Food Selection of Alligator Gar and Longnose Gar in a Texas Reservoir

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Abstract: Food selection of 209 alligator gar (*Lepisosteus spatula*) and 165 longnose gar (*L. osseus*) in Sam Rayburn Reservoir, Texas, was examined. Gar were collected with gill nets and jug lines during September and October 1986. Alligator gar were selective, primarily for bottom dwelling fishes, but not to as great an extent as longnose gar. Longnose gar selected small prey, primarily threadfin shad (*Dorosoma petenense*). Both species will apparently shift to different prey depending on the species available.

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For many years, anglers have expressed concern regarding the possible detrimental effects of gar predation on sport fishes (Lagler et al. 1942). Studies have consistently determined gar do not have an impact on sport fishes since most food is "non-sport" fishes (Lagler and Hubbs 1940, Bonham 1941, Raney 1942, Holloway 1954, Lambou 1961, Goodyear 1967, Crumpton 1970, Toole 1971).

The Texas Parks and Wildlife Commission increased harvest restrictions on largemouth bass (*Micropterus salmoides*) and crappie (*Pomoxis annularis* and *P. nigromaculatus*) in 1986 due to signs of overfishing for the species. Anglers, marina operators, guides, and other business owners near Sam Rayburn Reservoir, however, expressed concern that declines in these sports fisheries were due to gar predation rather than to fishermen. This study was conducted to determine the food selection of alligator and longnose gar in Sam Rayburn Reservoir.

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Methods

Sam Rayburn is a 45,911-ha reservoir impounded in 1965 on the Angelina River in southeast Texas. Largemouth bass, spotted bass (*M. punctualtus*), crappie, white bass (*Morone chrysops*), hybrid striped bass (*M. saxatilis* × *M. chrysops*),

and channel catfish (*Ictalurus punctuatus*) are the primary sport fishes sought by anglers. Other game species include blue catfish (*I. furcatus*), flathead catfish (*Pylodictus olivaris*), and striped bass (*M. saxatilis*). The forage base consists of threadfin shad, gizzard shad (*D. cepedianum*), brook silversides (*Labidesthes sicculus*), suckers, minnows, and sunfishes (*Lepomis* sp.). Smallmouth buffalo (*Ictiobus bubalus*), carp (*Cyprinus carpio*), freshwater drum (*Aplodinotus grunniens*), alligator gar, longnose gar, and spotted gar (*L. oculatus*) are other common fishes (Seidensticker 1983).

Multifilament gill nets and jug lines were placed in Sam Rayburn Reservoir on 20 nights, 10 nights each during September and October 1986. Sampling was started at the upper end of the reservoir and the sites were moved approximately 3 km each night until the entire impoundment was sampled. Gill nets were 97 m long and 2.7 m deep and were suspended approximately 1.5 m below the surface. Four nets each of 5.08- and 7.62-cm bar mesh, No. 209 multifilament webbing and 7.62-, 10.16-, 12.70-, and 15.24-cm bar mesh, No. 9 to No. 12 twine webbing were set approximately 1 km apart during each sample night. Total length (TL) data (2.5-cm size groups) on all fishes captured were recorded by mesh size.

A jug line consisted of a straight wooden pole approximately 1.5 to 2.0 m long with a 2-liter plastic bottle attached to 1 end and 1.0 m of 198-kg test nylon line with a double, stainless steel hook (7/0, 8/0, or 10/0) on the other end. Jug lines were baited with dead fish collected in gill nets. Baits used included gizzard shad, white bass, channel catfish, largemouth bass, crappie, freshwater drum, spotted sucker (*Minytrema melanops*), lake chubsucker (*Erimyzon sucetta*), bluegill (*Lepomis macrochirus*), and cut bait from larger species such as smallmouth buffalo, carp, striped bass, and hybrid striped bass. The bait fish were strung on the hook and main line to prevent baits from being stolen and biasing the food selection data. The sizes of baits ranged from 7.5 to 31.0 cm TL.

