

A PRELIMINARY REPORT ON THE ABUNDANCE AND BIOLOGY OF STOCKED STRIPED BASS IN THE CHOCTAWHATCHEE RIVER SYSTEM, FLORIDA

by

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ABSTRACT

Striped bass were stocked in the Choctawhatchee River System from 1968-1975. Abundance results are reported for seines, trawls, and gill nets. Striped bass accounted for 1.75% and 1.44% of the number and weight, respectively, of all fishes caught in 36 months of gill netting. The mean catch of striped bass in trawls was .070 fish per tow and in seines .094 fish per haul. Condition, growth rates, and stomach contents were similar to those reported in other studies.

INTRODUCTION

The U. S. Fish and Wildlife Service began stocking striped bass, *Morone saxatilis*, in the Choctawhatchee River System in 1968 with the stocking of 14,000 6-inch fish and 118,000 2-inch fingerlings. Annual stocking continued through 1975 for a total of almost 3.7 million fish at an accumulated density of 36.9 fish per acre.

The goals of this stocking program are:

- 1) to re-establish a fishery for the large game fish, striped bass, in the system and thereby
- 2) contribute to the economy of the area by attracting anglers from outside the area.

To determine if the first goal was achieved, a biological evaluation program was initiated in 1972. A portion of this investigation was to determine the abundance of the stocked striped bass, and aspects of their biology including condition, growth rates, and food habits. Preliminary results from this portion of the study will be reported in this paper.

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DESCRIPTION OF STUDY AREA

The Choctawhatchee River arises in Barbour county in Alabama and flows approximately 175 miles to Choctawhatchee Bay. It is the fourth largest river in Florida, and drains 4,650 square miles of southeast Alabama and northwest Florida (Fig. 1). It is a slightly meandering stream with a gradient of 2.5 feet per mile near Geneva, Alabama, and 1.4 feet per mile in its lower portions. The river is heavily loaded with sediment and forms a delta where it enters Choctawhatchee Bay. The formation of the delta decreases the gradient of the river and extends the alluvium upstream. The major tributaries are the Pea River in Alabama and Pinelog, Holmes, Wrights, and Sandy Creeks in Florida. The more rapid alluviation of the Choctawhatchee dams the latter four creeks and forms lakes in the lower part of each tributary valley. These creeks are largely spring fed and carry little sediment load (Vernon, 1942).

Choctawhatchee Bay is a narrow estuary-lagoon complex (Goldsmith, 1966) covering approximately 84,000 acres. The bay has only one direct outlet to the Gulf of Mexico near the west end at Destin. The Intra-coastal Waterway traverses the 30-mile-length of the bay connecting with Santa Rosa Sound on the west and West Bay (St. Andrew) through a 20 mile land cut on the east end.

The bay is relatively shallow and is usually highly stratified with respect to salinity and dissolved oxygen during the summer months. Much of the bay water is fresh or brackish during the winter months.

MATERIALS AND METHODS

Fish collections were made using otter trawls, beach seines, and gill nets. The trawls and beach seines were patterned after those used in the Cooperative Gulf of Mexico Estuarine Inventory. The otter trawl was a basic Gulf Coast flat design with a 4.9m headrope. The seine was 0.6 cm bar mesh, 32.3m long by 1.8m deep with a 1.8m by 1.8m by 1.8m bag at its center. Monofilament gill nets 38.1m

