An Assessment of the Fish Community in Lake Acworth

By

John Damer
Fisheries Biologist

Georgia Department of Natural Resources
Wildlife Resources Division
Fisheries Section
Calhoun, GA 30701

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Introduction

Lake Acworth is a ~260-acre impoundment located near the city of Acworth, Georgia. It is a sub-impoundment of the much larger Allatoona Lake, operated by the Army Corps of Engineers. A 1,500-foot long dam composed mostly of earthen fill impounds Proctor Creek, separating Lake Acworth from Allatoona Lake. In the center of the dam a sixty-foot concrete spillway is flanked by concrete non-overflow sections that support a heavily-trafficked bridge on Lake Acworth Drive (Hwy 90). The elevation of the spillway is 848 feet above mean sea level (ft-msl), making it only eight feet higher than the normal summer pool of Lake Allatoona (840 ft-msl). Two 24" inch valved drains were incorporated into the Acworth spillway during construction, allowing the lake to be drained to an elevation of 831.5 ft-msl. Because of the small height differential between Lake Allatoona and this sub-impoundment, Lake Allatoona backs up over the Acworth spillway with reasonable frequency during high water events (every ~5-10 years). During these high water events fish can move freely from Allatoona Lake into Lake Acworth.

In stark contrast to Allatoona Lake, which holds mostly spotted bass, Lake Acworth boasts a healthy largemouth bass population. If an angler prefers, catfish, crappie, and bream offer good alternatives to black bass fishing. Because of the small size of the lake and the presence of a public beach on its northern shore, boaters are limited by the City of Acworth to using electric motors when moving about the lake.

Methods

Region 1 Fisheries personnel sampled Lake Acworth on May 9, 2008 using boat-mounted pulsed-DC electrofishing gear. Four evenly spaced sample sites were selected around the shoreline of the lake (Figure 1). The shoreline was sampled in a clockwise direction for a total of 30 minutes pedal time (time when electricity is actually in the water) at each site, and all species of fish were netted and placed into a livewell on the boat. After each sample was complete, fish were identified, weighed (g, game fish only), and measured for total length (TL mm), and then returned to the water. Largemouth bass were also collected in December 2007 for age and growth analysis as part of a fish contaminant study. Results from this analysis are included in this study.

Results

A total of 414 fish from 18 different species were collected from Lake Acworth (Table 1). The most abundant species were bluegill and largemouth bass, which accounted for 33% and 27% of the total catch (by number), respectively. Of the sixteen other species collected, none represented more than 10% of the total number of fish collected. With the exception of three species (black crappie, white crappie, and redbreast sunfish) mean condition factors (*kn*) of game species were average or above (i.e., 1.0 or above; Table 2).

The mean *kn* for all largemouth bass collected was 1.0 (range: 0.81 – 1.44), suggesting an "average" condition relative to other Georgia waterbodies. Largemouth ranged from 145 - 579 mm in total length (6.0 - 22.8 inches), and from 33 to 3,202 g in weight (0.1 - 7.1 lbs; Table 3). Of the total biomass of all game species collected (148.3 kg), largemouth bass accounted for the majority (53%; 78.4 kg) of the sample. Growth coefficient (*K*) of largemouth bass in Lake Acworth (0.242; Figure 2) was much higher than in Lake Allatoona (0.171) or Lake Weiss (0.207; unpublished data). Spotted bass were less common (Figure 3), but were generally of similar size and weight when compared to largemouth bass (Table 3, Figure 4).

Although bluegill was the most abundant species in the sample in terms of raw numbers (Figure 3), most individuals were relatively small (mean length = 115.9 mm) and only accounted for 4.4 kg (3.0%) of the total biomass of game species collected. Bluegill ranged from 61 - 174 mm in total length (2.4 – 6.9 inches), and from 3 to 113 g in weight (0.1 – 4.0 oz; Table 3). Average condition factor for bluegill was high. Values of *kn* ranging from 0.9 – 1.76 were observed, with an overall mean of 1.2. Redear sunfish were also present in the sample, except at Site 1 where none were collected. Redear were larger than bluegill on average (151.9 mm and 62.5 g). Mean *kn* for redear was 1.1. Redbreast sunfish, green sunfish, and warmouth were also present in Lake Acworth, but in low numbers (Figure 6).

Both black crappie and white crappie were collected from Lake Acworth. Black crappie abundance (15.5 fish per hour) was more than twice that of white crappie (7 fish per hour; Figure 3). Black crappie averaged 258 mm in length and 252 g in weight, while white crappie were slightly larger, averaging 273 mm in length and 292 g in weight. A few individuals from both species weighed close to 1.5 lbs (0.68 kg).

Several species of catfish, including channel, flathead, and brown bullhead, were observed in Lake Acworth. Catch per hour for each of these species was low (Figure 7), although that is to be expected with the sampling gear employed in this study (standard boat-mounted electrofishing methods do not effectively sample most catfish populations). One trophy-sized flathead catfish was captured during the sample (Figure 8), measuring over 1 meter (39.8 in) in length and 28.1 kg (62 lbs) in weight. This specimen was large enough to account for 19% of the total weight of game fish collected.

Discussion

In its present state, Lake Acworth supports an exceptional fishery for largemouth bass, as well as providing opportunities for quality crappie, catfish, and bream fishing. Size, growth, and condition of bass are good, suggesting that these predators have a plentiful supply of prey, including small bluegill and other sunfish, threadfin and gizzard shad, and yellow perch. The presence of large flathead catfish in such a small impoundment also indicates high abundance of forage species, as large quantities of food are required for fish to grow to such great size.

The emergent aquatic vegetation found along the shoreline of Lake Acworth certainly plays a role in forage fish production. This vegetation provides food, as well as spawning and rearing habitat for young fish, and removes excessive nutrients and harmful chemicals from the water column. However, plant cover in an impoundment can sometimes be harmful to fish populations as well. Excessive plant cover can reduce dissolved oxygen levels, and can reduce the ability for predators, such bass and humans (anglers), to capture fish. Fortunately, the amount vegetation along the shoreline of Lake Acworth is not excessive and is considered beneficial, not harmful, to the fish community. Therefore, no aquatic weed control is necessary at this time.

Current management practices (i.e. general statewide regulations) have been, and should continue to be sufficient to sustain the quality fishing opportunities offered by Lake Acworth. Should fishing pressure or other variables (aquatic vegtetation) change significantly in the future, changes in management strategy may be warranted, but none are needed at the present time.

TABLE 1. Numbers of each species collected at four sites on Lake Acworth, May 9, 2008. Effort for each site was 30 minutes pedal time.

Species	Catch				
	Site 1	Site 2	Site 3	Site 4	Total
Bluegill	62	38	21	15	136
Largemouth bass	21	27	42	21	111
Redear Sunfish	0	13	7	18	38
Black Crappie	2	19	8	2	31
Gizzard Shad	0	6	8	8	22
Common Carp	4	6	6	2	18
White Crappie	0	6	4	4	14
Spotted Bass	9	2	1	1	13
Brown Bullhead	1	1	3	2	7
Channel Catfish	2	0	3	0	5
Warmouth	0	1	1	3	5
Yellow Perch	0	0	3	1	4
Blacktail Redhorse	2	0	1	0	3
Flathead Catfish	1	1	0	0	2
Green Sunfish	2	0	0	0	2
Golden Shiner	0	0	1	0	1
Redbreast Sunfish	1	0	0	0	1
Threadfin Shad	0	1	0	0	1
Total	107	121	109	77	414

TABLE 2. Condition factor (*kn*) of game fish collected from Lake Acworth, May 9, 2008.

Species	N	Mean	Std Dev	Minimum	Maximum
Bluegill	136	1.2	0.1	0.9	1.76
Largemouth bass	111	1.0	0.1	0.81	1.44
Redear sunfish	38	1.1	0.1	0.94	1.36
Black crappie	31	0.9	0.1	0.72	1.08
White crappie	14	0.9	0.1	0.8	1.05
Spotted bass	13	1.1	0.1	0.93	1.32
Brown bullhead	7	1.2	0.1	1.03	1.4
Channel catfish	5	1.1	0.1	0.97	1.26
Warmouth	5	1.3	0.3	0.7	1.61
Yellow perch	4	1.1	0.0	1.1	1.17
Flathead catfish	2	1.5	0.7	0.93	1.98
Green sunfish	2	1.1	0.2	0.95	1.2
Redbreast sunfish	1	0.6	NA	0.6	0.6

TABLE 3. Mean, standard deviation, minimum, and maximum values of length and weight for each species collected from Lake Acworth, May 9, 2008. Weight data was collected for game fish only.

