A FOOD HABIT STUDY OF THE SPOTTED SEATROUT, *CYNOSCION NEBULOSUS*, IN THE BILOXI MARSH AREA, LOUISIANA[1]

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ABSTRACT

The spotted seatrout, *Cynoscion nebulosus*, are found throughout the year in the Biloxi Marsh Area in southeastern Louisiana. A total of 368 stomachs were analyzed; 152 were empty. Fish occurred in 74.4 per cent of these stomachs and crustaceans in 25.3 per cent. During the summer months fish and crustaceans were comparable in per cent occurrence as food items. In this same period food availability samples showed that crustaceans had become more prevalent. This suggests a correlation of the food habits of the spotted seatrout to food availability.

Fish seem to be the most important food group in the Biloxi Marsh Area utilized by the spotted seatrout.

INTRODUCTION

The spotted seatrout, *Cynoscion nebulosus*, is one of the most important salt water game fish found along the Louisiana coast. It is also of extreme importance as a commercial species. Because of its importance as a game and commercial species and because of the limited amount of technical biological information available, a study was begun in 1961 to learn the feeding habits of the spotted seatrout in this region.

In conjunction with the food habit study, information was obtained on the occurrence of the spotted seatrout in this coastal region and the availability of food organisms during the different periods of the year. The occurrence of the spotted seatrout, its food habits, and the organisms available for food will all be discussed in this report.

DESCRIPTION OF THE AREA

All of the samples used in this report were collected in the Biloxi Marsh Area located in southeastern Louisiana. It is bordered to the southeast by Breton Sound and on the northwest by Lake Borgne. Between these two bodies of water is the location of the sample area shown in the map.

The Biloxi Marsh is traversed by many natural and man-made bayous, and is spotted with many lagoons and blind ponds. The salinities vary between five to 20 ppt with the lower salinities in the Lake Borgne area and the higher salinities in the Breton Sound area. Tidal changes between high and low tides vary daily from 6-18 inches with high and low extremes during abnormal weather conditions. The average water depth is 2-3 feet.

The marsh land is typical of most brackish marsh areas with *Spartina* sp. present as the most dominant plants. Aquatic vegetation is composed mainly of widgeon grass, *Ruppia maritina*. Much of the marsh land is being managed as a game management area for waterfowl.

Fishes in the Biloxi Marsh Area are of many types, however, the Family Sciaenidae is the most represented and the most abundant. This family is represented by the spotted seatrout, *Cynoscion nebulosus*; channel bass, *Sciaenops occellata*; Atlantic croaker, *Micropogon undulatus*; spot, *Leiostomus xanthurus*; southern kingfish, *Menticirrhus americanus*; sand seatrout, *Cynoscion arenarius;* silver perch, *Bairdiella chrysura*; and the black drum, *Pogonias cromis*. Samples taken

