

STATE OF FLORIDA
DEPARTMENT OF NATURAL RESOURCES

RANDOLPH HODGES

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TECHNICAL SERIES

NO. 63

EXPLORATORY FISHING FOR SOUTHERN SEA BASS,
CENTROPRISTES STRIATUS MELANUS,
IN THE NORTHEASTERN GULF OF MEXICO

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December 1970

Marine Research Laboratory
Florida Department of Natural Resources
Division of Marine Resources
St. Petersburg, Florida

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EXPLORATORY FISHING FOR SOUTHERN SEA BASS, CENTROPRISTES STRIATUS MELANUS, IN THE NORTHEASTERN GULF OF MEXICO

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ABSTRACT

An extensive exploratory trapping program for southern sea bass was conducted in the northeastern Gulf of Mexico by the Marine Research Laboratory of the Florida Department of Natural Resources in 1968. Three trap types were set a total of 540 times, producing 2283 sea bass. Caribbean heart traps were most successful, and deeper waters from the Suwannee River to Carrabelle were most productive. Twenty to forty percent of the trapped sea bass were of marketable size. These yielded approximately 33% by weight after filleting and deboning.

INTRODUCTION

The Florida Department of Natural Resources Marine Research Laboratory conducted a program from January to October 1968 to assess geographical distribution, population structure, and fishing potential of the southern sea bass, *Centropristes striatus melanus* Ginsburg. In addition to locating the most productive fishing grounds, three trap types were used to ascertain the best fishing methods. Studies were also pursued to evaluate the yield of sea bass meat at various commercial processing stages and to discern the economic feasibility of using sea bass in fish stick production.

Previous trapping explorations along the Florida west coast by our Laboratory (Tyler, 1964) and the Hourglass and post-Hourglass Cruises (Joyce and Williams, 1969) were successful for southern sea bass. Trapping of black sea bass, *Centropristes striatus striatus* Linnaeus, along the Atlantic seaboard has long supported a valuable fishery. During the slack winter shrimping season in the Carolinas, shrimp boats are slightly modified and are used to trap black sea bass (Rivers, 1966). The traps are

*Contribution No. 158.

similar to Chesapeake crab traps (Sundstrom, 1957; Dumont, 1961; Isaacson, 1963; Rivers, 1966). This daytime fishery, initiated in 1960, produced almost 1.8 million pounds in 1969 for North and South Carolina (U.S. Fish and Wildlife Service, 1970 a, b). The sea bass is readily taken by handline with almost any bait (Topp, 1963) and often saves the day for party boat anglers. It is an excellent table fish and supports a small sport and commercial fishery along the northern Atlantic and Gulf coasts of Florida. Because of past successful catches and an excellent potential for an expanded sea bass fishery in the northeastern Gulf, the Marine Research Laboratory initiated this program.

Relationships

Centropristes striatus striatus and *C. s. melanus* are closely related serranids. Ginsburg (1952) described *Centropristes melanus* as a new species from the Gulf of Mexico and demonstrated, on the basis of gill raker and pectoral ray counts, that *C. melanus* and *C. striatus* differed at the species level. He believed that speciation was a consequence of the isolation of east and west stocks by the Florida Peninsula, the southern tropical waters preventing genetic exchange between these two temperate species.

Miller (1959) compared the two, using 21 measurements and 9 counts, and concluded that divergence was of subspecific degree. He stated that allopatry of these subspecies has not been verified. Therefore, there is a possibility that interbreeding may take place in the upper Keys where Miller believed inadequate sampling failed to document the existence of southern sea bass.

Distribution, Habitat, and Seasonality

C. striatus melanus has been reported from Pensacola to Placida on the Florida west coast, while *C. s. striatus* ranges from the Gulf of Maine to the northern Florida Keys (Miller, 1959). Large populations of *C. s. melanus* occur between lower Tampa Bay and Apalachee Bay in depths of 30-60 ft (9.1-18.3 m), with some records to 80 ft (24.4 m). They congregate around low reef areas of limestone outcroppings, dead coral, and sponges. Artificial obstructions (such as boat wrecks, submerged car, and ice boxes) often provide suitable protection and habitat. Tagging studies reveal that the southern sea bass is highly residential, showing no signs of seasonal inshore-offshore movement (Topp, 1963; Beaumariage, 1964, 1969; Beaumariage and Wittich, 1966; Moe, 1966). *C. s. striatus* in the northern Atlantic migrates annually

to the continental shelf, beginning in late summer and terminating the following January (Lavenda, 1949). Tagging studies of *C. striatus* in Florida waters have not revealed seasonal migrations. Beaumariage (1969) lists three tagged *C. s. striatus* captured in January (free 259 days) and February (free 263 and 287 days), none of which showed significant movement. In summer, young congregate around rock piles and other inshore objects (Reid, 1954; Topp, 1963). These subspecies do not appear on Gunter's (1949) list of euryhaline fishes.

