
<i>Gambusia affinis</i>	western mosquitofish	X			X		X		
<i>Gambusia holbrookii</i>	eastern mosquitofish								
<i>Heterandria formosa</i>	least killifish								
<i>Cottus carolinae</i>	banded sculpin								
<i>Ambloplites ariommus</i>	shadow bass								
<i>Ambloplites rupestris</i>	rock bass								
<i>Centrarchus macropterus</i>	flier	X			X				
<i>Lepomis auritus</i>	redbreast sunfish								
<i>Lepomis cyanellus</i>	green sunfish								
<i>Lepomis gulosus</i>	warmouth	X			X				
<i>Lepomis macrochirus</i>	bluegill	X			X	X	X		
<i>Lepomis marginatus</i>	dollar sunfish								
<i>Lepomis megalotis</i>	longear sunfish				X	X	X		X
<i>Lepomis microlophus</i>	redear sunfish	X				X	X		X
<i>Lepomis miniatus</i>	redspotted sunfish	X				X	X		X
<i>Micropterus coosae</i>	redeye bass								
<i>Micropterus punctulatus</i>	spotted bass								X
<i>Micropterus salmoides</i>	largemouth bass					X			X
<i>Pomoxis annularis</i>	white crappie								
<i>Pomoxis nigromaculatus</i>	black crappie								
<i>Ammocrypta beanii</i>	naked sand darter								
<i>Ammocrypta bifascia</i>	Florida sand darter								
<i>Ammocrypta meridiana</i>	southern sand darter								
<i>Etheostoma chlorosomum</i>	bluntnose darter								
<i>Etheostoma colorosum</i>	coastal darter								
<i>Etheostoma dawsoni</i>	Choctawhatchee darter								
<i>Etheostoma edwini</i>	brown darter								
<i>Etheostoma fusiforme</i>	swamp darter								
<i>Etheostoma histrio</i>	harlequin darter								
<i>Etheostoma lachneri</i>	Tombigbee darter							X	
<i>Etheostoma nigrum</i>	johnny darter					X		X	
<i>Etheostoma proeliare</i>	cypress darter					X		X	
<i>Etheostoma ramseyi</i>	Alabama darter								
<i>Etheostoma rupestre</i>	rock darter								
<i>Etheostoma stigmaeum</i>	speckled darter						X		
<i>Etheostoma swaini</i>	gulf darter							X	
<i>Etheostoma zonifer</i>	backwater darter								
<i>Percina kathae</i>	Mobile logperch								
<i>Percina nigrofasciata</i>	blackbanded darter							X	X
<i>Percina sciera</i>	dusky darter								X
<i>Percina vigil</i>	saddleback darter								
<i>Elassoma zonatum</i>	banded pygmy sunfish								

