Food Habits of Flathead Catfish in the Altamaha River System, Georgia

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Abstract: The food habits of flathead catfish *(Pylodictis olivaris)* in the Altamaha River system, Georgia were determined by examining the contents of 866 flathead catfish stomachs from the Altamaha and Ocmulgee rivers during the summer of 1997. Stomach contents were analyzed by frequency of occurrence, percent composition by weight, and percent composition by number. Dominant prey items consumed were centrarchids, ictalurids, and invertebrates. Invertebrates were the most prevalent diet item by number and weight consumed by flathead catfish <301 mm. Centrarchids were the dominant prey item consumed by flathead catfish >301mm. Since the establishment of flathead catfish in the Altamaha River system there has been a decrease in the native redbreast sunfish *(Lepomis auritus)* population. Forage species availability and the food habits of flathead catfish in the Altamaha River system may be related to the negative impact flathead catfish have had on native species, in particular the redbreast sunfish.

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Historically, flathead catfish have been widely stocked throughout the United States. Many introductions in the Southeastern United States have been highly successful, resulting in the creation of new sport fisheries with minimal or acceptable impacts on native fish populations (Guier et al. 1981, Ashley and Buff 1987, Quinn 1987). Unauthorized release of flathead catfish into rivers along the southeast Atlantic coastal plain as well as the Gulf coast of Florida have become more common. Many of these introductions have resulted in the creation of viable flathead catfish populations.

Unauthorized introduction of this nonnative predator into the Altamaha River system has negatively impacted native fish species (Probst 1991, Thomas 1993). Flathead catfish were first introduced into the upper Ocmulgee River, 1 of the 2 main

tributaries of the Altamaha River during the 1970s (Evans 1991). This unauthorized stocking established flathead catfish as one of the dominant fish species in the Altamaha River by the late 1980s (Probst 1991). Before the introduction of the flathead catfish, redbreast sunfish were the dominant game fish species as measured by electrofishing catch rate and angler harvest. Decreases in redbreast sunfish and bullhead (*Ameiurus* spp.) population abundance were first noticed by anglers and later documented by Probst (1991) and Thomas (1993). Thomas (1993) found that redbreast sunfish catch rates and harvest decreased significantly while bullheads were almost eliminated. This pattern of introduction and decline in native sunfish and bullhead populations is being repeated throughout the Southeastern United States. The Apalachicola River in Florida and the Edisto River in South Carolina contain recently introduced flathead catfish populations that are having the same type of impact on native fish species (D. Dobbins, pers. commun., C. Thomason, pers. commun.) Additionally, flathead catfish have been recently discovered in several other southeastern coastal river drainages where their impact on native fishes has yet to be determined.

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Methods

The Altamaha River begins at the confluence of the Ocmulgee and Oconee rivers in Georgia's upper Coastal Plain. It flows in a southeasterly direction for approximately 221 km where it discharges into the Atlantic ocean near Darien, Georgia. Flathead catfish were collected with the use of low-frequency electrofishing from June to September 1997 from the Altamaha and Ocmulgee rivers. Stomachs were removed in the field and held on ice, frozen upon return to the lab, and thawed immediately before their contents were examined. Contents were identified to the lowest possible taxa and the results were expressed as frequency of occurrence, percent composition by weight, and percent composition by number for all fish combined and for 3 different size classes of fish: $<$301 mm, 301–600 mm, and $>$600 mm.

Results

A total of 866 flathead catfish stomachs from the Altamaha River system were examined and 59.4% of these contained food items. Dominant flathead catfish prey items consumed by weight from the Altamaha River system consisted of centrarchids (42.1%), ictalurids (20.4%), and invertebrates (11.4%) (Table 1). Fish were the dominant food item consumed by flathead catfish by weight (85.9%) and occurred in 68.1% of all stomachs containing food items. Fish became increasingly more important as

Table 1. Stomach contents of three size classes of flathead catfish from the Altamaha River system, June – September 1997. A = %, composition by number, B = % composition by weight, C = frequency of occurrence. 514 out of 866 flathead catfish stomachs contained food items (59.4%).