Sexual Dimorphism

Sexual dimorphism in mature sea bass becomes most apparent during spawning season (Lavenda, 1949; Moe, 1966; Hoff, 1970). At this time males develop a large fleshy nuchal hump and their brown-black coloration becomes highlighted with fluorescent blues and greens. The female coloration becomes olive and her physique rotund. Average length of all fish is 175 mm standard length (SL) with a maximum of 345 mm. The east coast subspecies is generally larger.

Spawning

Centropristes striatus striatus is a protogynous hermaphrodite with females usually becoming functional males after their fifth year (Lavenda, 1949). *C. s. melanus* may be similar in this respect since the largest are males. Spawning occurs in late winter through early spring, with peak spawning months being February, March, and April (Reid, 1954; Moe, 1966; Hoff, 1970). Spawning apparently occurs in early summer in cooler northern Gulf waters (Goode, 1884). The east coast subspecies also spawns at about this time (Smith, 1907; Hildebrand and Schroeder, 1928; Lavenda, 1949).

Food

Crustaceans and fish represent the staple of the sea bass diet (Hildebrand and Schroeder, 1928; Reid, 1954; Miller, 1959). They are voracious eaters, gulping almost any bait offered them (Topp, 1963).

FLORIDA SEA BASS FISHERY

West Coast

Most sea bass produced on the west coast are landed in Pinellas, Citrus, and Pasco counties (U.S. Fish and Wildlife Serv-

ice, 1968, 1969, 1970c). Landings of 302,649 pounds (\$35,336) of sea bass were reported during 1968, with an average price to the fisherman being 11.7¢ lb. (Table 1). This price increased 0.7¢ in 1969, and production rose slightly to 305,396 pounds (\$37,744). Most fish are produced from October through March, a period coinciding with the Florida tourist season and slack production period of the northern Atlantic coast fishery. Most fish are shipped to the Carolinas, Virginia, Maryland and New York.

TABLE 1. SEA BASS LANDINGS IN POUNDS AND DOCKSIDE DOLLAR VALUE

EAST COAST COUNTIES									
	Nassau	Duval	St. Johns	Volusia	Brevard	Indian River	St. Lucie	Martin	Palm Bch.
1968									
Jan.	877	1,660	1,384	155				62	4,138
Feb.	775	993	562	722					3,052
Mar.	382	1,644	1,169	2,248		260			5,703
Apr.	880	3,474	2,795	1,701				349	9,816
May	549	4,981	4,342	1,275					32 11,179
June	384	2,491	4,703	718				216	8,457
July	45	3,543	684	1,014			108	86	5,480
Aug.	414	4,862	1,182	1,409			111	36	8,014
Sep.	399	2,513	211	309			58		3,490
Oct.	186	379	1,126	1,071		1,428	199	111	4,500
Nov.	140	1,283	639	187			568	11	2,839
Dec.	76	1,585	780				92		2,533
Annual Summary	5,057	29,408	19,577	10,804		1,688	1,136	871	68,701
1969									
Jan.		4,004	249	394			40	82	4,769
Feb.		3,078	1,154	1,012			14		129 5,387
Mar.		1,732	3,818	1,247					6,797
Apr.		5,781	3,244	2,803	267				93 12,188
May	546	5,457	1,138	644	268				8,253
June	48	5,127	991	2,122	107	80	100	186	8,761
July	67	5,199	2,000	756	97	350	406		8,875
Aug.	120	2,087	2,589	1,000	323		25	25	6,169
Sep.	148	2,073	320	212	95		120		2,968
Oct.			237	215	63		174	858	1,547
Nov.	128	479	78	147	55		287		1,174
Dec.		740	1,448	1,010			120		3,318
Annual Summary	1,057	35,957	17,266	11,562	1,275	430	1,286	1,164	222 70,219

Retirees from New Port Richey produce most of the west coast sea bass landings. They operate small boats and capture fish with handlines and traps. Fish under eight inches are discarded. A few fishermen operate on a larger scale and generally return from three to four day cruises with up to three or four thousand pounds of fish. They fish approximately 20 traps continuously from dawn till dusk. Immediately after setting all 20 traps the fisherman returns to the beginning of the trap line and empties, rebaits, and resets traps.