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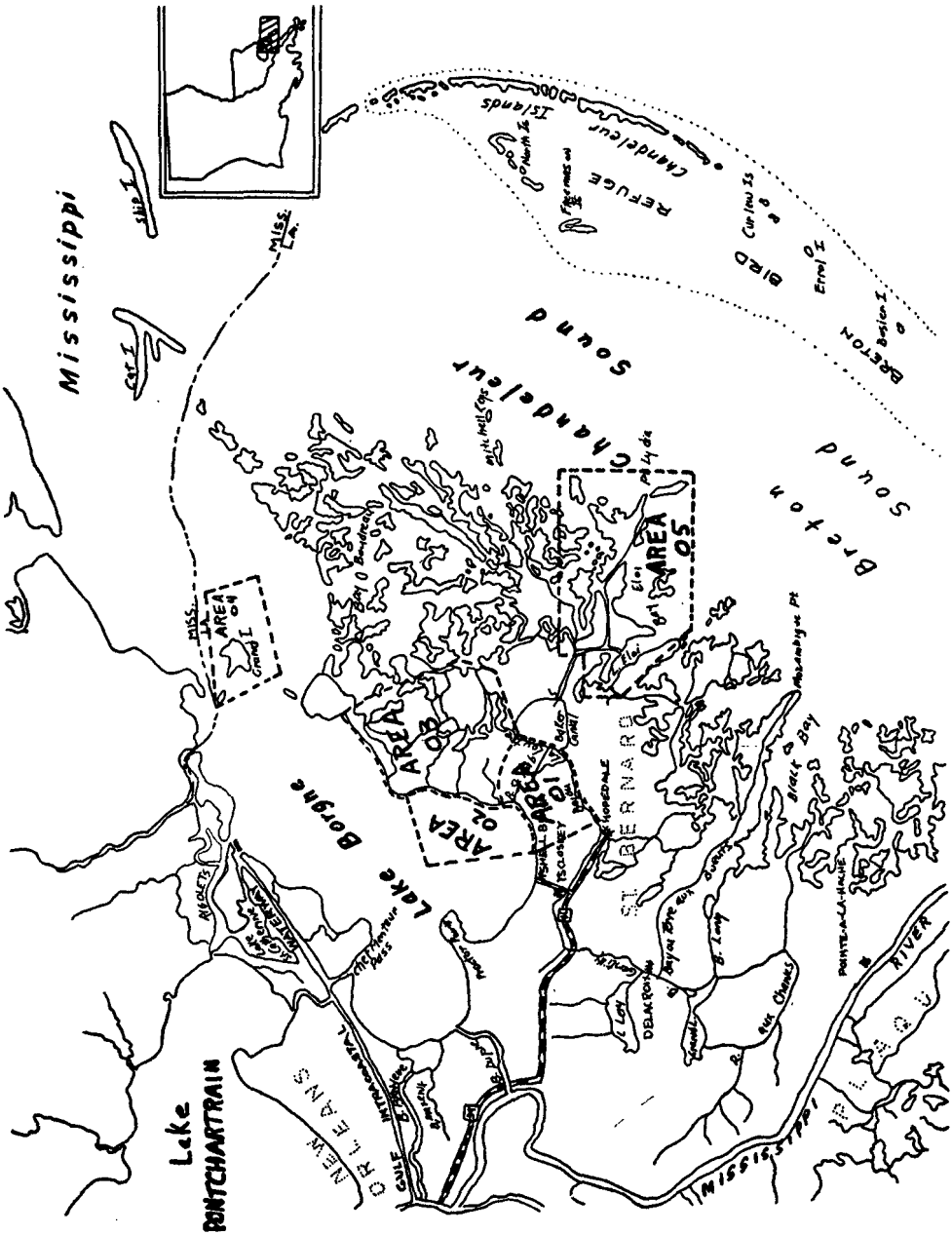

in the Biloxi Marsh show that approximately 35% of the fish species sampled belong to the Family Sciaenidae. Gordon (1938) also found that the Sciaenid Family was the most represented along the Louisiana coast.

METHODS AND PROCEDURES

The specimens used for stomach analyses were collected with a 200-yard trammel net. One end of the net was placed at the shoreline and the rest of the net was placed in the form of a semicircle. When the net

was completely put out, the loose end was dragged toward the end on the shoreline. The ends were then joined together to form an enclosed circle. The area inside the net was churned up with the boat and outboard motor in an attempt to excite the fish enough so that they will hit the net.

These samples were taken in regular sampling areas at three-week intervals and were taken in accordance with the objectives of Federal Aid Project F-8-R, which was an evaluation of the sport fisheries along the Louisiana coast. All of the samples taken gave some idea about the occurrence and abundance of the different game species in the Biloxi Marsh at different times of the year.

Stomach samples were taken from fish specimens collected in the trammel net samples described above. Because of a change-over in personnel, the methods of analyzing the stomachs were not the same throughout the study. The content of each stomach was identified and counted. A percent occurrence was calculated for each food item. In addition to the numerical analyses, a volumetric measurement was made on a portion of the stomachs. The volume of each food item was measured. If more than one item occurred in the stomach, the volumes were added together to obtain a total volume content for that particular stomach. Volume was determined by water displacement with accuracy to the nearest tenth of a milliliter.