	All size classes $N = 514$			<301 mm $N = 253$			301–600 mm $N = 186$			>600 mm $N = 75$		
Food item	A	B	C	A	B	C	A	B	C	A	B	C
Cambarus	20.7	10.6	30.0	17.9	30.1	24.5	28.7	24.7	44.1	8.9	2.4	12.0
Plecoptera	6.7	*t*[a]	9.7	13.3	1.4	18.2	1.4	*t*	2.2			
Megaloptera	6.8	0.3	9.9	13.5	6.6	18.6	1.0	*t*	1.1	0.9	*t*	1.3
Odonata	0.5	*t*	0.8	0.9	0.2	1.2				0.9	*t*	1.3
Trichoptera	1.5	*t*	2.1	2.9	0.3	4.0				0.9	*t*	1.3
Ephemeroptera	0.3	*t*	0.4	0.6	*t*	0.8						
Chironomidae	0.3	*t*	0.4	0.6	*t*	0.8						
Unid. insects	1.3	*t*	1.9	2.9	*t*	4.0						
Terr. insects	0.3	*t*	0.4	0.6	0.7	0.8						
Mussels	3.6	0.5	5.2	0.8	0.1	0.8	6.6	0.4	10.2	6.3	0.6	8.0
All invertebrates	42.0	11.4	60.9	54.0	39.4	73.5	37.7	25.1	57.5	17.9	3.0	25.3
Organic matter	10.9	2.4	15.8	9.8	8.2	13.4	9.4	2.2	14.0	17.9	2.1	26.7
Ictalurus punctatus	0.1	10.0	0.2							0.9	15.5	1.3
Pylodictus olivaris	2.7	8.9	3.9	0.3	0.9	0.4	2.4	4.7	3.8	10.7	11.5	16.0
Unid. Ictaluridae	1.5	1.5	2.1	1.2	2.6	1.6	1.4	2.0	2.2	2.7	1.2	4.0
All Ictaluridae	4.3	20.4	6.2	1.5	3.5	2.0	3.8	6.7	5.9	14.3	28.2	21.3
Micropterus salmoides	0.3	3.4	0.4				0.3	6.4	0.5	0.9	2.2	1.3
Lepomis macrochirus	0.3	2.6	0.4				0.3	*t*	0.5	0.9	4.0	1.3
Lepomis microlophus	0.4	6.9	0.6	0.3	1.1	0.4				1.8	10.7	2.7
Lepomis punctatus	0.1	0.9	0.2				0.3	2.8	0.5			
Lepomis sp.	7.0	28.3	10.1	1.2	3.8	1.6	10.5	38.7	16.1	16.1	25.0	24.0
All Centrarchidae	8.1	42.1	11.7	1.5	4.9	2.0	11.4	47.9	17.7	19.7	41.9	29.3
Notropis sp.	1.9	0.5	2.7	1.4	3.6	2.8	2.8	1.1	3.2	0.9	*t*	1.3
Anguilla rostrata	0.1	0.1	0.2							0.9	0.2	1.3
Trinectes maculatus	1.7	0.4	2.5	1.4	2.6	2.0	2.1	0.8	3.2	1.8	*t*	2.7
Unid. Teleostei	30.9	22.4	44.7	30.8	37.9	42.3	32.2	16.1	50.0	26.8	24.3	40.0
All Teleostei	47.0	85.9	68.1	36.6	52.5	51.0	52.3	72.6	80.1	64.4	94.6	96.0

a. *t* = <0.1%

flathead catfish matured in the Altamaha system, increasing by both number and weight in each successive size class evaluated.

Invertebrates were the primary diet item consumed by flathead catfish <301 mm at 39.4% by weight and 54.0% by number (Table 1). Crayfish (*Cambarus* spp.) comprised 30.1% by weight of all the invertebrates consumed. Fish in this size class also consumed large numbers of fish as indicated by the amount of unidentifiable fish remains present by weight (37.9%). Unidentifiable fish were the dominant prey item consumed by weight, followed by crayfish, organic matter, *Lepomis* spp., and *Notropis* spp. for this size class (Table 1).

Fish, in particular centrarchids, became an increasingly more important prey item as the flatheads grew larger. Invertebrates were the most significant diet item consumed by number at 37.7% in flathead catfish from 301 mm to 600 mm in length, but centrarchids were the most dominant item consumed by weight (47.9%) (Table 1). *Lepomis* spp. comprised 38.7% by weight of all centrarchids consumed. Crayfish were the dominant invertebrate consumed by both number (28.7%) and weight (24.7%). *Lepomis* spp. were the dominant prey item consumed by weight, followed by crayfish, unidentified fish, and largemouth bass in this size class (Table 1).

Flathead catfish >600 mm were found to be almost completely piscivorus. Invertebrates comprised 3.0% by weight of the diet of flathead catfish in this size class while fish comprised 94.6% by weight (Table 1). Centrarchids were the dominant prey item present at 41.9% by weight. *Lepomis* spp. comprised 25.0% by weight of the centrarchids consumed. Ictalurids were consumed at higher rates by flathead catfish in this size class. Channel catfish *(Ictalurus punctatus)* and flathead catfish comprised 15.5% and 11.5% by weight of the diet respectively. Unidentifiable fish were accountable for 24.3% by weight of the diet for flatheads >600 mm. *Lepomis* spp. were the dominant prey item consumed by weight, followed by unidentifiable fish, channel catfish, and flathead catfish for this size class (Table 1).

Discussion

Flathead catfish are often the top predator in stream ecosystems and are capable of impacting stream fish assemblages both functionally and structurally (Jackson et al. 1989). For this reason, flathead catfish introductions have been used as a tool to modify prey species populations with varying degrees of success. (Swingle 1964, Hackney 1965, Davis 1985). Therefore, it is reasonable to assume that forage fish populations may be impacted by the introduction of flathead catfish. Some authors have suggested that the abundance of forage fishes and invertebrates influences prey selection by flathead catfish (Minckley and Deacon 1959, Morris et al. 1968). Prey species present in lakes and reservoirs within the native range of the flathead catfish are often dominated by shad (*Dorosoma* spp.), which are an important part of the diet of adult flathead catfish (Turner and Summerfelt 1970, Layher and Boles 1980). Little information exists concerning the food habits of flathead catfish in river systems within their native range. However, Morris et al (1968) examined the food habits of flathead catfish in the Missouri River, which is within the flathead's native range.