All gar were weighed (nearest kg), measured (nearest 2.5 cm), and sexed. Food items in each stomach were separated, counted, measured (cm TL), and identified to species (Robins 1980) whenever possible. Stomach content data were compared to gill net catches using Fisher's exact test of binomial proportions (SAS Inst. Inc. 1982). This test compared the proportion of each species found in the stomachs to the proportion of that species taken in gill nets. The probability level used for significance was 0.05.

Results

Three hundred seventy-four gar (209 alligator gar and 165 longnose gar) were collected (Table 1). Fishes were the major food of both gar species. Most of the alligator gar (126) and longnose gar (109) stomachs were empty. Twelve species were present in alligator gar stomachs and 9 in longnose gar stomachs (Table 2). Gizzard shad (26.4%), channel catfish (14.9%) and freshwater drum (12.6%) comprised over half, by number, of the food items identified in alligator gar (Table 3). Other food items included sunfishes, suckers, white bass, largemouth bass, spotted

Table 1. Summary of alligator gar and longnose gar size data from gill nets and jug lines, Sam Rayburn Reservoir, Texas, September and October 1986.

Species	Size group (TL) (cm)	Average weight (kg)	Weight range (kg)	Number collected
Alligator gar	119–152	13.7	8.2–21.8	17
Alligator gar	153–183	28.7	18.1–37.6	64
Alligator gar	184–213	46.5	33.6–59.4	106
Alligator gar	214–226	56.7	49.0–71.2	22
Longnose gar	68–138	4.8	1.3–13.6	165

Table 2. Summary of food items (TL range) found in alligator gar and longnose gar stomachs and in gill net samples, Sam Rayburn Reservoir, Texas, September and October 1986.

	Gill nets		Alligator gar		Longnose gar	
Food item	Number	TL range (cm)	Number	TL range (cm)	Number	TL range (cm)
Threadfin shad	69	8–11	—	—	35	5–10
Gizzard shad	256	17–41	23	25–38	4	28–31
Channel catfish	35	21–51	13	25–51	1	20
Freshwater drum	37	19–72	11	18–51	—	—
Sunfish	50	6–21	7	10–15	2	10
Suckers	3	21–22	6	20–25	1	25
White bass	68	14–41	4	20–25	1	31
Buffalo remains	—	—	3	—	—	—
Largemouth bass	25	10–41	3	25–30	—	—
Spotted gar	14	52–69	3	51–61	—	—
Lake chubsucker	1	21–22	2	20–21	—	—
Crappie	14	18–36	2	10–15	—	—
Silversides	—	—	—	—	2	7–8
Golden shiner	—	—	—	—	1	15
Bullhead catfish	—	—	—	—	1	15
Carp remains	—	—	1	—	—	—
Unidentified fish	—	—	22	—	6	—
Miscellaneous items*	—	—	24	—	—	—

*Miscellaneous items included 7 crappie carcasses, 2 coots, 1 grasshopper, 11 fish hooks, 1 artificial lure, and 1 plastic bag.

gar, lake chubsuckers, crappie, coots, carp, and buffalo. Threadfin shad comprised 73%, by number, of the food items identified in longnose gar (Table 3). Other food items included gizzard shad, bluegill, silversides, white bass, and channel catfish (*Ictulurus* sp.). Unidentified fish remains were found in 22 alligator gar and 6 longnose gar.

Alligator gar were species selective, but not to as great an extent as longnose gar. The proportion of food items in alligator gar stomachs differed significantly from the proportion of those items collected in gill nets for gizzard shad, threadfin shad, freshwater drum, channel catfish, spotted sucker, and lake chubsucker (Table 3). For gizzard and threadfin shad the proportion in the gar stomachs was lower

Table 3. Numbers and frequency of occurrence of species collected in gill nets and observed in alligator gar and longnose gar stomachs, Sam Rayburn Reservoir, Texas, September and October 1986. Parentheses show probabilities that proportion of food items in gill net samples = proportion of food items in gar stomachs using Fisher's Exact Test of Binomial Proportions.