Only an average length of the spotted seatrout is used because lengths and weights were not recorded until the 1964-65 segment of the project. Therefore, the fish for which these data are available are too few in number to give food habits by inches or size groups.

Collection of food organisms

Every time that stomach samples were taken food availability checks were made. The potential food organisms were collected by dragging a six-foot bobbinet otter trawl in the immediate area of the trammel net sample. The trawl was dragged for one minute and its contents removed. These organisms were preserved in formaldehyde solution for later laboratory analyses. The organisms were identified to species.

DISCUSSION OF RESULTS

The spotted seatrout occurs in the Biloxi Marsh during all periods of the year. Pearson (1928) and Gunter (1935) reported similar findings along the Texas coast. Table I shows that spotted seatrout were collected during every month of the year. The table also shows that more fish were present in the samples between August and January. It can be assumed that during this period the spotted seatrout is more abundant than at other times of the year. The fewest number of specimens were collected in February. It is also the month in which the coldest weather usually occurs. Gunter (1945) reports that the great majority of the spotted seatrout leave the shallow inland area and move to deeper waters as the temperature drops toward the freezing mark. This also seems to be the case along the Louisiana coast.

A total of 368 stomachs were analyzed for food content; 152 were empty. The size of the specimens used for samples ranged from 10-20 inches; the average fish was about 12 inches. The results show that fishes were the preferred food (Table II). Fishes occurred in 74.4 percent of the stomachs analyzed. Of the fishes found in the stomachs, 68.5 percent were unidentified. They had been digested beyond recognition, however, bone structures in many cases were similar to other members of the Family Sciaenidae, particularly the croaker. Pearson (1925) reports that the principal fish species eaten were croaker, spot, and mullet, *Mugil cephalus*.

Crustaceans appeared in 25.3 percent of the stomachs that contained food. Shrimp, *Penaeus* sp. made up 11.1 percent of the crustaceans. Pearson (1929), Kemp (1948), and Moody (1950) reported that shrimp is the preferred food of the spotted seatrout. However, this is contradictory to the findings in this report. Gunter (1145) reported that fish was the preferred food in the winter, but suggested that shrimp was probably the preferred food. Most of his specimens

Table I. The number of samples, total spotted seatrout collected, and the average catch per sample by months with a 200-yard trammel net from 1961-1965.

Months	Number of Samples	Number of Spotted seatrout	Average Catch per sample
1	26	224	8.6
2	49	27	.6
3	56	123	2.2
4	59	202	3.4
5	68	190	2.8
6	41	49	1.2
7	30	41	1.4
8	45	366	8.1
9	20	48	2.4
10	34	196	5.7
11	47	206	4.4
12	33	134	2.5

Table II. Percent occurrence and total number organisms contained in the stomachs analyzed. The percent occurrence is a percentage of the stomachs containing food.

Organisms	Total Number	Percent Occurrence
Total stomachs	368	
Number empty	152	
Pisces	200	74.4
Anchovy	5	1.4
Croaker	2	.9
Flounder	2	.9
Menhaden	3	1.4
Sleeper	3	.9
Striped mullet	2	.4
Unidentified fish	183	68.5
Crustacea	118	25.3
Blue crab	21	4.1
Panopeus sp.	1	.4
Palaemonetes sp.	32	6.5
Penaeus sp.	56	11.1
Cymothoidae	6	2.3
Gammaridae	2	.9
Bryozoa	2	.9
Amphibia (frog)	1	.4
Nais	1	.4
Vegetation	...	2.3
Grass seed	2	.4
Mud	...	.9
Unidentified Material	24	10.2

were collected after a freeze along the Texas coast in which most of the shrimp were killed or had migrated out of the area.

Table III shows the results of 41 stomachs that were analyzed volumetrically. The same results hold true as was described above. Fish was more important in both number and volume. In the 41 stomachs analyzed, the volumetric analyses showed that 281.2 ml. of fish were consumed as compared to 8.9 ml. of crustacea. Shrimp made up 8.7 ml. of this total.