GSA collection number

Scientific name	Common name	2328	2343	2329	2345	2309	2310	2369	2370
<i>Lepisosteus oculatus</i>	spotted gar								
<i>Lepisosteus osseus</i>	longnose gar								
<i>Amia calva</i>	bowfin					X			
<i>Dorosoma cepedianum</i>	gizzard shad	X							
<i>Campostoma oligolepis</i>	largescale stoneroller								
<i>Cyprinella venusta</i>	blacktail shiner			X	X		X		X
<i>Hybopsis winchelli</i>	clear chub								
<i>Hybopsis sp. cf winchelli</i>									
<i>Luxilus chrysocephalus</i>	striped shiner			X					
<i>Lythrurus atrapiculus</i>	blacktip shiner								
<i>Lythrurus bellus</i>	pretty shiner		X		X		X	X	
<i>Lythrurus roseipinnis</i>	cherryfin shiner								
<i>Nocomis leptcephalus</i>	bluehead chub			X					
<i>Notemigonus crysoleucas</i>	golden shiner		X				X	X	
<i>Notropis ammophilus</i>	orangefin shiner								
<i>Notropis amplamata</i>	longjaw minnow								
<i>Notropis baileyi</i>	rough shiner			X					
<i>Notropis chalybaeus</i>	ironcolor shiner								
<i>Notropis chrosomus</i>	rainbow shiner								
<i>Notropis harperi</i>	redeye chub								
<i>Notropis longirostris</i>	longnose shiner								
<i>Notropis maculatus</i>	taillight shiner	X							
<i>Notropis petersoni</i>	coastal shiner								
<i>Notropis photogenis</i>	silver minnow								
<i>Notropis texanus</i>	weed shiner		X		X		X	X	X
<i>Opsopoeodus emiliae</i>	pugnose minnow				X				
<i>Pimephales vigilax</i>	bullhead minnow	X					X		
<i>Pteronotropis grandipinnis</i>	Apalachee shiner								
<i>Pteronotropis hypselopterus</i>	sailfin shiner								
<i>Pteronotropis signipinnis</i>	flagfin shiner								
<i>Pteronotropis welaka</i>	bluenose shiner								
<i>Erimyzon oblongus</i>	creek chubsucker								
<i>Erimyzon suetta</i>	lake chubsucker								
<i>Erimyzon tenuis</i>	sharpfin chubsucker				X				
<i>Hypentelium etowanum</i>	Alabama hog sucker						X		
<i>Ictiobus bubalus</i>	smallmouth buffalo								
<i>Minytrema melanops</i>	spotted sucker								
<i>Moxostoma carinatum</i>	river redhorse						X		
<i>Moxostoma poecilurum</i>	blacktail redhorse						X		
<i>Ameiurus melas</i>	black bullhead					X			
<i>Ameiurus natalis</i>	yellow bullhead								
<i>Noturus funebris</i>	black madtom								
<i>Noturus gyrinus</i>	tadpole madtom								
<i>Noturus leptacanthus</i>	speckled madtom			X					
<i>Noturus nocturnus</i>	freckled madtom								
<i>Pylodictis olivaris</i>	flathead catfish						X		
<i>Esox americanus</i>	redfin pickerel					X			
<i>Esox niger</i>	chain pickerel			X				X	
<i>Aphredoderus sayanus</i>	pirate perch		X			X		X	
<i>Labidesthes sicculus</i>	brook silverside	X	X	X			X		X

GSA collection number

Scientific name	Common name	2328	2343	2329	2345	2309	2310	2369	2370
<i>Fundulus escambiae</i>	russetfin topminnow								
<i>Fundulus notti</i>	bayou topminnow								
<i>Fundulus olivaceus</i>	blackspotted topminnow	X			X		X		
<i>Lucania goodei</i>	bluefin killifish								
<i>Gambusia affinis</i>	western mosquitofish		X	X	X			X	X
<i>Gambusia holbrookii</i>	eastern mosquitofish								
<i>Heterandria formosa</i>	least killifish								
<i>Cottus carolinae</i>	banded sculpin								
<i>Ambloplites ariommus</i>	shadow bass						X		
<i>Ambloplites rupestris</i>	rock bass								
<i>Centrarchus macropterus</i>	flier			X					
<i>Lepomis auritus</i>	redbreast sunfish								
<i>Lepomis cyanellus</i>	green sunfish					X			
<i>Lepomis gulosus</i>	warmouth								
<i>Lepomis macrochirus</i>	bluegill	X	X	X	X		X	X	
<i>Lepomis marginatus</i>	dollar sunfish								
<i>Lepomis megalotis</i>	longear sunfish	X			X		X		
<i>Lepomis microlophus</i>	redear sunfish								
<i>Lepomis miniatus</i>	redspotted sunfish				X	X			
<i>Micropterus coosae</i>	redeye bass								
<i>Micropterus punctulatus</i>	spotted bass								
<i>Micropterus salmoides</i>	largemouth bass	X	X	X			X		X
<i>Pomoxis annularis</i>	white crappie								X
<i>Pomoxis nigromaculatus</i>	black crappie	X							
<i>Ammocrypta beanii</i>	naked sand darter						X		
<i>Ammocrypta bifascia</i>	Florida sand darter								
<i>Ammocrypta meridiana</i>	southern sand darter						X		
<i>Etheostoma chlorosomum</i>	bluntnose darter								
<i>Etheostoma colorosum</i>	coastal darter								
<i>Etheostoma davisoni</i>	Choctawhatchee darter								
<i>Etheostoma edwini</i>	brown darter								
<i>Etheostoma fusiforme</i>	swamp darter								
<i>Etheostoma histrio</i>	harlequin darter						X		
<i>Etheostoma lachneri</i>	Tombigbee darter					X			
<i>Etheostoma nigrum</i>	johnny darter					X		X	
<i>Etheostoma proeliare</i>	cypress darter								
<i>Etheostoma ramseyi</i>	Alabama darter								
<i>Etheostoma rupestre</i>	rock darter					X			
<i>Etheostoma stigmaeum</i>	speckled darter								
<i>Etheostoma swaini</i>	gulf darter							X	
<i>Etheostoma zonifer</i>	backwater darter								
<i>Percina kathae</i>	Mobile logperch							X	
<i>Percina nigrofasciata</i>	blackbanded darter					X		X	
<i>Percina sciera</i>	dusky darter							X	
<i>Percina vigil</i>	saddleback darter							X	
<i>Elassoma zonatum</i>	banded pygmy sunfish		X		X			X	