FROM FLORIDA EAST AND WEST COAST COUNTIES, 1968 AND 1969

WEST COAST COUNTIES											
Total Value (\$)	Av. Price/Lb (¢)	Manatee	Hillsboro	Pinellas	Citrus Hernando Pasco	Levy	Wakulla	Total Pounds	Total Value (\$)	Av. Price/Lb (¢)	
613	14.8										
480	15.7			11,402				11,402	1,234	10.8	
975	17.1		22	14,240				14,240	1,542	10.8	
1,503	16.1			9,722	7,850			17,572	1,924	10.9	
1,907	17.1			6,150	6,876			13,026	1,394	10.7	
1,440	17.0			1,427	772			2,199	237	10.8	
822	15.0			1,983	881			2,864	321	11.2	
1,337	16.7	202		3,218	4,278			7,698	790	10.3	
632	18.1			716	3,812			4,528	529	11.7	
854	19.0		59					11,064	1,285	11.6	
431	15.2			3,501	151,128			154,629	18,494	12.0	
440	17.4				48,225			63,427	7,586	12.0	
11,489	16.7	202	59	71,924	228,964			302,649	35,322	11.7	
883	16.3			7,250	61,250			68,500	8,227	12.0	
1,144	21.2			18,323	8,222			26,545	3,373	12.7	
1,209	17.8			2,580	19,967			22,569	2,688	11.9	
2,531	20.8			11,169	9,216			20,385	2,342	11.5	
1,658	20.1			10,925	4,988	4,200		20,113	2,327	11.6	
1,715	19.6	251		10,744	1,240			12,235	1,491	12.2	
2,073	23.4	2,754		3,084	3,489			6,573	873	13.3	
1,242	20.1			4,953	4,825			12,582	2,142	17.1	
803	27.8			4,813	987			5,800	812	14.0	
289	18.7			2,731	61,211	397	192	64,531	9,060	14.0	
218	18.6		47	11,578	2,764		2,445	16,834	2,262	13.4	
651	19.6			12,544	6,185			18,729	1,931	10.3	
15,299	21.8	3,005	69	100,744	188,625	10,338	2,637	305,418	38,574	12.6	

East Coast

East coast sea bass are usually handlined, but when fish are plentiful traps are used. They are often caught with other fish, especially with red snapper. Duval, St. Johns, and Volusia Counties are leading Florida producers. Total poundage produced for the Florida east coast for 1968 was 68,701 (\$11,489) (U.S. Fish and Wildlife Service, 1968, 1969, 1970c). The average price to the fisherman was 16.7¢/lb. In 1969 production, dockside value, and price per pound increased to 70,206 lb, \$14,416, and 20.3¢.

In the early 1940's a New Smyrna fisherman, Anchor Damgaard, captured sea bass by an old Norwegian fishing method, using a high speed winch, with a 10 ft diameter hoop attached to a net of 1-3 inch mesh. Bait fish were run through a grinder prior to placing them in chum bags of 1-1.5 inch mesh. Chum bags were secured in a cross configuration inside the net. The hoop and net were then lowered to a position just above the bottom. After a few minutes the gear was rapidly retrieved with the high speed winch. Net speed and resultant water pressure trapped the fish feeding over the net. Some hauls yielded as much as 300 to 400 lb (personal communication, Mrs. Damgaard).

METHODS AND MATERIALS

Fishing Locations

Southern sea bass trapping cruises were conducted from our research vessel, the R/V *Hernan Cortez*, with a crew of three. Expeditions lasted three to five days and fishing was limited to predetermined quadrants (Figure 1). Five cruises of 29 total fishing days were completed from January to October 1968. From Egmont Key to Panama City, Florida, 45 stations were sampled in depths of 18-19 ft (6.5-27.4 m). Forty-three trap sets were made in twenty quadrants and two additional sets were made off Panama City.