Species	N	Length (mm)				Weight (grams)			
		Mean	Std Dev	Minimum	Maximum	Mean	Std Dev	Minimum	Maximum
Bluegill	136	115.9	24.4	61	174	32.3	21.2	3	113
Largemouth bass	111	347.8	85.2	145	579	706.2	526.1	33	3202
Redear sunfish	38	151.9	21.6	87	189	62.5	22.2	11	106
Black crappie	31	257.7	57.7	159	360	251.5	172.0	40	627
Gizzard shad	22	223.0	33.0	170	282	.	.	.	.
Common carp	18	594.1	74.9	407	673	.	.	.	.
White crappie	14	272.7	59.9	183	361	291.7	195.2	63	640
Spotted bass	13	369.1	88.6	190	484	727.2	505.9	69	1644
Brown bullhead	7	303.1	15.1	284	325	406.1	72.3	291	488
Channel catfish	5	533.6	92.3	398	648	1877.6	1056.5	574	3484
Warmouth	5	203.6	21.2	183	232	213.6	104.2	79	323
Yellow perch	4	150.5	18.8	123	163	34.8	11.1	19	43
Blacktail redhorse	3	489.3	8.1	480	494	.	.	.	.
Flathead catfish	2	616.5	556.5	223	1010	14112.0	19814.6	101	28123
Green sunfish	2	116.5	30.4	95	138	34.5	29.0	14	55
Threadfin shad	1	91.0	.	91	91	.	.	.	.
Golden shiner	1	181.0	.	181	181	.	.	.	.
Redbreast sunfish	1	167.0	.	167	167	48.0	.	48	48

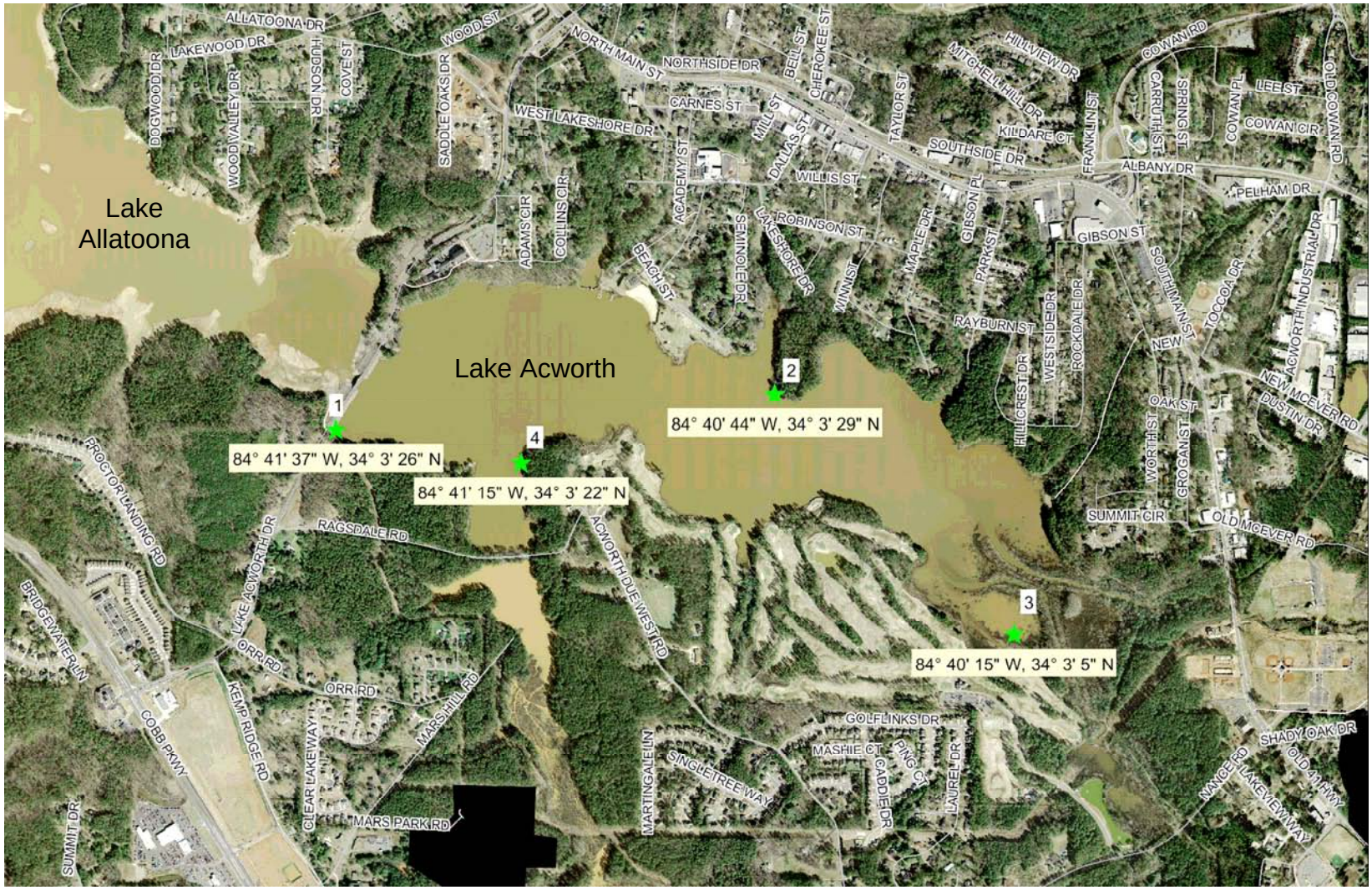

FIGURE 1. Starting locations of sample sites used in an electrofishing survey of Lake Acworth on May 9, 2008. Scale: 1:16,971

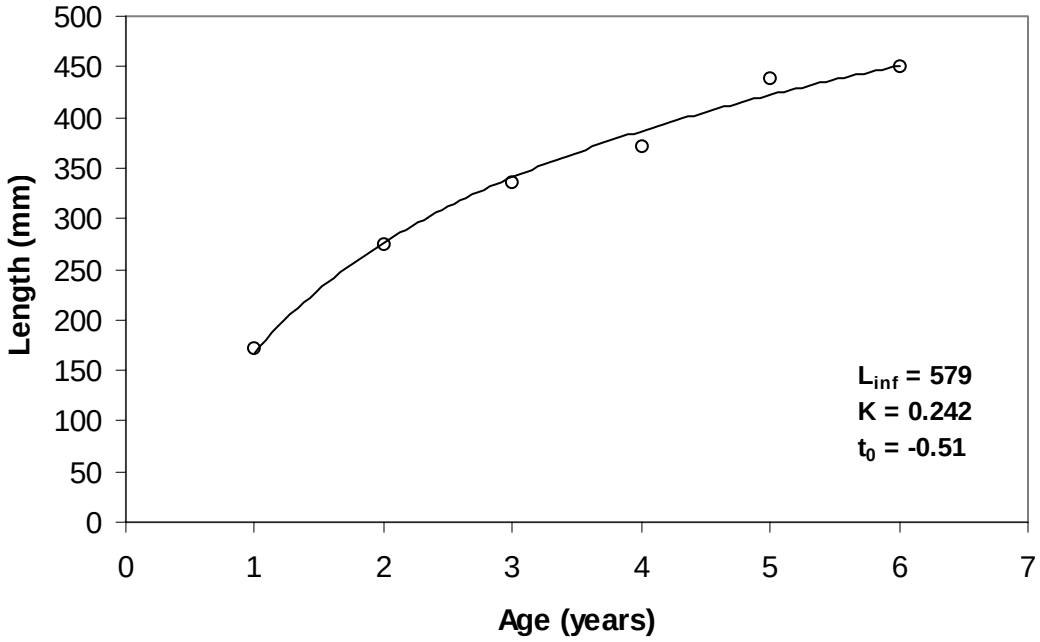

FIGURE 2. Length-at-age data for largemouth bass collected from Lake Acworth December 6, 2007 as part of a fish contaminant study.