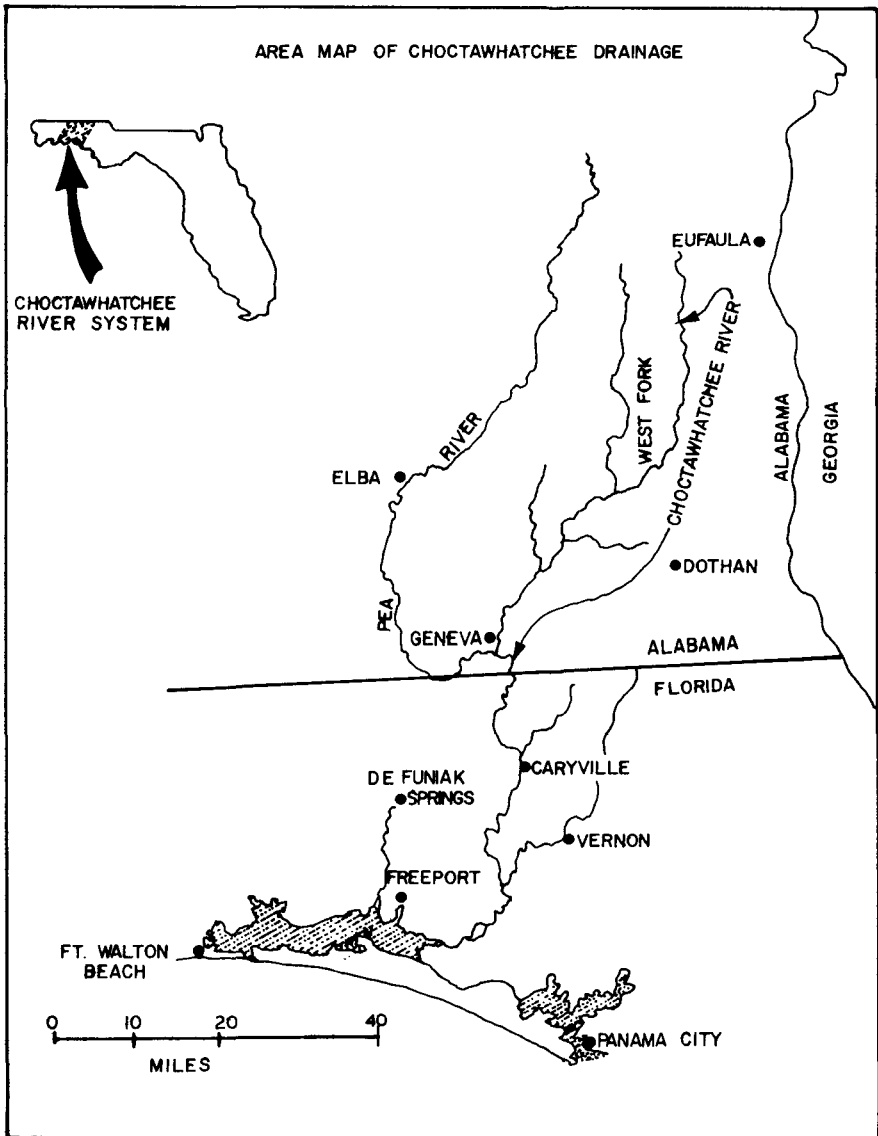


Figure 1. Area map of Choctawhatchee River System, Florida and Alabama.

in length and 1.8m in depth having five panels of different mesh sizes ranging from 1.3 cm to 6.4 cm bar, were used in the bay and river delta. A monofilament gill net 100m in length and 3m deep was used only in the bay. It had five panels of mesh ranging in size from 2.5-7.6 cm bar.

From July 1972 through September 1973, monthly samples using the two sizes of gill nets and the otter trawl were made at six stations in Choctawhatchee Bay (Fig. 2). Shore seining was begun in August 1972 at six bay stations and continued through September 1973. In October two more stations were added and seining continued through September 1974. Monthly gill net samples were made using the 38.1m net in the river delta from July 1972 through June 1975 with various modifications in procedure. From July 1972 through September 1973, 2-hour daylight sets were made at stations 1 through 6 (Fig. 3); 12-hour overnight sets were made at these six and variously at four additional stations from October 1973 through November 1974. In December 1974, 24-hour sets in 8-hour segments were made at the original six stations. From January through June 1975, 2-hour sets were again made at these six stations as in 1972-1973.

Fishes collected by each type of gear were enumerated by species, measured for total length to the nearest 0.5 cm, and collectively weighed to the nearest gram. All striped bass specimens were either frozen or placed in formalin and returned to the laboratory for processing. Striped bass were measured for total, fork, and standard length to the nearest millimeter and weighed to the nearest 0.1 g. Meristic counts were made and compared to those of Barkuloo (1970).

