

NOTES ON FOOD HABITS, SIZE, AND SPAWNING BEHAVIOR OF SPOTTED GAR IN LAKE LAWTONKA, OKLAHOMA

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A total of 172 spotted gar (*Lepisosteus oculatus*) was collected from Lake Lawtonka in Comanche County, southwestern Oklahoma, during each spawning season between 6 May 1980 and 10 June 1982. Specimens were weighed, measured, sexed, and stomach contents examined. Total lengths ranged from 422 to 1030 mm and weights from 224 to 4311 g. Only 31 (18%) of the stomachs contained food. Fish constituted 68% and invertebrate organisms 32% of food recovered. Spawning extended from about mid-April to early June and typically occurred in water of 6 to 18 inches depth. Each large female gar was usually attended by 3 to 5 much smaller males.

INTRODUCTION

There is little information concerning the biology of *Lepisosteus oculatus* in Oklahoma. To counter this information void, this study was undertaken to identify specific prey items, evaluate sexual dimorphism in length and weight relationships, ascertain sex ratios, and record spawning behavior.

Spotted gar are abundant in Lake Lawtonka, being most conspicuous during spring, when large numbers congregate in the warm shallows to spawn. Dense beds of submerged and emergent vegetation (primarily *Polygonum*, *Potamogeton*, *Myriophyllum*, and *Justicia*) characterize these waters.

METHODS

Most gar were collected by bowfishing in well-vegetated water less than 18 inches deep, but five gar were taken by electroshocking. Polarized sunglasses enabled us to see below the water's surface. Gar were usually taken as they cruised the shallows, lay motionless near the surface, or were engaged in spawning. Initially, solid fiberglass fishing arrows were used, but we subsequently changed to hollow aluminum arrows with plastic fletchings because they were lighter, faster, and generally more effective. Bright shaft colors helped to avoid arrow loss. The shock of being impaled usually immobilized a fish. Each gar was weighed, measured, sexed, and its stomach removed, numbered, and preserved for later identification of contents. Tinsnips had to be used to cut through the body wall. Ovaries were distinguished from testes by their larger size, more granular consistency and by their more posterior location in the body cavity.

RESULTS AND DISCUSSION

We collected 54 females and 118 males, primarily because males were far more numerous. Stomachs of 141 (82%) of 172 gar contained no food. The high incidence of empty stomachs agrees with Hunt (1), who found empty stomachs in 76% of 448 spotted gar from Florida, and with Scott (2), who autopsied 89 longnose gar (*L. osseus*) in Indiana, 56% of which had empty stomachs. However, our results and those of Hunt (1) are in conflict with findings of Goodyear (3), who found empty stomachs in only 19% of 176 gar from Mississippi coastal waters, and Bonham (4), who found only 25% empty stomachs in 28 Texas spotted gar. The estuarine environment of the former study and the small sample size of the latter could explain the differences in results. In our gar ($n = 31$), 68% of the prey were fish and 16% each were crayfish and insects (Table 1). Advanced digestion precluded species identification except in two cases: a juvenile bluegill sunfish (*Lepomis macrochirus*) occurred in one stomach and a small drum (*Aplodinotus grunniens*) in another. Lengths of prey fishes varied from 40-290 mm and only 3 of 21 of them were 180 mm (7 in.) or longer. As can be seen in Table 1, there was a general trend for the larger gar to feed on bigger fishes. The only recognizable insects were coleopterans. Scott (2) also concluded that longnose gar are largely piscivorous in Indiana. A review of papers on food habits of spotted gar concluded that fish are the principal prey (5). The high number of empty stomachs seen in our data may be an artifact of sampling time since almost every fish taken in this study was collected in mid-afternoon. Other studies have indicated that feeding occurs princi-

pally in early morning (5). If early morning feeding is the rule, rapid digestion would at least partially explain our high incidence of stomachs without food. Too, it is possible that feeding of gar slows or ceases altogether during the spawning period, and they may also be opportunistic (therefore sporadic) feeders as well. Perhaps some combination of these (and possibly other) variables is responsible for the disproportionately large number of empty stomachs in our sample.

Female spotted gar weighed from 440 to 4311 g (\bar{x} = 1717) and their lengths ranged from 508 to 1030 mm (\bar{x} = 729). Male weights varied from 224 to 2208 g (\bar{x} = 472) and lengths from 422 to 809 mm (\bar{x} = 508), although only 4 of 118 males exceeded 688 grams and only 2 were longer than 580 mm. Hancock (6) collected 14 spotted gar from Canton Lake in northwestern Oklahoma that ranged in length from 378-688 mm and 163 taken in Alabama by Swingle (7) measured from 152 to 737 mm. Data from the specimens were separated into nine weight classes of 500-g increments each, and seven length classes of 100 mm each. Largest numbers occurred in the lightest weight class (containing individuals weighing 500 g or less), and in the shortest length class (ranging from 501 to 600 mm; see Figs. 1 and 2). Males were nearly always lighter than females of comparable length and outnumbered females more than 2:1. Therefore, they dominate both the lightest weight class in Figure 1 and the shortest length class in Figure 2. The average female gar was 3.63 times as heavy and 1.43 times as long as an average male. Other authors (e.g., 6 and 7 above) have reported individual gar lengths, but without including the sex, therefore little or no comparable data are available.