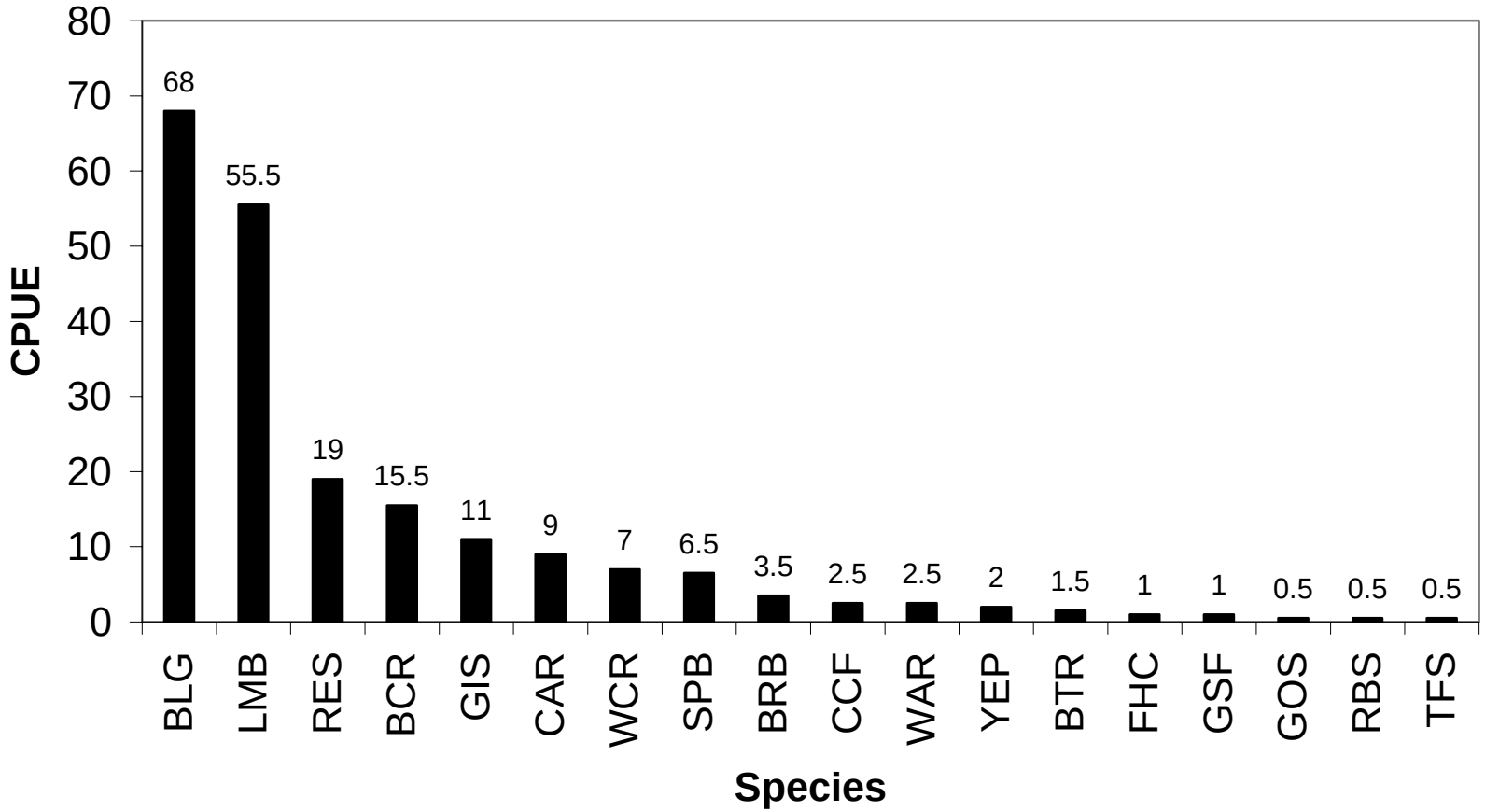

FIGURE 3. Mean catch-per-unit-effort (CPUE, fish/hr) of all species collected during an electrofishing survey of Lake Acworth on May 9, 2008 (Legend: bluegill = BLG, largemouth bass = LMB, redear sunfish = RES, black crappie = BCR, gizzard shad = GIS, common carp = CAR, white crappie = WCR, spotted bass = SPB, brown bullhead = BRB, channel catfish = CCF, warmouth = WAR, yellow perch = YEP, blacktail redhorse = BTR, flathead catfish = FHC, green sunfish = GSF, golden shiner = GOS, redbreast sunfish = RBS, threadfin shad = TFS).

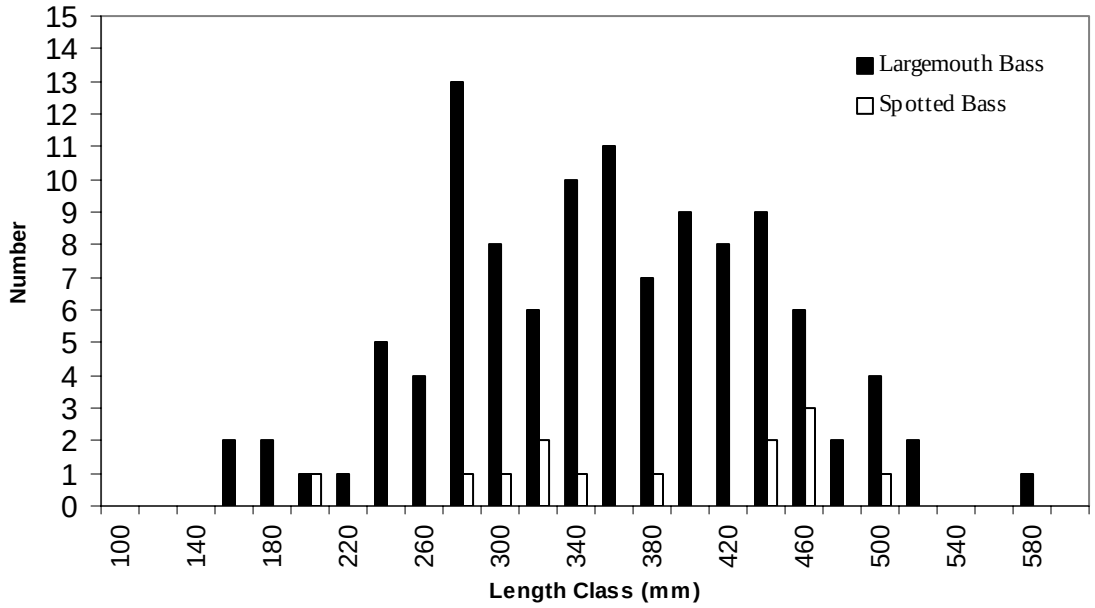

FIGURE 4. Length frequency of black bass (*Micropterus* spp.) collected during an electrofishing survey of Lake Acworth on May 9, 2008

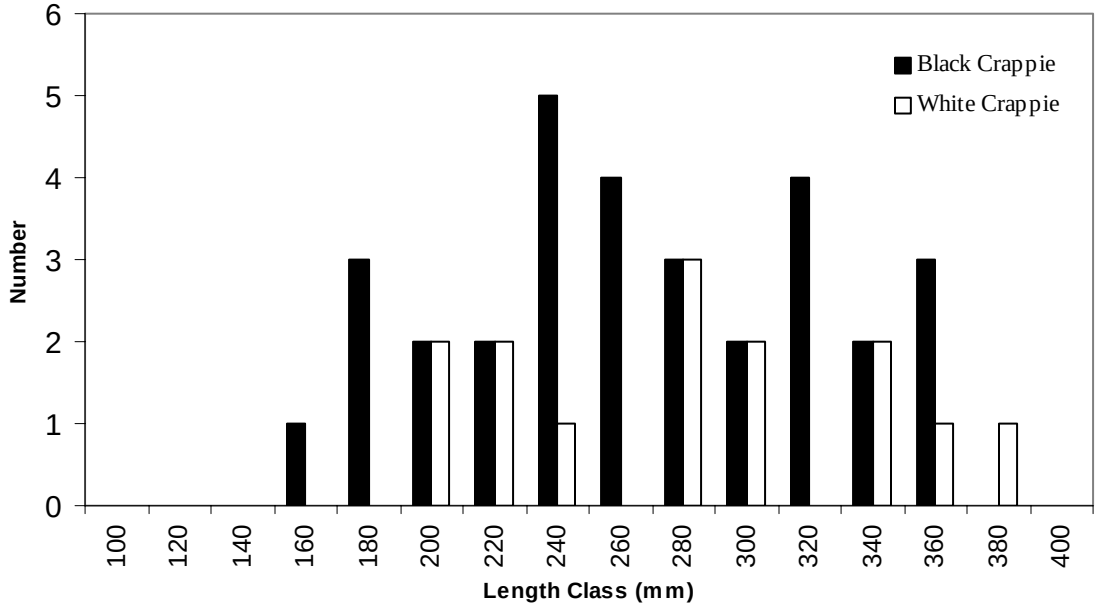

FIGURE 5. Length frequency of crappie (*Poxomis* spp.) collected during an electrofishing survey of Lake Acworth on May 9, 2008.