To express relative abundance we used two indices: (1) percentage composition of the sample by weight and number of fishes; and (2) catch-per-unit-effort by number of fishes. The units of effort we chose for each gear are trawls, one 10-minute tow; seines, one haul; and gill nets, one net per hour (net hour). We studied three aspects of the biology of the striped bass, age and growth, condition, and stomach contents.

Stomach contents were identified when possible, and frequency of occurrence was determined by counting every stomach that contained at least one of the particular food items. K-factors were calculated for 150mm standard length classes of striped bass using the relationship

$$K = \frac{W \times 100,000}{L^3}$$

(Rounsefell and Everhart, 1953.)

Age was determined from returns of tagged specimens, and a length-weight-age curve was plotted. During the first 5 years (1968-1972) of stocking, all 6-inch fish stocked were marked either by fin clipping or a monofilament Dennison tag.

RESULTS

Six young-of-the-year striped bass were caught in one trawl tow in July, 1973. These were the only striped bass caught in the 90 tows over the 15 month period for a mean catch of .067 fish per tow. They ranged in length from 52 to 67mm S.L.

In the 26 months of beach seining representing 180 hauls, striped bass were caught in June, July, August, and September 1973. The mean S.L for the striped bass caught in each of these months was 52.4mm, 67.5mm, 71.6mm and 103.0mm, respectively. They comprised .009% by number and .020% by weight of the total seine catch. The mean number caught per haul was .094.

No striped bass were caught during the 15 months of gill netting in the bay. Gill net sets in the delta, however, have consistently caught striped bass. In the 36 months of continuous delta gill netting representing 1,988 hours of fishing, striped bass accounted for 1.75% of the total number of fishes caught and 1.44% of the total weight. The mean number of striped bass caught per net hour was .021. The mean catch of all fish was 1.18 fish per net hour. The mean catch by weight of striped bass was 10.59 grams per net hour and for all fishes 735.3 grams per net hour. The most abundant species by number and weight taken during the first 2-hour daylight phase of netting are listed in Table 1. The most abundant fishes caught during the 12-hour-night netting segment are shown in Table 2.

In December 1974 24-hour sets, most striped bass were caught during day sets, followed closely by midnight sets. Table 3 summarizes the catch in each of these 8-hour sets. Catches of striped bass in the delta gill nets were grouped by quarters for the 3-year sampling period. The 1973 spring quarter yielded the greatest mean catch of striped bass (Table 4). Spring and fall catches were superior to those of winter and summer. Striped bass were caught every quarter after the fall quarter 1973.

The mean catch per net hour of striped bass for each sampling year (July-June) is 1972-73, .021; 1973-74, .013; 1974-75, .031.