Table IV presents the stomach data by months. Included in the table is the percent occurrence for each food item during the indicated month and the number of empty and full stomachs. It can be seen that in the summer months, May, June and July, fish and crustacea are comparable in the number of times they appear in stomachs of the spotted seatrout. During this time crustaceans are taken in as food

more than at any other time of the year. *Penaeus sp.* and *Palaemonetes sp.* seem to be the preferred crustaceans during these summer months. Table V, which gives the available food organisms that were collected in the six-foot bobbinet trawl during the 12 months of the year, shows that there is an increase in the percentage of crustaceans during the summer months. This suggests a correlation between the food habits of the spotted seatrout and food availability.

The high percentage of unidentified fish shown in Table I and the ratio between stomachs containing food and empty stomachs shown in Table IV gives reason to believe that the spotted seatrout has a rapid digestive and metabolic rate. Gunter also assumed the spotted seatrout has a rapid digestive rate.

Table III. Numerical percent occurrence and volume in ml. of 41 stomachs analyzed volumetrically.

Food Organism	Total Number	% occurrence	Volume (ml.)
Total Fish	34	64	281.2
Anchovy	6	7	2.0
Croaker	1	3	13.0
Flounder	2	5	17.1
Menhaden	2	5	20.0
Sleeper	3	7	79.0
Unidentified fish	20	39	87.1
Total Crustacea	8	18	8.9
Penaeus sp.	6	14	8.7
Panopeus sp.	1	3	0.1
Cymothoidoe	1	3	0.1
Bryozoa	1	2	Trace
Vegetation	—	7	.2
Unidentified Material	—	5	.9

CONCLUSIONS

The spotted seatrout occurs in southeastern Louisiana during all months of the year, however, the population seems to be the lowest during the month of February. Stomach analysis indicates that the spotted seatrout feeds mainly on fish, such as croaker, spot and mullet. Also of importance as a food item was crustaceans, mainly shrimp. Shrimp occurred in the stomachs more in the summer months than in other times of the year. During the summer the crustaceans occurred as often as did fishes. The importance of crustaceans as a food group was greatly reduced during the rest of the year.

The spotted seatrout seems to have a rapid digestive rate and be very active in its feeding habits. They are reported to be highly cannibalistic, but no evidence of this was found in the specimens examined.

The Game, Fish and Oyster Commission (1932) reported that the spotted seatrout were frequently cannibalistic, however, no definite young was found in any of the stomachs examined.

ACKNOWLEDGMENTS

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Table IV. Number of stomachs containing food, number empty and the percent occurrence of food organisms by months.

Months	1	2	3	4	5	6	7	8	9	10	11	12
Stomachs containing food	30	1	5	26	44	4	7	4	9	61	0	25
Stomachs empty	32	1	5	13	45	0	7	6	1	27	0	15
Food organisms												
Pisces	74.4	100.0	40.0	69.1	84.0	25.0	42.5	50.0	100.0	75.4		80.0
Anchovy										4.9		
Croaker				3.8						1.6		
Flounder	6.7											
Menhaden					4.5							8.0
Sleeper										3.3		
Striped mullet		100										
Unidentified fish	67.7		40.0	65.3	79.5	25.0	42.5	50.0	100.0	65.6		72.0
Crustacea	13.3		40.0	30.7	20.4	50.0	42.9	50.0		27.7		36.0
Blue crab										1.6		
Panopeus sp.					4.5					1.6		24.0
Palaemonetes sp.				19.2		25.0	42.9	50.0		4.9		
Penaeus sp.			20.0	11.5	13.6	25.0				18.0		8.0
Cymothoidae	10.0				2.3					1.6		4.0
Gammaridae	3.3		20.0									
Bryozoa										1.6		4.0
Amphibia (frog)												4.0
Nais												4.0
Vegetation				7.7			14.3			1.6		4.0
Grass seed					2.3							
Mud	3.3			11.5	2.3							
Unidentified Material	20.0		40.0		9.1	25.0				13.1		4.0

Table V. Organisms available for food at the time the stomachs were collected. Food organisms were collected in a 6′ bobbinet trawl. Each species is a percentage of the food organisms collected during the specified month.