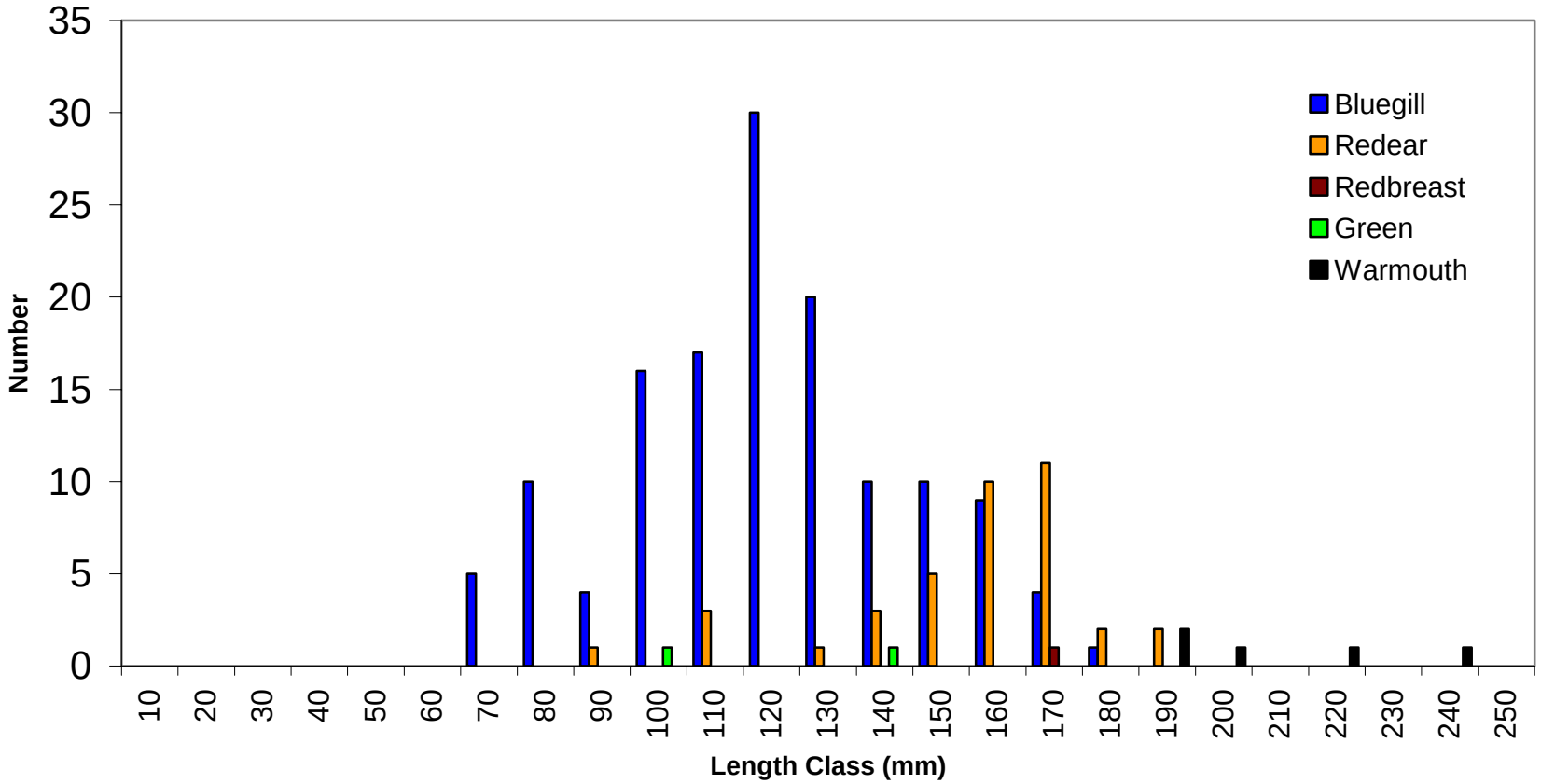

FIGURE 6. Length frequency of sunfish (*Lepomis* spp.) collected during an electrofishing survey of Lake Acworth on May 9, 2008.

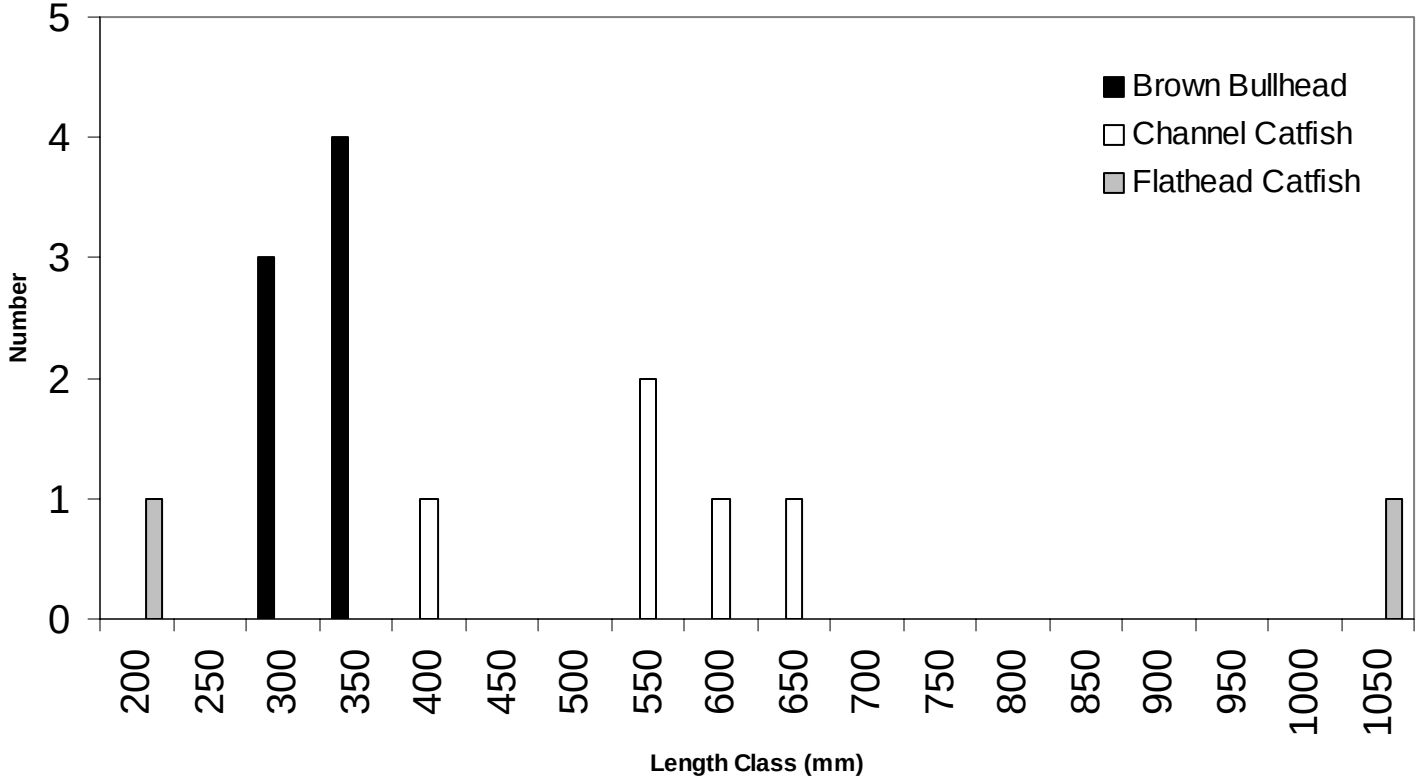

FIGURE 7. Length frequency of catfish (Family Ictaluridae) collected during an electrofishing survey of Lake Acworth on May 9, 2008.

FIGURE 8. Fisheries Technician Mark Bowen with a 62 lb flathead catfish captured on Lake Acworth, May 9, 2008.