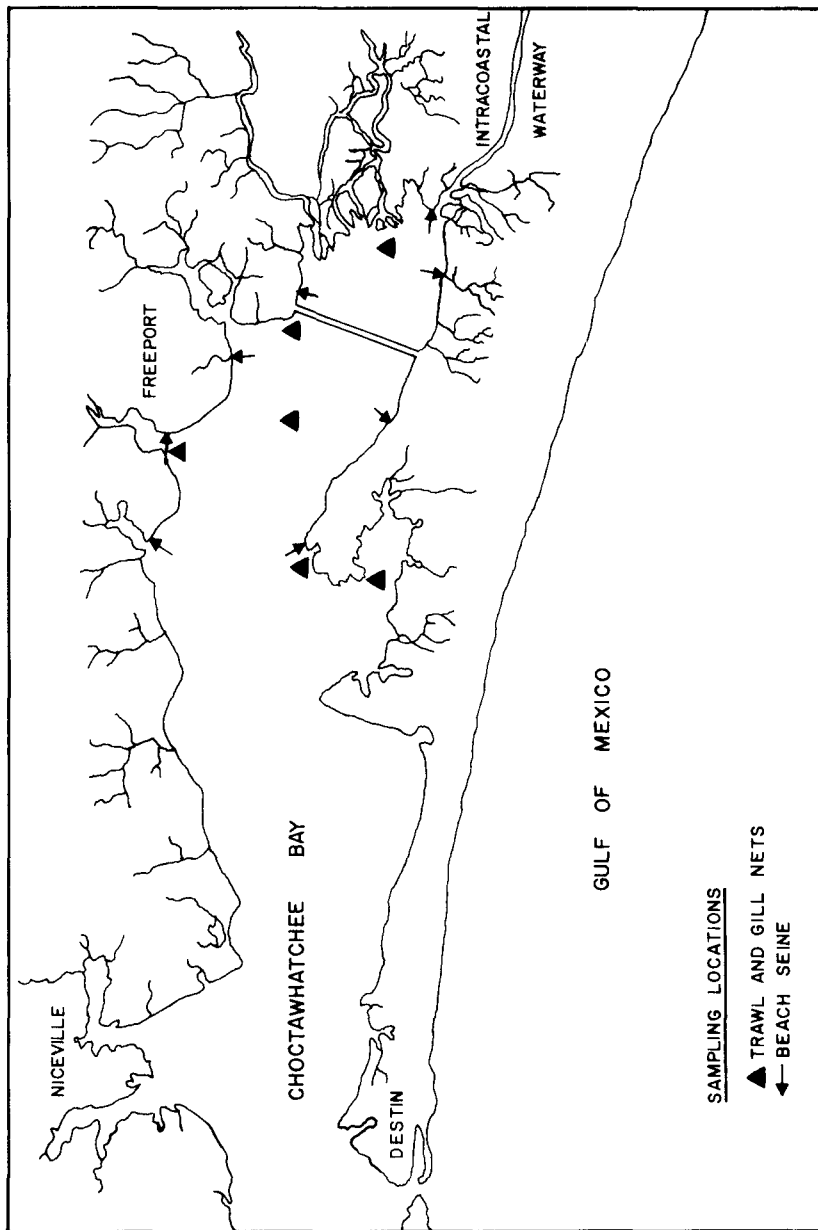


Figure 2. Sampling station locations in Choctawhatchee Bay. Trawl and gill net stations were sampled from July 1972 through September 1973. Beach seine stations were sampled from August 1972 through September 1974.