The northeastern Gulf of Mexico was divided into two areas to provide comparative fishing data: AREA I—Dunedin to Chassahowitzka (28°00' to 28°40' N Lat.; 82°50' to 83°10' W. Long.); AREA II—Suwannee River to Carrabelle (29°20' to 30°00' N Lat.; 83°30' to 84°40' W Long.). Seven unproductive sets for sea bass (in Quadrants 1, 55, 59, 64, and off Panama City) are excluded from these two areas because they were test sets made on sandy bottoms and in depths where sea bass do not usually occur.

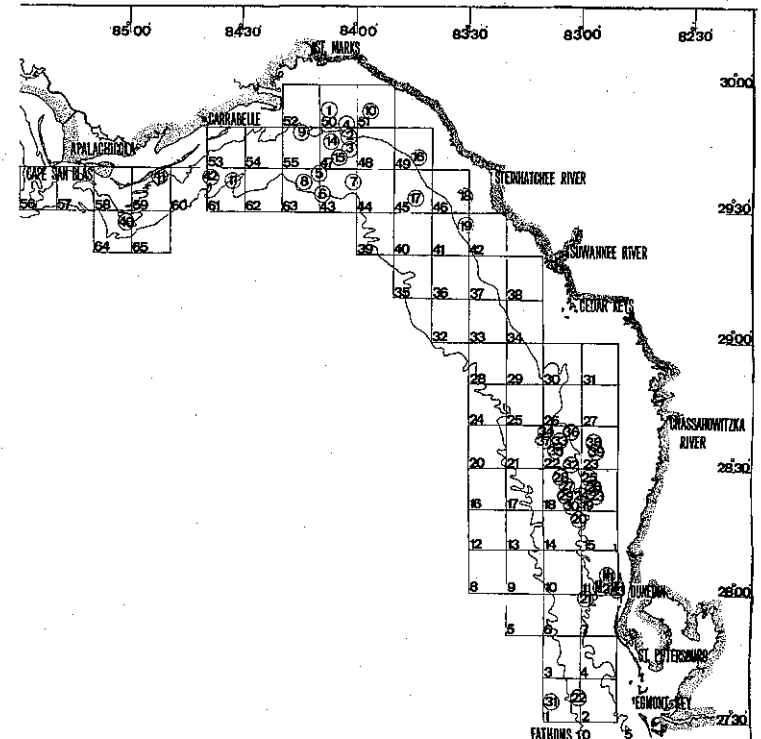


Figure 1. Southern sea bass exploratory fishing stations and established quadrants on the west and northwest coasts of Florida.

Twenty-one sets representing six quadrants were sampled in Area I. Daylight sets (12) outnumbered overnight sets (9) and trapping was carried out in January (3 sets), April (2 sets), May (8 sets), and June (8 sets). Fishing depths ranged from 18-42 ft (6.5-12.8 m) and bottom temperatures ranged from 14.8°C in January to 30.7°C in June.

In Area II, 17 sets were made in 10 quadrants. Ten overnight sets and seven daylight sets were made in April (16 sets) and October (1 set). Bottom temperatures in April ranged from 17.7°C to 23.8°C in depths of 20-64 ft (6.1-19.5 m). In October

a temperature of 26.9°C at 50 ft (15.2 m) was recorded for Quadrant 61.

Trap Types

Three trap types were used in this study: Caribbean heart-shaped fish trap (Joyce and Williams, 1969) (Figure 2), Cedar Key blue crab trap (Figure 3), and Cedar Key stone crab trap (Figure 4). The Cedar Key blue crab trap and the Caribbean heart-shaped trap were constructed of 1 in x 2 in galvanized hardware cloth, and the Cedar Key stone crab trap was made of galvanized 1.5 in hexagonal mesh wire. The two crab traps are similar to Chesapeake Bay crab traps (Andrews, 1947; Sundstrom, 1957;