By the third week in April (the earliest spawning date was 22 April 1981 and the latest was 10 June 1982), spotted gar had begun to spawn. In our study area, the most intense spawning activity occurred during mid-May. Typical spawning behavior was as follows: a large female, closely accompanied by 3 to 5 much smaller males, would swim slowly through the well-vegetated shallows.

TABLE 1. Stomach contents of 31 spotted gar taken from Lake Lawtonka, Oklahoma, between 6 May 1980 and 10 June 1982.

Gar No.	Sex	Length, mm	Weight, g	Food F=fish, C=crayfish, I=insects	Prey Length, mm
42	Male	460	296	I	---
104	Male	465	319	C	65
102	Male	498	412	F	50
162	Male	504	486	F	40
151	Male	505	478	F	150
163	Male	505	477	F	70
73	Male	508	402	I	---
116	Female	508	440	F (<i>Lepomis macrochirus</i>)	60
17	---	510	393	C	65
6	Male	515	482	F	100
171	Male	525	466	C	50
123	Male	526	681	C	---
13	Male	530	482	F	100
139	Male	530	585	I (Coleoptera)	---
166	Male	542	587	C	70
145	Male	549	563	F	40
81	Female	555	651	F (Perciform)	115
36	Male	560	589	I (Coleptera)	---
14	Male	570	588	I	---
159	Female	637	930	F	50
150	Female	643	1091	F	100
101	Male	809	2208	F (Perciform)	180
18	Female	835	2329	F	125
71	Female	839	2724	F	150
91	Female	846	2494	F	75
111	Female	864	2820	F (Perciform)	150
58	Female	869	2892	F (Perciform)	200
120	Female	879	3518	F	---
154	Female	883	4086	F (<i>Aplodinotus grunniens</i>)	130
1	Female	913	3515	F	---
121	Female	958	4311	F	290

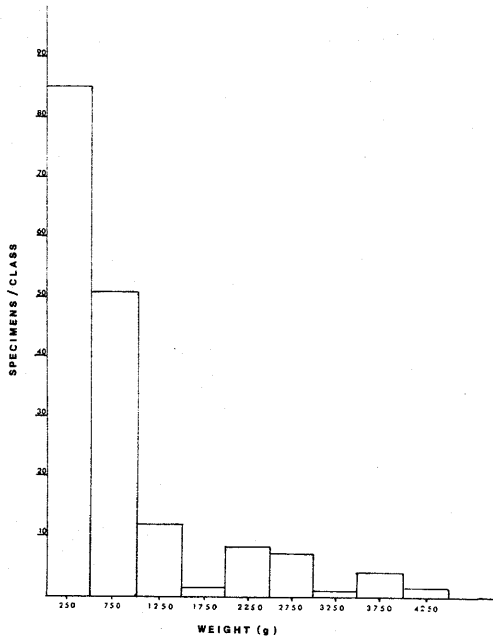


FIGURE 1. Histogram showing the nine weight classes and the total number of gar for each class.

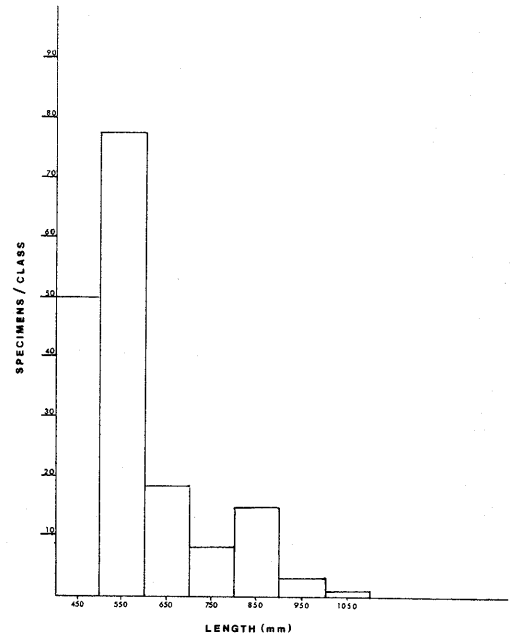


FIGURE 2. Histogram showing the seven length classes and the total number of gar for each class.

The apparent moment of egg deposition was denoted by her quick jerks, thrashing and concomitant splashing. Spawning was interrupted by the advent of cooler temperatures and turbid water resulting from spring rains.

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