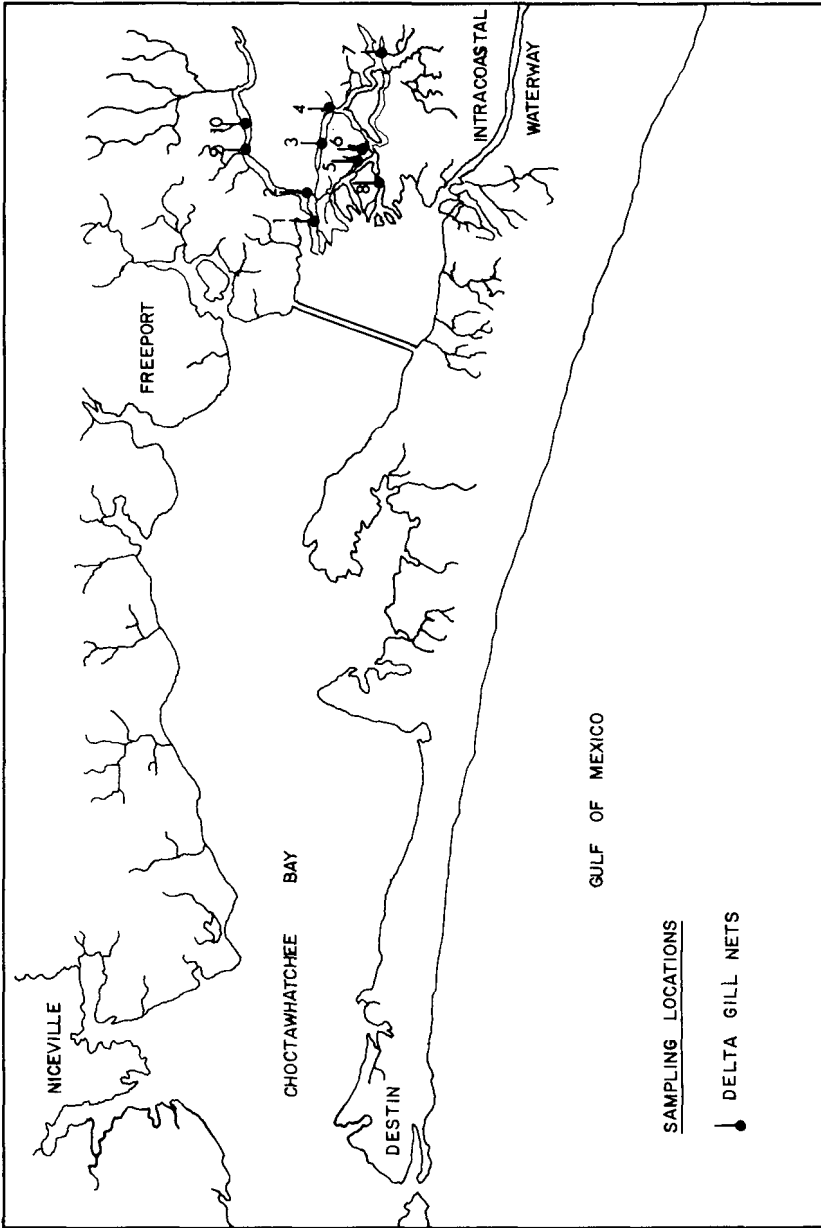


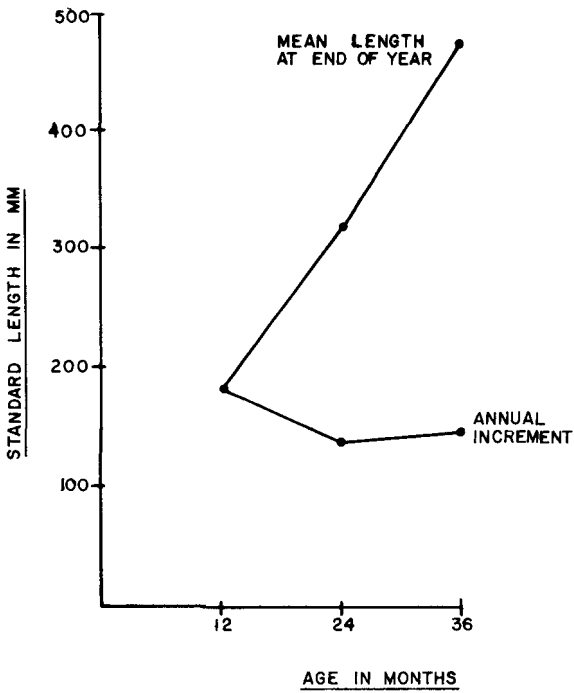
Figure 3. Gill net sampling stations in Choctawhatchee River delta. Stations 1 through 6 were sampled from July 1972 through June 1975, the others were sampled variously during this time frame.

Table 1. Most abundant species caught in 38.1m gill nets in the Choctawhatchee River delta from July 1972 through September 1973 listed in order of decreasing abundance.

Rank	Species	% of Total		% of Total		Mean Catch per Net Hour
		Number	Rank	Weight	Rank	
1	Threadfin shad	49.24	1	79.38	1	2.522
2	Longnose gar	23.54	2	5.03	2	1.206
3	Sea catfish	7.27	3	4.64	3	.372
4	Spot	5.75	4	1.74	4	.294
5	Atlantic croaker	2.82	5	1.59	5	.144
6	Skipjack herring	2.71	6	1.39	6	.139
7	Menhaden	1.52	7	0.86	7	.078
8	Quillback	1.08			8	.056
15	Striped bass	0.32			9	.033
					10	.033
					11	.028
					15	.017

Table 2. Most abundant species caught in 38.1m gill nets in the Choctawhatchee River delta from October 1973 through September 1974 listed in order of decreasing abundance.