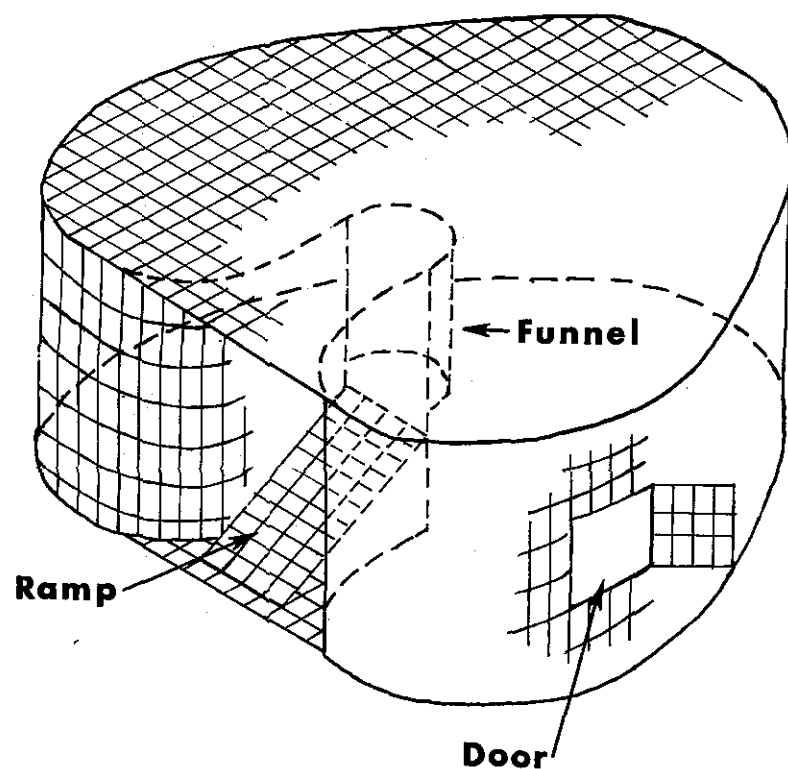


Figure 2. Caribbean heart-shaped fish trap.

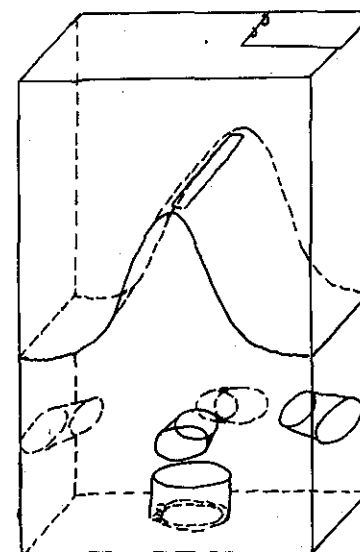


Figure 3. Cedar Key blue crab trap.

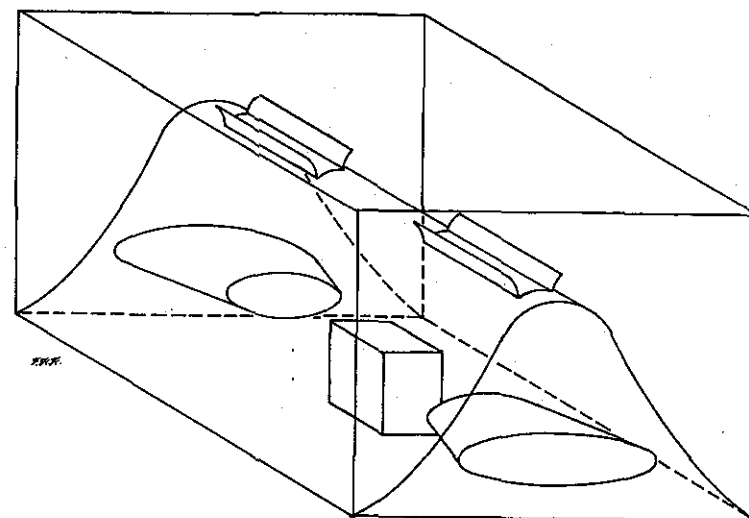


Figure 4. Cedar Key stone crab trap.

Dumont, 1961; Van Engel, 1962; Isaacson, 1963). Trap dimensions are listed in Table 2.

TABLE 2. DIMENSIONS (IN) OF TRAPS
(I, inside; O, outside)

Trap Type	No. of Openings	Funnel Size	Overall Dimensions			Volume
			Height	Length	Width	
Caribbean heart-shaped	1	(I) 8 x 10	24	48	48	46,944 in ³
		(O) 48 x 8				
Cedar Key blue crab	4	(I) 4 x 6	21	18	18	6,804 in ³
		(O) 4 x 6				
Cedar Key stone crab	2	(I) 6 x 4	18	24	24	10,368 in ³
		(O) 11 x 4				

Only the crab traps have bait wells and partitions. Two floats (commercial plastic gallon containers) were attached to each trap with 0.25 in nylon line. No weights were used to submerge traps.