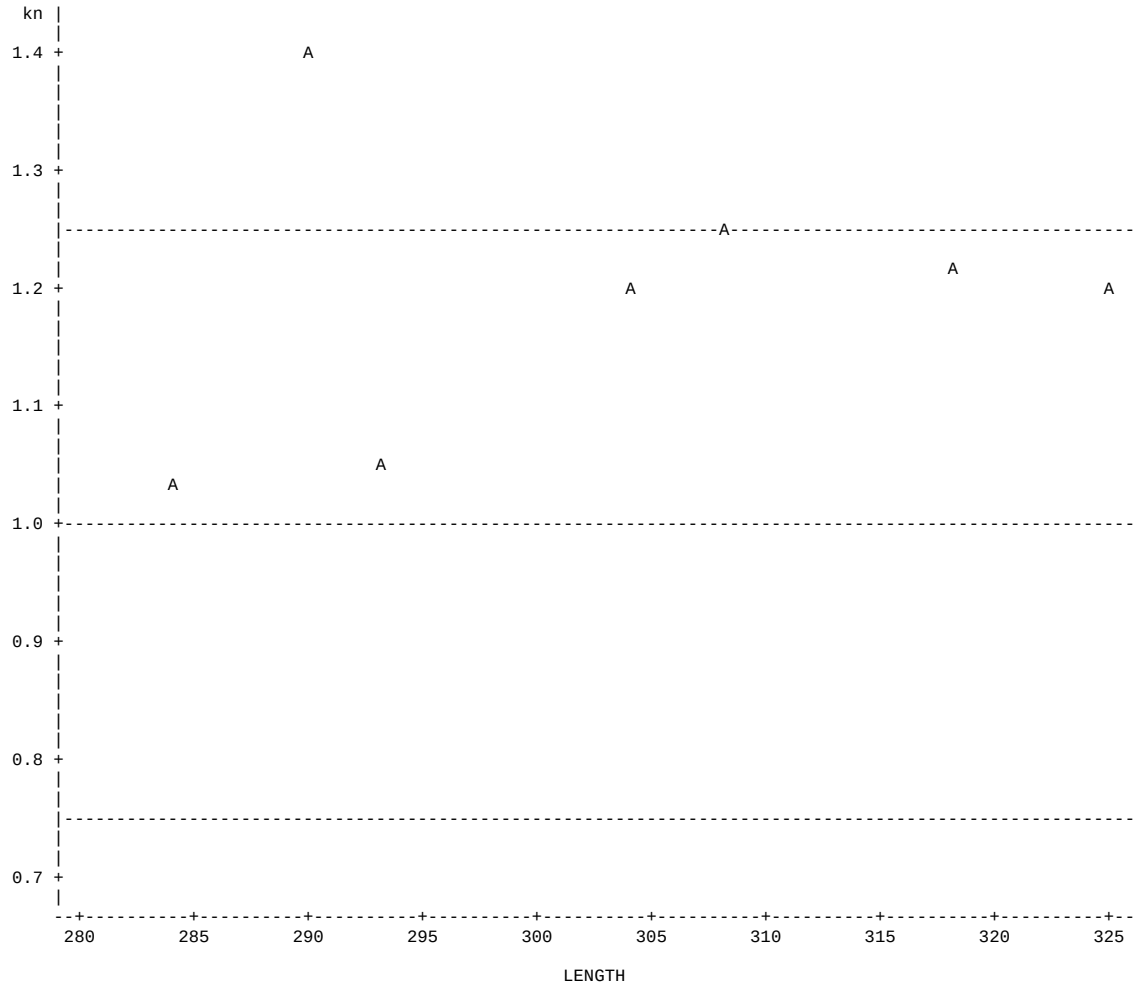

FIGURE 9. Condition factors (*kn*) of brown bullhead catfish collected from Lake Acworth, May 9, 2008.

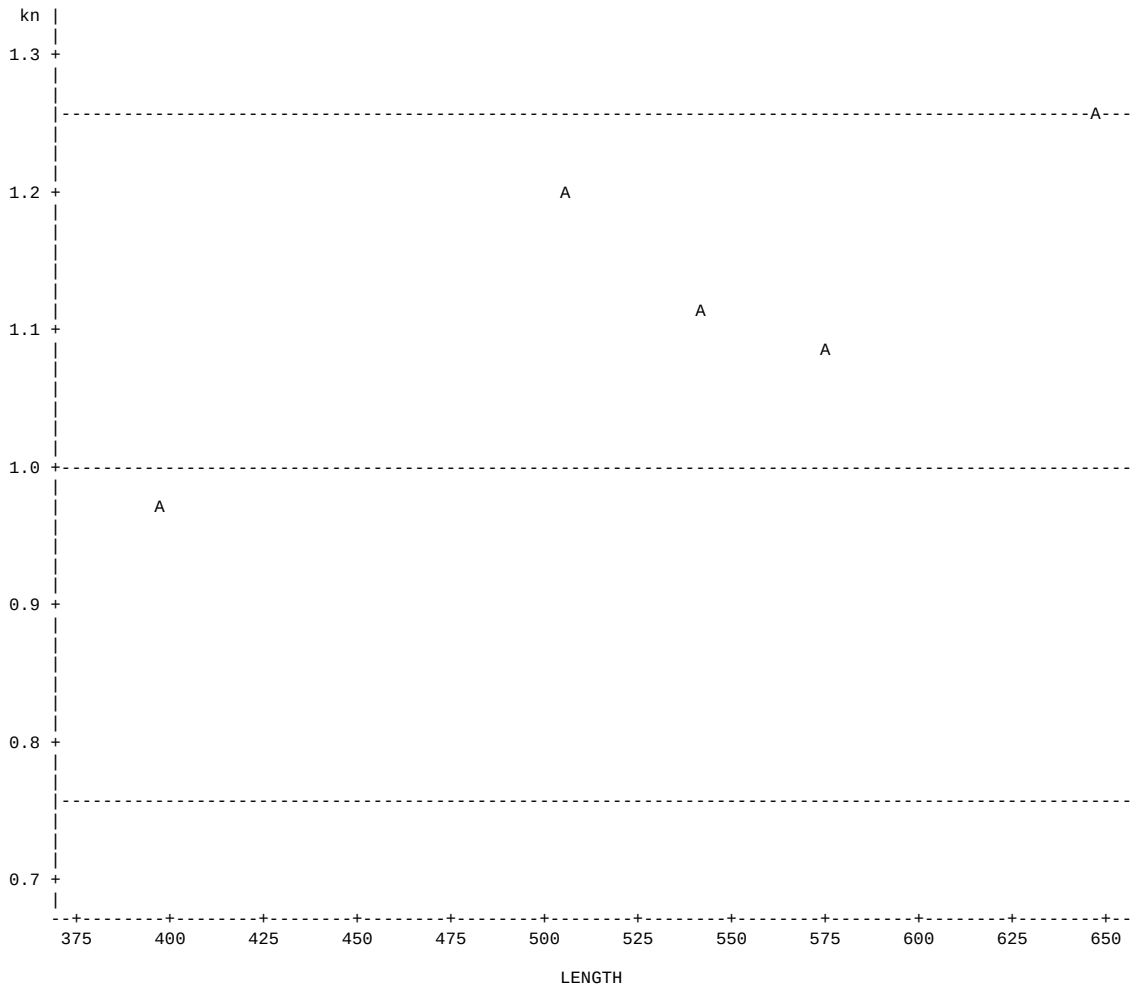

FIGURE 10. Condition factors (*kn*) of channel catfish collected from Lake Acworth, May 9, 2008.

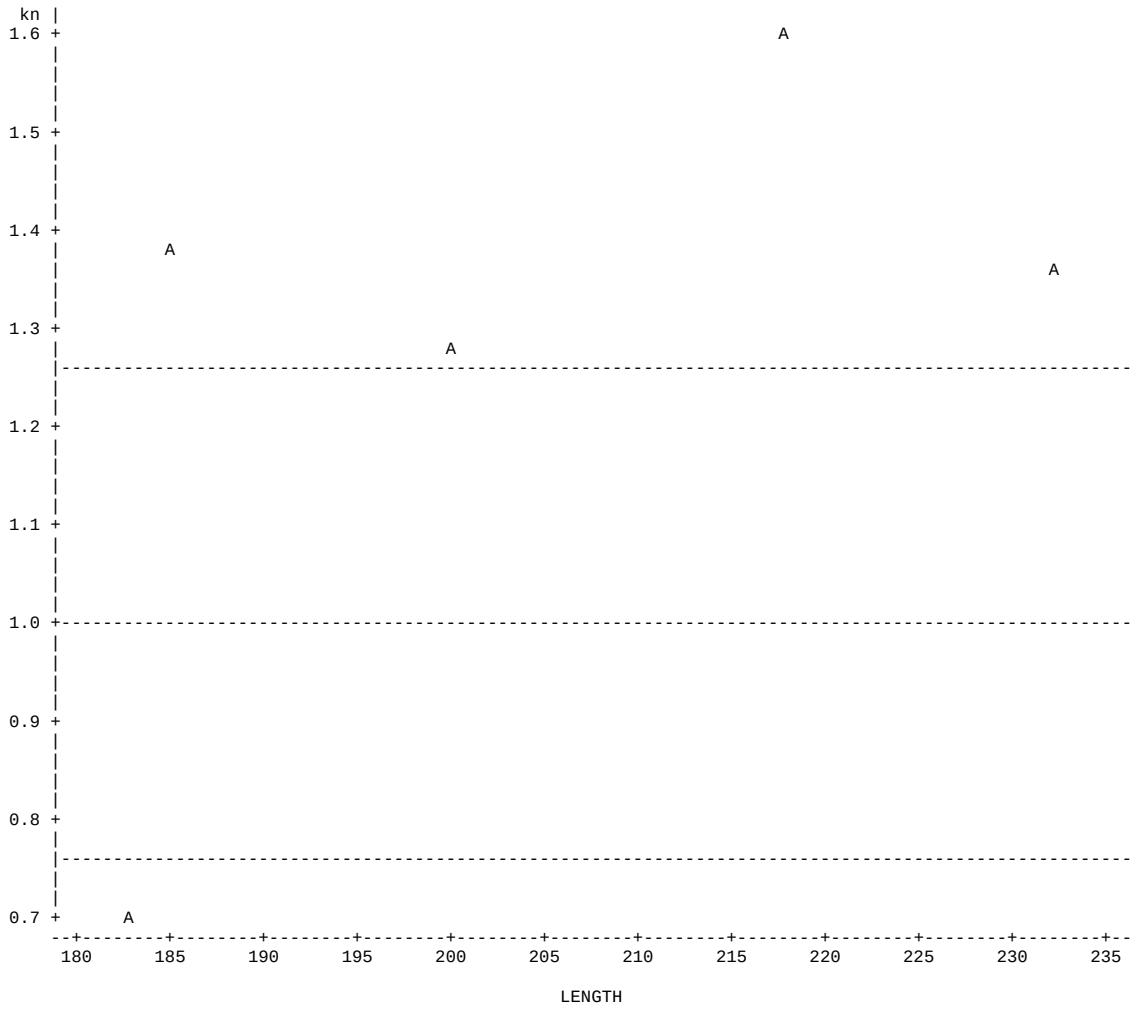

FIGURE 11. Condition factors (*kn*) of warmouth collected from Lake Acworth, May 9, 2008.