Rank	Species	% of Total		% of Total		Mean Catch per Net Hour
		Number	Rank	Weight	Rank	
1	Longnose gar	35.99	1	72.85	1	.235
2	Sea catfish	13.52	2	5.88	2	.088
3	Atlantic croaker	10.90	3	2.89	3	.071
4	Threadfin shad	6.00	4	1.44	4	.039
5	Spot	4.91	5	1.85	5	.032
6	Menhaden	3.82	6	1.62	6	.025
7	Spotted gar	2.07	7	1.15	7	.014
8	Striped bass	2.07	8	1.08	8	.014
9	Gizzard shad	1.74	9	1.03	9	.011
10	Spotted sucker	1.74	10	1.01	10	.011
11	Quillback	1.31			11	.008
12	Skipjack herring	1.20			12	.008
13	Red drum	1.20			13	.008
14	Striped mullet	1.20			14	.006
					15	.006
					16	.006



**ANNUAL LENGTH INCREMENTS AND MEAN LENGTHS
OF STRIPED BASS AT END OF YEAR FROM TAGGED FISH**

Figure 4. Mean growth of striped bass, determined from marked fish recaptured during the project in the Choctawhatchee River System.

Table 3. Comparison of catch data between 8-hour segments of 24-hour 38.1m gill net sets made in the Choctawhatchee River delta in December 1974.

	<i>TIME OF SET</i>		
	<i>Day</i> <i>0800-1600</i>	<i>Evening</i> <i>1600-2400</i>	<i>Midnight</i> <i>2400-0800</i>
Number of striped bass caught	6	3	5
Mean catch of all fish per net hour	.687	.513	.676
Mean catch of striped bass per net hour	.121	.051	.113
% by number	17.65	10.00	16.67
% by weight	7.15	7.24	14.37

Table 4. Mean catch of striped bass by quarterly periods caught in 38.1m gill nets in Choctawhatchee River delta from July 1972 through June 1975.

<i>Season</i>	<i>Quarterly</i> <i>Period</i>	<i>Year</i>			
		<i>1972</i>	<i>1973</i>	<i>1974</i>	<i>1975</i>
Winter	Jan.-Mar.	—	0	.008	.028
Spring	Apr.-Jun.	—	.083	.022	.056
Summer	Jul.-Sep.	0	0	.014	—
Fall	Oct.-Dec.	0	.009	.048	—

Table 5. K-factor values by size groups of striped bass recaptured in the Choctawhatchee River System.

	<i>Size Groups (mm S.L.)</i>			
	<i>0-150</i>	<i>151-300</i>	<i>301-450</i>	<i>415-600</i>
Number Examined	31	70	17	3
Range	1.659— 2.284	1.691— 2.540	1.658— 2.445	1.652— 2.211
Mean	2.005	1.949	1.994	2.017