Trap Setting

When suitable irregular bottom contours or low reefs were detected by the ship's depth recorder, and when handline catches produced southern sea bass or other reef fishes, traps were baited with fresh fish and set. Instead of strategically positioning traps about reef areas (which might have produced better catches), traps were set in a straight line 75-100 ft (22.9-30.5 m) apart to allow for vessel maneuvering during retrieval. At Stations 23 through 42, trap types were alternated, i.e., crab trap, heart trap, crab trap, etc. The float was thrown overboard first, followed by the trap after the attached line had trailed out behind the boat. A 20 ft (6.1 m) bamboo pole with attached hook was used to snatch the trap floats from the water at the bow of the boat. The float and trap line were then brought to the midport side, where the trap was winched aboard with an open block and mechanical drum. All species were identified and counted; standard lengths were recorded for all southern sea bass. Surface and bottom temperatures (°C) were recorded for each station.

Effort Calculations

Numerical effort values were calculated for each trap type at each trap set. Two effort formulae were used: one for daylight sets lasting three hours (12 quarter hours) or less, and the sec-

ond for overnight sets or daylight sets lasting longer than three hours. The effort formula for daylight sets of less than three hours duration is

$$\text{EFFORT (C/f)} = \sum_{i=1}^n \frac{f_i}{n}$$

where "f" is the effort value for each trap (no. of trapped sea bass/actual quarter-hours fished) and "n" is the number of traps for each trap type. The numerical result of this equation represents the average number of sea bass caught per trap type for each quarter-hour fishing time.

For overnight sets and daylight sets lasting more than three hours, the preceding equation reduces to

$$\text{EFFORT (C/f)} = \frac{\text{No. of trapped sea bass}}{\text{No. of traps} \times 12 \text{ quarter-hour units}}$$

The numerical result here represents the average yield of sea bass per trap per quarter-hour unit. Judging from the results of preliminary exploratory attempts (Martin Moe, personal communication), we established that a three hour fishing period constitutes a reasonable estimate of saturation time. This standard twelve quarter-hour unit was used so that more meaningful comparisons could be made between daylight and overnight effort values.

Effort calculations were also prepared for total food fish captured. Formulae vary from the preceding two in only one respect: all other captured food fish are considered along with the sea bass as total catch. Food fish included in these results are:

Serranidae — sea basses

Centropomus ocyurus — Gulf sea bass

Diplectrum formosum — sand perch

Epinephelus morio — red grouper

Mycteroperca microlepis — gag

Pomadasyidae — grunts

Haemulon aurolineatum — tomtate

Haemulon plumieri — white grunt

Sparidae — porgies

Calamus arctifrons — grass porgy

Calamus nodosus — knobbed porgy

Calamus proridens — littlehead porgy

Sciaenidae — drums

Menticirrhus americanus — southern kingfish

TABLE 8. SOUTHERN SEA BASS TRAPPING STATIONS WITH PERTINENT HOWITZKA), AREA II (SUWANNEE RIVER TO CARRABELLE),

Stations	Quadrants	Coordinates	Date Sampled	Temperature (°C)		Depth		No. Seabass Caught- No. Traps Used			Total Sea Bass
				Sur.	Bot.	Feet	Meters	Blue Crab	Heart Crab	Stone Crab	
Area I											
M1*	11	28°01'N 82°52'W	1/15-16/68	15.0	15.0	24	7.3	33-8	51-9	-	84
M2*	11	28°01'N 82°52'W	1/16-17/68	15.0	14.8	24	7.3	30-3	130-10	-	160
M3*	11	28°01'N 82°52'W	1/17-18/68	14.8	15.0	24	7.3	29-3	101-10	-	130
20*	14	28°18'N 83°05'W	4/27-28/68	23.2	23.3	42	12.8	17-5	75-5	-	92
21	11	28°05'N 82°58'W	4/28/68	25.3	24.8	30	9.1	8-4	1-5	5-1	14
23*	19	28°24'N 82°58'W	5/14-15/68	26.9	26.9	18	6.5	0-5	1-5	1-1	2
24	19	28°24'N 83°00'W	5/15/68	26.2	26.1	28	8.5	20-5	8-5	0-1	28
25	19	28°28'N 82°58'W	5/15/68	27.2	26.5	24	7.3	30-5	22-5	0-1	52
26	19	28°26'N 82°58'W	5/15/68	26.8	26.2	28	8.5	37-5	39-5	6-1	82
27*	18	28°25'N 83°03'W	5/15-16/68	25.8	25.8	32	9.8	7-5	31-5	3-1	41
28	18	28°28'N 83°05'W	5/16/68	25.9	25.9	34	10.4	14-5	34-5	4-1	52
29	18	28°23'N 83°03'W	5/16/68	26.6	25.5	42	12.8	6-5	3-5	0-1	9
30	18	28°23'N 83°03'W	5/16/68	26.3	26.0	36	11.0	7-5	0-5	1-1	8
32*	22	28°31'N 83°03'W	6/24-25/68	30.2	30.1	26	7.9	8-5	5-5	3-1	16
33	22	28°36'N 83°06'W	6/25/68	30.1	29.8	30	9.1	8-5	3-5	0-1	11
34	22	28°39'N 83°09'W	6/25/68	30.7	30.3	34	10.4	0-5	1-5	0-1	1
35*	22	28°35'N 83°07'W	6/25-26/68	30.0	29.8	34	10.4	6-5	12-5	6-1	24
36	22	28°39'N 83°04'W	6/26/68	30.1	30.3	32	9.8	7-5	6-5	0-1	13
37	22	28°39'N 83°09'W	6/26/68	30.0	30.0	37	11.3	1-5	0-5	0-1	1
38	23	28°35'N 82°07'W	6/26/68	30.7	30.7	24	7.3	6-5	8-5	0-1	14
39*	23	28°35'N 82°57'W	6/26-27/68	30.5	30.5	20	6.1	4-5	5-4	2-1	11

*= overnight sets

Overnight set mean

Daylight set mean

Overall mean

PHYSICAL AND STATISTICAL DATA FOR AREA I (DUNEDIN TO CHASSA- AND OTHER UNINCORPORATED AREAS

Avg. No. Sea Bass Caught/Trap			Total Fishing Time (hrs)			C/f SB			C/f FF				
Blue Crab	Heart Crab	Stone Crab	Blue Crab	Heart Crab	Stone Crab	Blue Crab	Heart Crab	Stone Crab	Mean	Blue Crab	Heart Crab	Stone Crab	Mean
11.0	5.6	-	47.5	142.5	-	.92	.47	-	.58	1.10	.50	-	.65
10.0	13.0	-	56.0	185.0	-	.83	1.08	-	1.02	1.08	2.67	-	2.30
9.7	10.1	-	46.5	155.0	-	.81	.84	-	.83	1.00	1.96	-	1.74
8.4	15.0	-	67.5	67.5	-	.28	1.25	-	.77	.52	2.23	-	1.38
1.6	0.2	5.0	26.3	26.3	5.3	.13	.02	.42	.09	.33	.43	.67	.38
0	0.2	1.0	65.5	66.0	13.5	0	.02	.08	.02	.03	.48	.08	.28
4.0	1.6	0.0	6.2	6.2	1.2	.74	.28	.00	.46	.77	.70	.00	.67
6.0	4.4	0.0	6.1	6.0	1.3	1.17	.90	.00	.94	1.90	1.18	.00	1.40
7.4	7.8	6.0	6.5	6.5	1.3	1.44	1.55	1.20	1.47	2.74	2.71	1.60	2.62
1.4	6.2	3.0	67.0	67.7	12.9	.12	.52	.25	.31	.33	.87	.25	.57
2.8	6.8	4.0	6.8	7.1	1.7	.49	1.35	.59	.89	.72	2.94	.59	1.72
1.2	0.6	0.0	6.6	6.7	6.4	.19	.10	.00	.13	1.27	1.03	.00	1.05
1.4	0.0	1.0	6.6	6.5	1.3	.30	.00	.19	.15	.47	.22	.19	.33
1.6	1.0	3.0	50.8	51.2	10.5	.13	.08	.25	.12	.30	.23	.66	.30
1.6	.6	0.0	9.3	9.7	1.5	.22	.09	.00	.14	.30	.43	.00	.33
0.0	.2	0.0	8.0	8.3	2.0	.00	.05	.00	.02	0.0	.14	.50	.11
1.2	2.4	6.0	78.0	78.8	16.0	.10	.20	.50	.18	.45	.87	.67	.66
1.4	1.2	0.0	7.2	7.0	1.1	.21	.19	.00	.18	.56	.45	.23	.48
0.2	0.0	0.0	7.5	7.8	2.0	.03	.00	.00	.01	.03	.03	.03	.03
1.2	1.6	0.0	7.5	7.3	1.2	.18	.26	.00	.20	.18	.26	.00	.20
0.8	1.3	2.0	71.6	71.3	14.0	.07	.08	.17	.08	.18	.30	.17	.23
.43	6.1	3.0	61.2	98.3	13.4	.36	.50	.25	.43	.55	1.12	.37	.90
2.40	2.1	1.3	8.7	8.8	2.2	.43	.40	.20	.39	.77	.88	.32	.78
3.20	3.8	1.8	31.2	47.2	17.0	.40	.44	.21	.41	.68	.98	.33	.83