Months	1	2	3	4	5	6	7	8	9	10	11	12
Monthly total no.	411	0	985	2189	1114	866	527	223	190	926	0	109
Available food organisms												
Pisces	43.2		88.3	80.7	68.1	74.4	79.9	87.1	47.9	87.1		77.1
Anchovy	12.9		42.9	7.8	38.8	42.5	66.6	78.5	41.6	71.8		55.0
Croaker	14.4		12.3	2.9	7.0	*	.4					3.7
Flounder				.1	*	*	.8	1.8		7.8		.9
Fundulus	9.9		.2	1.1	3.5	14.2				.2		
Gambusia			.7	*	*		.4			.5		4.8
Goby	.5		1.2	1.3	*	.1		.4	3.6	.2		
Ladyfish			*	*		*						
Lizardfish					1.9					.2		
Menhaden	1.9		3.3	61.8								
Needlefish	1.2											
Pinfish			.3	.8	2.1				.6	.6		.9
Pipefish	.9		.5	1.2	6.5	4.0	9.1	.4		.8		
Puffer					*	*		.4				
Redear sunfish			.3							.1		9.2
Sailfin molly										.1		.9
Sand seatrout					*	9.4		2.8		4.9		
Seacat							.2		.5			
Sheepshead minnow	.2											
Silver Perch							.6					
Silversides			.2	*	1.1							
Speckled worm eel	1.3											
Spot			26.2	3.7	7.2	4.3	.9	2.8	1.6	.5		
Spotted seatrout			.1				.9					
Spotted sunfish			.1									1.7
Crustacea	62.8		11.7	19.1	29.6	23.7	20.1	12.9	47.9	19.9		22.9
Blue crab	14.8		6.9	1.5	1.1	1.5	2.3	2.2	23.2	9.3		5.5
Cymothoidae					*			5.8				
Gammaridae			.6	.4	*		.2					
Palaemonetes sp.	5.7		3.8	14.2	18.1	13.5	16.5	2.2		6.4		
Panopeus sp.				*								
Penaeus sp.	36.3		.4	3.0	10.4	8.7	1.1	2.7	24.7	4.2		17.4
Mullusca									4.2			
Mulinia									4.2			

* Represents less than .1%.

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AGE AND GROWTH OF BLUE CATFISH, *Ictalurus furcatus* (LeSueur), IN THE RECENT DELTA OF THE MISSISSIPPI RIVER [1]

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ABSTRACT

Age and growth of blue catfish, *Ictalurus furcatus* (LeSueur), collected on Delta National Wildlife Refuge, Venice, Louisiana were determined by length frequency and the pectoral spine technique. Lengths calculated from pectoral spines agree with the length frequency mode for age I fish collected during January, 1965. Three regressions were computed for the data and the cubic equation provided the best fit. This equation indicated that weight increased faster than the cube of the length.

INTRODUCTION

Data were collected from 193 blue catfish taken on Delta National Wildlife Refuge, Plaquemines Parish, Louisiana, in 1963, 1964, and 1965. The blue catfish is the most important commercial species of fish occurring in this area. Yelverton (1963) stated that Fish and Wildlife Service records show an annual harvest of over 34 tons of blue catfish taken from Delta Refuge waters.

This estuarine portion of the Mississippi River is characterized by shallow mud-bottom ponds, interlaced with distributaries from the Mississippi River. The ponds annually receive flood waters keeping them virtually fresh, however, during late summer and fall saline waters from the Gulf of Mexico invade the ponds and gradually increase the salinity. All specimens collected were in waters having salinities of less than 7.0 ppt. with most individuals being taken in waters having salinities of 0.8 to 2.0 ppt.

Age was determined by counting the rings on a cross section of the pectoral spine following the procedure outlined by Sneed (1951).

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