They determined that fish comprised 81% by weight of the diet of flathead catfish. Ictalurids and cyprinids were the dominant fish species consumed followed by clupeids, freshwater drum *(Aplodinotus grunniens)* and percids. The prey base for flathead catfish in many southeastern coastal rivers is dominated by centrarchids, such as redbreast sunfish, bluegill *(Lepomis macrochirus)* and by ictalurids.

The Altamaha River system flathead catfish population appears to rely on centrarchids more than previously described introduced flathead catfish populations in the Southeast. In the Cape Fear River, Guier et al. (1981) determined that the dominant food item consumed by flatheads was fish (ictalurids, clupeids, and centrarchids). Ashley and Buff (1987) also examined the diet of flathead catfish in the Cape Fear River and compared it to Guier et al. (1981). Based on percent weight, they determined that the primary food items consumed by flathead catfish remained the same, clupeids (57.1%), ictalurids (28.6%), and centrarchids (3.5%) (Fig. 1). However, the dominant food item had shifted from ictalurids to clupeids. The primary food items consumed by flathead catfish by weight in the Flint River consisted of catastomids (32.5%), ictalurids (19.0%), and invertebrates (15.4%) (Quinn 1987) (Fig. 1). Guier et al (1981) stated that there is strong evidence that introduced flathead catfish caused a severe decline in native bullhead populations within the Cape Fear River, North Carolina, while centrarchid numbers increased. Both Guier et al. (1981) and Ashley and Buff (1987) reported flathead catfish appeared to have little impact on centrarchid populations in the Cape Fear River. Quinn (1987) found that impacts to traditional fisheries were unlikely based on the diet of introduced flathead catfish in the Flint River, Georgia. However, Thomas documented that flathead catfish caused a significant reduction in the redbreast sunfish population in the Altamaha River (1993).

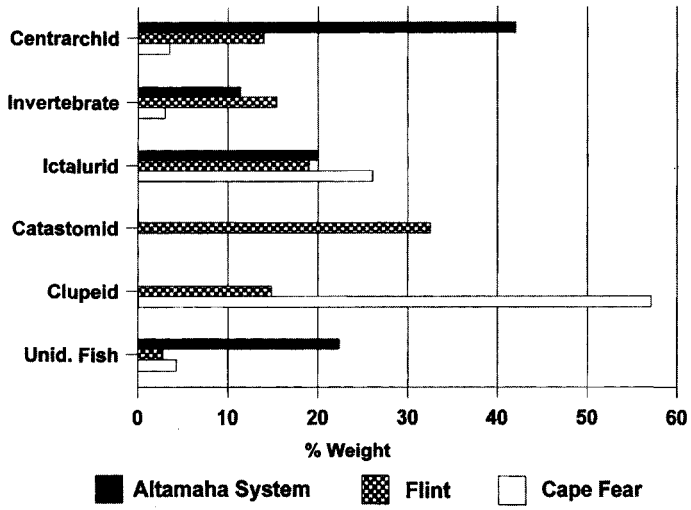

Figure 1. Percent weight of flathead catfish diet items from 3 southeastern river systems. Diet data for the Cape Fear River does not include fish < 1 kg in weight.

These differences may be directly related to the greater degree to which flathead catfish consume centrarchids within the Altamaha River system. Centrarchids accounted for 42.1% by weight of the diet of flathead catfish in the Altamaha system while only accounting for 3.5% by weight in the Cape Fear and 14% by weight in the Flint (Fig. 1). Centrarchids are the dominant prey item of flathead catfish in the Altamaha system, while clupeids are the dominant prey item of flathead catfish in the Cape Fear River, and catastomids are the main prey item of flathead catfish in the Flint River. Clupeids and catastomids were not found in the stomachs of flathead catfish from the Altamaha River system although both are found throughout the system.

Although we were unable to address specific predation on redbreast sunfish, we determined that all *Lepomis* species combined, including unidentified sunfish, were the dominant item consumed by flathead catfish by weight in the Altamaha River system. Diet data from the Altamaha and Cape Fear river systems showed no indication of the negative impact introduced flathead catfish have had on native bullhead populations. Guier et al. (1981) stated that native bullhead populations in the Cape Fear River have severely declined since the introduction of the flathead catfish, and Thomas (1993) documented the virtual elimination of bullheads in the Altamaha River. Bullhead catfish may be the first prey item utilized by some introduced populations of flathead catfish. The diets of flathead catfish in both the Cape Fear and Althama River system were examined after substantial reductions in bullhead populations had already occurred.

The food habits of introduced flathead catfish from the Altamaha River system when compared with the diets of introduced flathead catfish from other southeastern rivers shows obvious differences. These differences may be related to the forage base available to flathead catfish in these rivers. We encourage agencies considering the introduction of flathead catfish to first evaluate the forage base available to this predator and the possible negative impacts they may have on native fish populations.

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