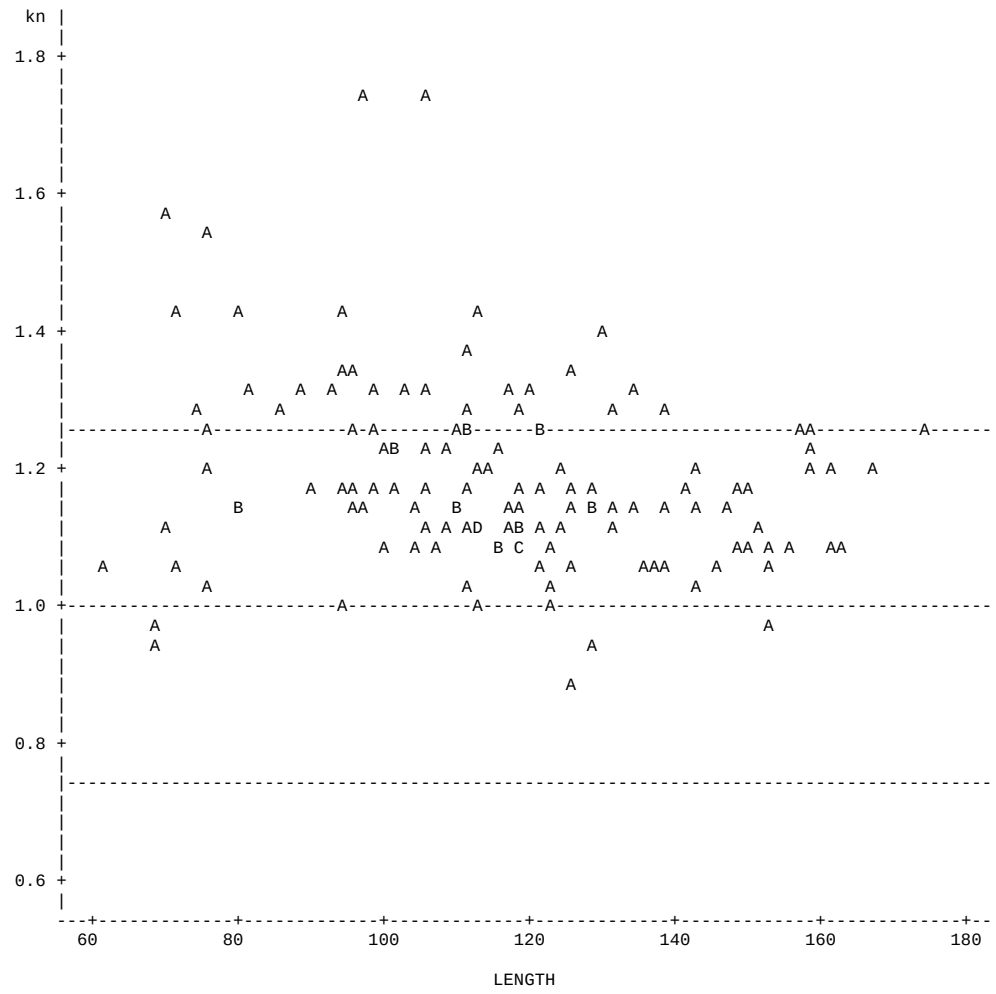

FIGURE 12. Condition factors (*kn*) of bluegill collected from Lake Acworth, May 9, 2008.

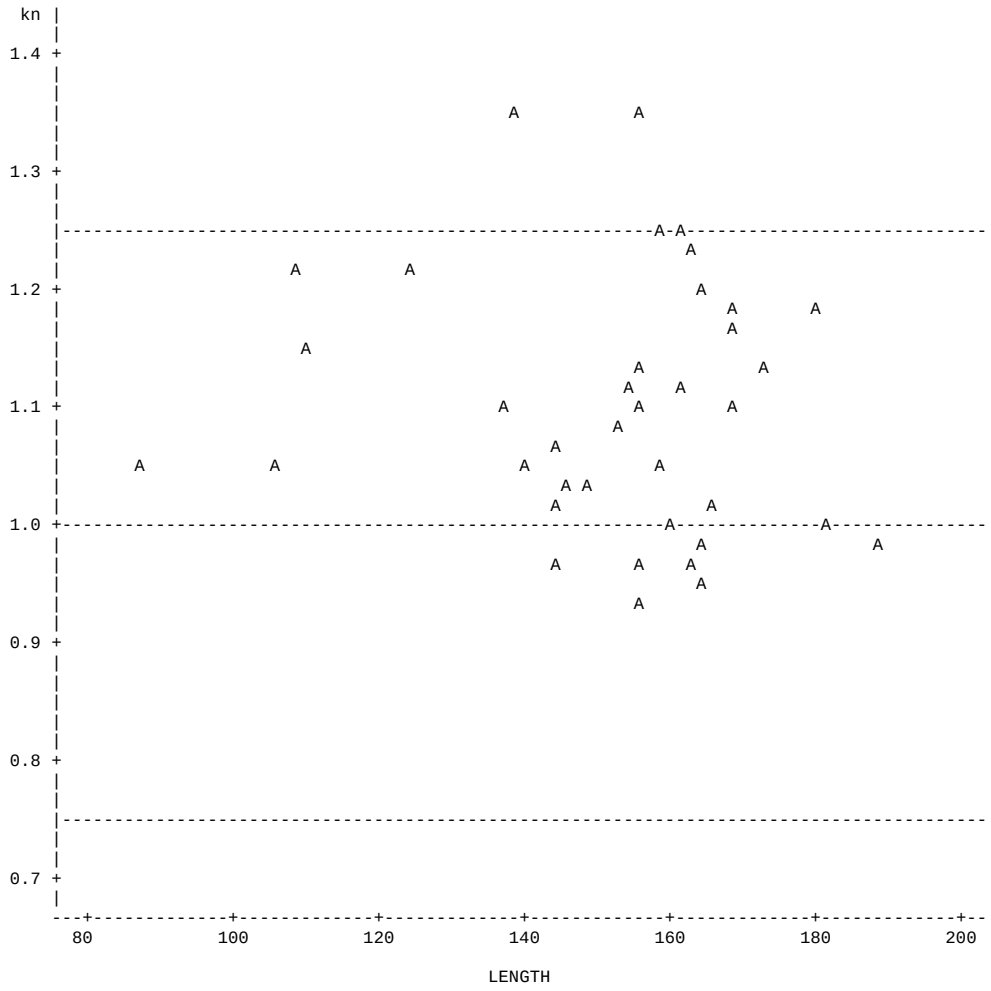

FIGURE 13. Condition factors (*kn*) of redear sunfish collected from Lake Acworth, May 9, 2008.