GSA collection number

Scientific name	Common name	2371	2306	2372	2308	2373	2374	2375	2376	2327
<i>Lepisosteus oculatus</i>	spotted gar									
<i>Lepisosteus osseus</i>	longnose gar									
<i>Amia calva</i>	bowfin									
<i>Dorosoma cepedianum</i>	gizzard shad									
<i>Campostoma oligolepis</i>	largescale stoneroller									
<i>Cyprinella venusta</i>	blacktail shiner									
<i>Hybopsis winchelli</i>	clear chub									
<i>Hybopsis sp. cf winchelli</i>										
<i>Luxilus chrysocephalus</i>	striped shiner									
<i>Lythrurus atrapiculus</i>	blacktip shiner									
<i>Lythrurus bellus</i>	pretty shiner									X
<i>Lythrurus roseipinnis</i>	cherryfin shiner		X						X	
<i>Nocomis leptcephalus</i>	bluehead chub									
<i>Notemigonus crysoleucas</i>	golden shiner									
<i>Notropis ammophilus</i>	orangefin shiner									
<i>Notropis amplamata</i>	longjaw minnow									
<i>Notropis baileyi</i>	rough shiner									
<i>Notropis chalybaeus</i>	ironcolor shiner									
<i>Notropis chrosomus</i>	rainbow shiner									
<i>Notropis harperi</i>	redeye chub									
<i>Notropis longirostris</i>	longnose shiner									
<i>Notropis maculatus</i>	taillight shiner									
<i>Notropis petersoni</i>	coastal shiner									
<i>Notropis photogenis</i>	silver minnow									
<i>Notropis texanus</i>	weed shiner		X							X
<i>Opsopoeodus emiliae</i>	pugnose minnow									
<i>Pimephales vigilax</i>	bullhead minnow									
<i>Pteronotropis grandipinnis</i>	Apalachee shiner									
<i>Pteronotropis hypselopterus</i>	sailfin shiner		X						X	
<i>Pteronotropis signipinnis</i>	flagfin shiner				X	X			X	
<i>Pteronotropis welaka</i>	bluenose shiner		X							
<i>Erimyzon oblongus</i>	creek chubsucker									
<i>Erimyzon suetta</i>	lake chubsucker									
<i>Erimyzon tenuis</i>	sharpfin chubsucker				X	X	X	X		
<i>Hypentelium etowanum</i>	Alabama hog sucker									
<i>Ictiobus bubalus</i>	smallmouth buffalo									
<i>Minytrema melanops</i>	spotted sucker									
<i>Moxostoma carinatum</i>	river redhorse									
<i>Moxostoma poecilurum</i>	blacktail redhorse									
<i>Ameiurus melas</i>	black bullhead									
<i>Ameiurus natalis</i>	yellow bullhead							X		
<i>Noturus funebris</i>	black madtom						X			
<i>Noturus gyrinus</i>	tadpole madtom					X				
<i>Noturus leptacanthus</i>	speckled madtom								X	
<i>Noturus nocturnus</i>	freckled madtom				X					
<i>Pylodictis olivaris</i>	flathead catfish									
<i>Esox americanus</i>	redfin pickerel						X	X	X	
<i>Esox niger</i>	chain pickerel									
<i>Aphredoderus sayanus</i>	pirate perch									
<i>Labidesthes sicculus</i>	brook silverside				X	X	X	X	X	X