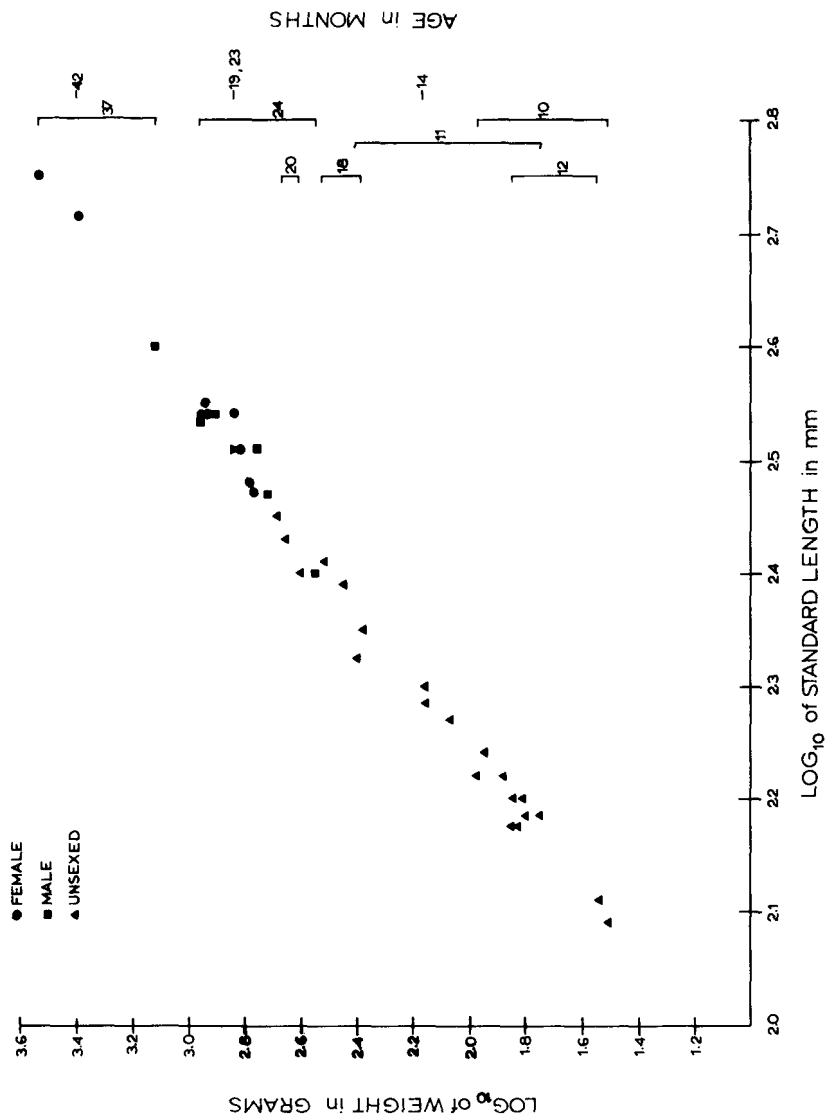


Figure 5. Length-weight-age plot of marked striped bass recaptured during the project. The ranges in size at different ages shown on the right ordinate.

Condition:

K-factor values ranged from 1.652-2.540 for the 121 specimens used for calculation of this value. Values were similar to those reported by Ware (1971) for five central Florida lakes. The data are presented by size groups in Table 5.

Age and growth:

The oldest marked fish recovered was 3.5 years old. Fish at 12 months old averaged 173.6mm S.L.; 24 months, 319.9mm S.L.; and 36 months, 470.5mm S.L.; with an annual increment of approximately 150mm between successive years (Fig. 4).

A length-weight-age plot was made for all suitable specimens (Fig. 5).

Stomach contents:

Of 122 striped bass specimens examined for stomach contents 93 (76.23%) contained food items. They ranged in length from 47 to 545mm S.L. There was no apparent difference between length groups in the occurrence of food items. Crustaceans occurred most frequently in the stomachs examined, 44.09%; followed by fish, 41.94%; insects, 19.35%; unidentifiable residue, 17.20%; and other invertebrates, 5.38%. The fish consisted mostly of clupeids, a few gobies, and one striped bass.

DISCUSSION

Striped bass apparently were not available to either of the two sizes of gill nets in the bay during the time span they were fished; however, striped bass were available to gill nets in the river delta. A 5-inch stretched mesh was the largest mesh size in our gill nets set in the delta.

Trent and Hassler (1968) found that a gill net with a stretched mesh of 5 inches most efficiently captures a 19-inch fork length striped bass. This is about the size of a 3-year old striped bass in the Choctawhatchee.

The only 3-year-olds we collected were foul gilled; therefore, the nets probably only sample striped bass less than 3 years of age. The nets would only sample 2- and occasionally 3-year classes at any given time. The fluctuations in abundance probably reflect year-class strength and/or changes in sampling procedures.

Partially due to the selectivity of our gill nets, information is lacking on fish past 3 years of age, but the few angler reports received indicate some larger fish are being caught.

CONCLUSIONS

1. Stocked striped bass survived in the Choctawhatchee River System. Their growth rates, stomach contents, and condition are comparable to those reported for striped bass in other areas.
2. The status of the striped bass after 3 years of age is unknown as we did not sample for fish over 3 years old.
3. The abundance results reported apply only to striped bass up to three years of age.

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