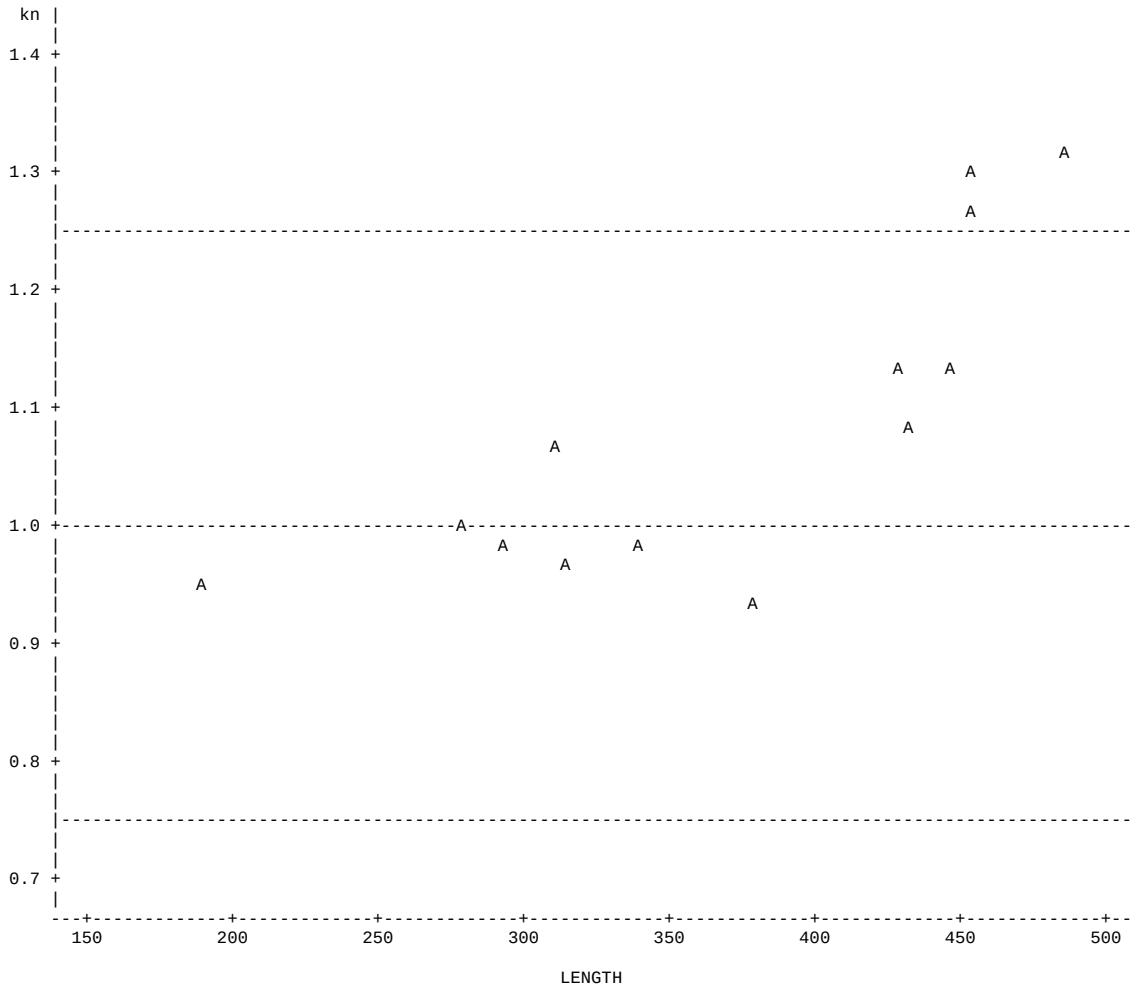

FIGURE 14. Condition factors (*kn*) of spotted bass collected from Lake Acworth, May 9, 2008.

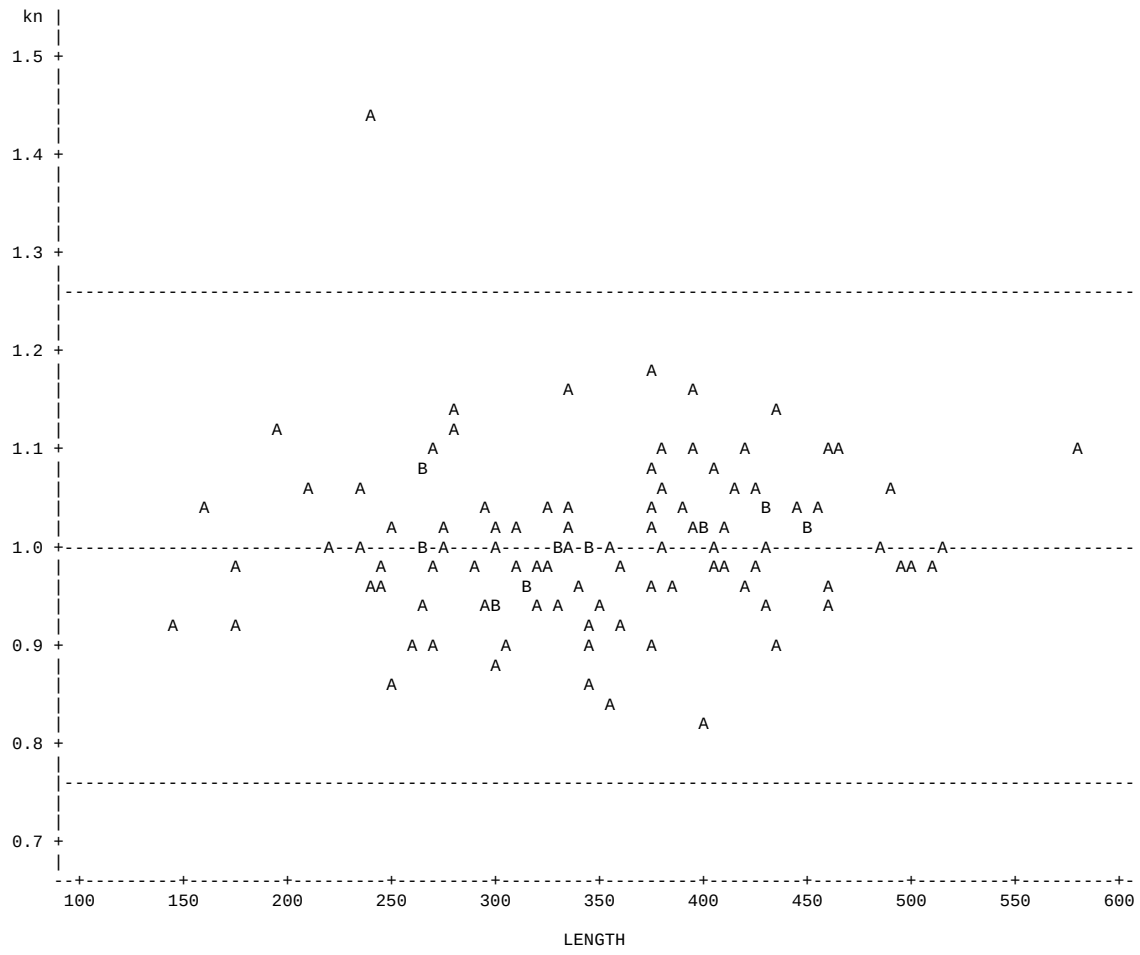

FIGURE 15. Condition factors (*kn*) of largemouth bass collected from Lake Acworth, May 9, 2008.

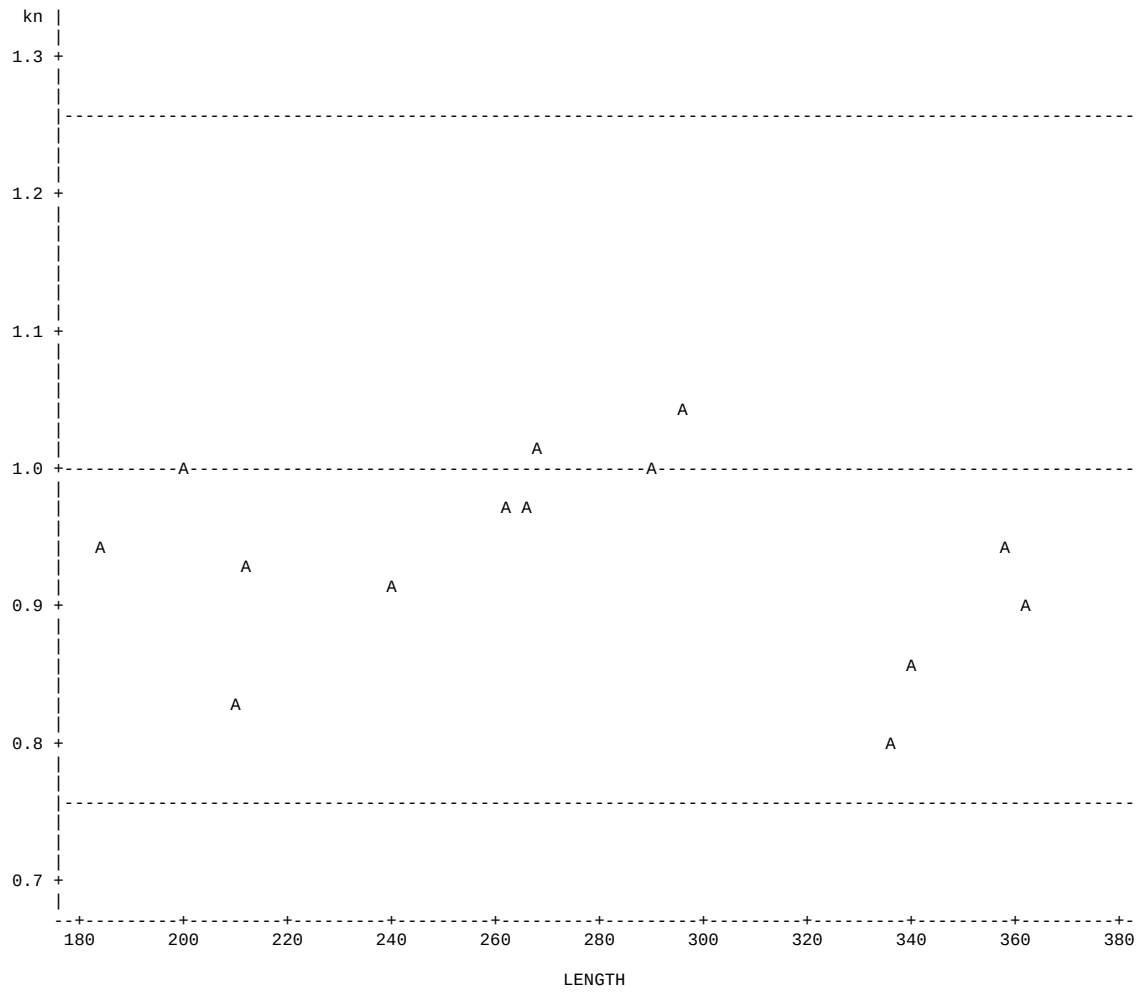

FIGURE 16. Condition factors (*kn*) of white crappie collected from Lake Acworth, May 9, 2008.