	Gill nets		Alligator gar		Longnose gar	
Species	Number	% total	Number	% total	Number	% total
Gizzard shad	256	39.7	23	26.4 (0.036)*	4	8.3 (0.000)*
Threadfin shad	69	10.7	0	0.0 (0.000)*	35	73.0 (0.000)*
White bass	68	10.5	4	4.5 (0.162)	1	2.1 (0.074)
Sunfish[a]	50	7.8	7	7.9 (1.000)	2	4.1 (0.567)
Freshwater drum	37	5.7	11	12.6 (0.026)*	0	0.0 (0.164)
Channel catfish	35	5.4	13	14.9 (0.003)*	1	2.1 (0.503)
Spotted bass	26	4.0	0	0.0 (0.099)	0	0.0 (0.408)
Largemouth bass	25	3.9	3	3.4 (1.00)	0	0.0 (0.401)
Hybrid striped bass	14	2.2	0	0.0 (0.384)	0	0.0 (0.615)
Spotted gar	14	2.2	3	3.4 (0.415)	0	0.0 (0.615)
Crappie[b]	14	2.2	2	2.2 (0.688)	0	0.0 (0.615)
Carp	3	0.5	1	1.1 (0.368)	0	0.0 (1.000)
Spotted sucker	3	0.5	6	6.8 (0.001)*	1	2.1 (0.242)
Blacktail shiner	2	0.3	0	0.0 (1.000)	0	0.0 (1.000)
Lake chubsucker	1	0.2	2	2.2 (0.032)*	0	0.0 (1.000)
Flathead catfish	1	0.2	0	0.0 (1.000)	0	0.0 (1.000)

*Proportion differs significantly from gill net collections.
[a]Includes warmouth, bluegill and redear sunfish.
[b]Includes black and white crappie.

than in gill nets. For remaining species, the proportion was higher in gar stomachs. Alligator gar also seemed to prefer larger size prey, more than 20 cm TL (Table 2).

Longnose gar were selective for shad, primarily threadfin shad. However, longnose gar did consume some game fish (channel catfish and white bass). The proportion of food items in longnose gar stomachs differed significantly from the proportion of those items collected in gill nets for gizzard shad and threadfin shad (Table 3). The proportion of gizzard shad was lower in longnose gar stomachs than in gill nets while the threadfin shad proportions were higher.

Discussion

Alligator gar in Sam Rayburn Reservoir were selective for bottom feeding species including gizzard shad, channel catfish, freshwater drum, spotted sucker, and lake chubsucker. These findings are consistent with observations in Louisiana (Hussakof 1914, Lambou 1961), Mississippi (Goodyear 1967), southeast Texas (Bonham 1941), south Texas (Raney 1942), and east Texas (Toole 1971). Also, alligator gar are sometimes scavengers. Crappie carcasses, coots, a grasshopper, trotline hooks, jugline hooks, crappie hooks, lures, and a trash bag were found in the stomachs of gar during this study. Goodyear (1967) has reported that alligator gar do consume fish discarded by shrimp trawlers and have been caught with dead bait.

The narrow food selectivity of longnose gar in Sam Rayburn Reservoir was

similar to that reported in other studies. However, threadfin shad, which was the primary species selected for during this study, was not selected by the gar in other locales. Longnose gar stomachs in southern Michigan (Lagler and Hubbs 1940) contained 60% game and panfish (bullheads, yellow perch, and sunfishes) and 37% other fishes (carp, shiners, madtoms, logperch, silversides, and others). Similar results were reported for longnose gar from Florida with stomachs containing 59% centrarchids and 40% miscellaneous small fishes (Holloway 1954). Longnose gar in Florida also fed extensively on nongame forage fish and invertebrates (Crumpton 1970). His study showed the longnose gar stomachs contained 60% gizzard shad, 10% bullhead catfish, 8% bullgill, 5% shrimp, and 4% black crappie. Differential selectivity for longnose gar probably reflects the availability of prey species in different lakes.

Alligator gar were selective for bottom feeding species, usually greater than 20 cm TL, and longnose gar were selective for small prey species, primarily threadfin shad, during this study. However, both species exhibited the ability to feed on a variety of fishes. The prey selected appears to depend upon its availability.

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