Scientific name	Common name	GSA collection number							
		2371	2306	2372	2308	2373	2374	2375	2376
<i>Fundulus escambiae</i>	russetfin topminnow								
<i>Fundulus notti</i>	bayou topminnow	X			X	X	X	X	
<i>Fundulus olivaceus</i>	blackspotted topminnow		X					X	
<i>Lucania goodei</i>	bluefin killifish								
<i>Gambusia affinis</i>	western mosquitofish								X
<i>Gambusia holbrookii</i>	eastern mosquitofish	X		X	X	X		X	
<i>Heterandria formosa</i>	least killifish								
<i>Cottus carolinae</i>	banded sculpin								
<i>Ambloplites ariommus</i>	shadow bass								
<i>Ambloplites rupestris</i>	rock bass								
<i>Centrarchus macropterus</i>	flier						X		
<i>Lepomis auritus</i>	redbreast sunfish								
<i>Lepomis cyanellus</i>	green sunfish								
<i>Lepomis gulosus</i>	warmouth			X					
<i>Lepomis macrochirus</i>	bluegill			X		X			X
<i>Lepomis marginatus</i>	dollar sunfish								
<i>Lepomis megalotis</i>	longear sunfish			X			X	X	
<i>Lepomis microlophus</i>	redear sunfish								
<i>Lepomis miniatus</i>	redspotted sunfish		X	X	X	X		X	X
<i>Micropterus coosae</i>	redeye bass								
<i>Micropterus punctulatus</i>	spotted bass			X				X	
<i>Micropterus salmoides</i>	largemouth bass					X			
<i>Pomoxis annularis</i>	white crappie								
<i>Pomoxis nigromaculatus</i>	black crappie								
<i>Ammocrypta beanii</i>	naked sand darter								
<i>Ammocrypta bifascia</i>	Florida sand darter								
<i>Ammocrypta meridiana</i>	southern sand darter								
<i>Etheostoma chlorosomum</i>	bluntnose darter								
<i>Etheostoma colorosum</i>	coastal darter								
<i>Etheostoma davisoni</i>	Choctawhatchee darter								
<i>Etheostoma edwini</i>	brown darter								
<i>Etheostoma fusiforme</i>	swamp darter			X	X	X			
<i>Etheostoma histrio</i>	harlequin darter								
<i>Etheostoma lachneri</i>	Tombigbee darter								
<i>Etheostoma nigrum</i>	johnny darter								
<i>Etheostoma proeliare</i>	cypress darter								
<i>Etheostoma ramseyi</i>	Alabama darter								
<i>Etheostoma rupestre</i>	rock darter								
<i>Etheostoma stigmaeum</i>	speckled darter							X	
<i>Etheostoma swaini</i>	gulf darter								
<i>Etheostoma zonifer</i>	backwater darter								
<i>Percina kathae</i>	Mobile logperch								
<i>Percina nigrofasciata</i>	blackbanded darter	X		X			X		
<i>Percina sciera</i>	dusky darter								
<i>Percina vigil</i>	saddleback darter								
<i>Elassoma zonatum</i>	banded pygmy sunfish			X		X			

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