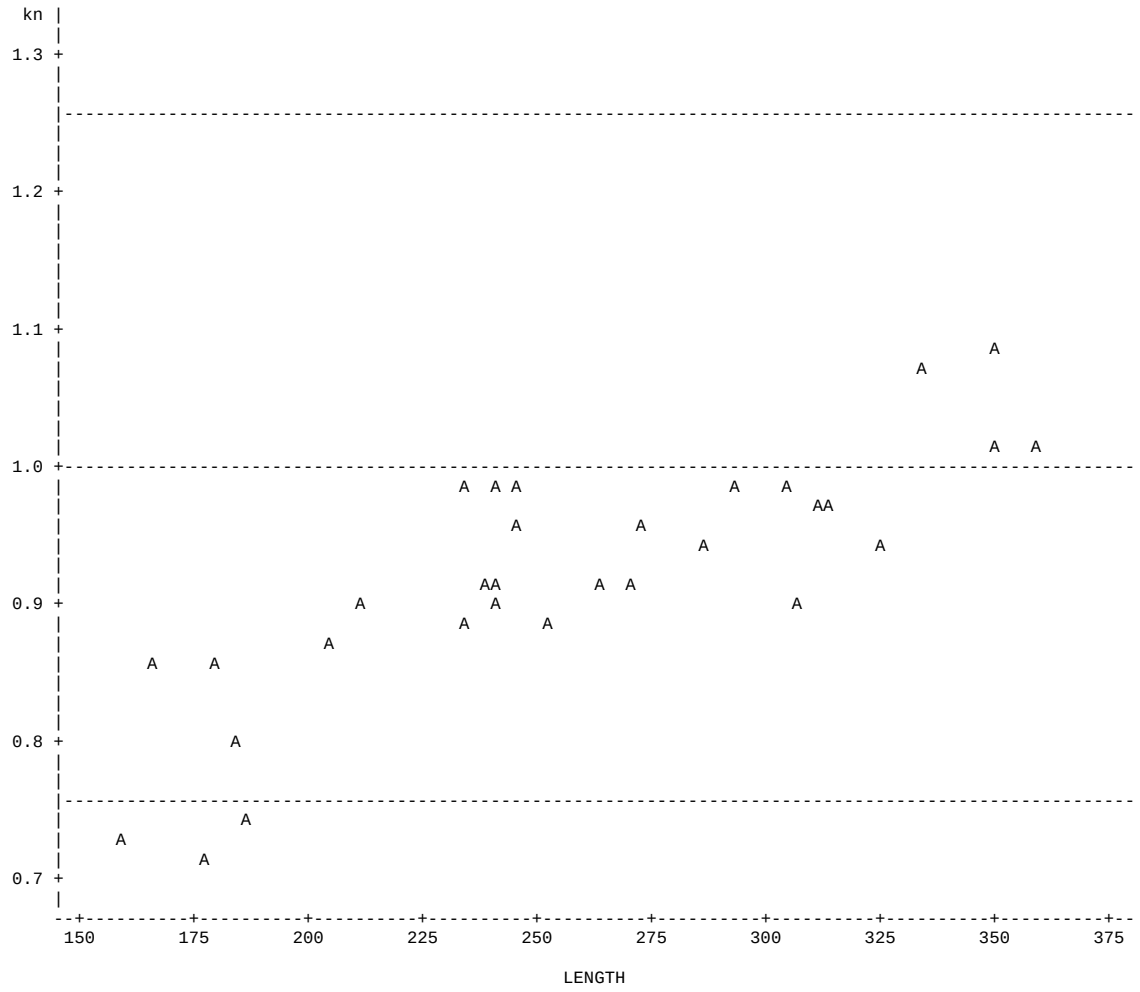

FIGURE 17. Condition factors (*kn*) of black crappie collected from Lake Acworth, May 9, 2008.

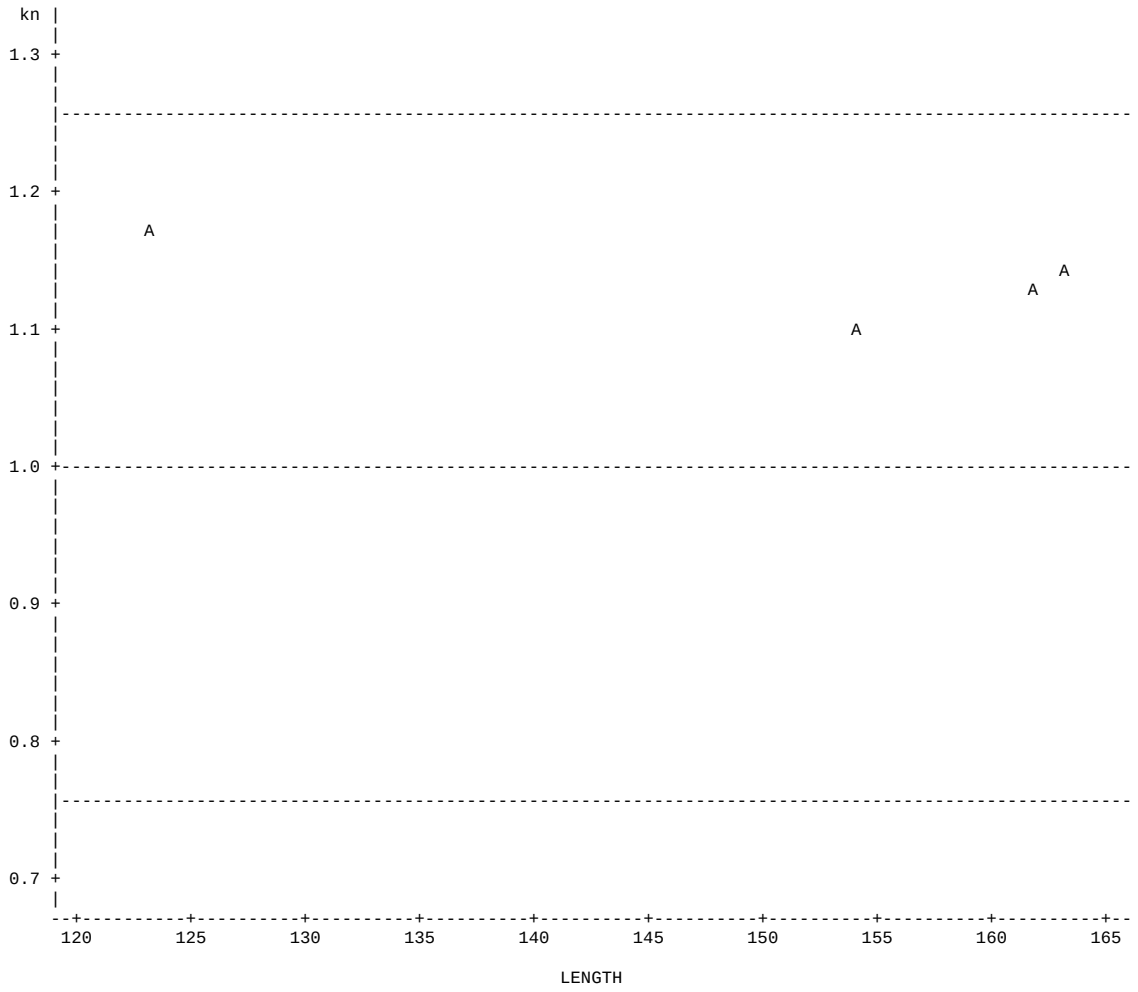

FIGURE 18. Condition factors (*kn*) of yellow perch collected from Lake Acworth, May 9, 2008.