TABLE 3. SOUTHERN SEA BASS TRAPPING STATIONS WITH PERTINENT HOWITZKA), AREA II (SUWANNEE RIVER TO CARRABELLE),

Stations	Quadrants	Coordinates	Date Sampled	Temperature (°C)		Depth		No. Seabass Caught- No. Traps Used			Total Sea Bass
				Sur.	Bot.	Feet	Meters	Blue Crab	Heart Crab	Stone Crab	
Area II											
1*	50	29°53'N 84°08'W	4/2-3/68	19.0	19.0	22	6.7	15-3	128-11		143
2*	47	29°48'N 84°05'W	4/3/68	18.5	19.0	32	9.8	7-3	90-11		97
3*	47	29°45'N 84°02'W	4/3-4/68	18.0	18.0	36	11.0	6-3	69-11		75
4*	50	29°51'N 84°03'W	4/4-5/68	20.0	20.0	22	6.7	0-3	35-11		35
5	43	29°40'N 84°10'W	4/9/68	20.0	17.7	48	14.6	67-4	118-11		185
6*	43	30°04'N 84°09'W	4/9-10/68	20.0	17.7	60	18.3	22-3	150-11		172
7	43	29°37'N 84°05'W	4/10/68	22.0	20.0	48	14.6	35-3	203-11		238
8*	63	29°39'N 84°14'W	4/10-11/68	20.0	-	48	14.6	15-3	98-11		113
10*	51	29°52'N 83°58'W	4/11-12/68	22.0	-	22	6.7	3-3	27-11		30
11*	61	29°37'N 84°33'W	4/16-17/68	20.2	19.8	64	19.5	5-9	13-11		18
14	47	29°44'N 84°06'W	4/23/68	21.8	21.0	38	11.6	28-6	60-5		88
15	47	29°43'N 84°06'W	4/23/68	23.8	22.5	32	9.8	31-5	4-5		35
16*	49	29°43'N 83°44'W	4/23-24/68	24.0	23.7	20	6.1	5-5	4-5		9
17	45	29°33'N 83°44'W	4/24/68	23.2	21.1	36	11.0	8-5	25-5		33
18	46	29°34'N 83°31'W	4/24/68	23.8	23.5	22	6.7	19-5	33-5		52
19*	41	29°27'N 83°31'W	4/24-25/68	23.4	23.8	28	8.5	17-5	62-5		79
42*	61	29°38'N 84°39'W	10/9-10/68	26.8	26.9	50	15.2	0-4	36-5		36
			Overnight set mean								
			Daylight set mean								
			Overall mean								
Other Stations											
9	55	29°49'N 84°15'W	4/11/68	21.0	-	36	11.0	0-3	0-11		0
12*		30°05'N 85°46'W	4/17-18/68	20.7	20.0	66	20.1	0-9	0-11		0
13*		30°06'N 85°52'W	4/19-20/68	20.8	18.8	90	27.4	0-7	0-6		0
22*	1	27°36'N 83°05'W	4/28-29/68	24.2	22.5	70	21.3	0-5	0-5	0-1	0
31*	1	27°35'N 83°07'W	5/17/68	26.2	25.0	75	22.9	0-5	0-5	0-1	0
40*	64	29°27'N 85°02'W	10/8-9/68	27.2	27.2	20-32	6.1-9.8	0-4	0-5	0-1	0
41	59	29°38'N 84°52'W	10/9/68	27.3	27.0	22-30	6.7-9.1	0-4	0-5	0-1	0

PHYSICAL AND STATISTICAL DATA FOR AREA I (DUNEDIN TO CHASSA- AND OTHER UNINCORPORATED AREAS

Avg. No. Sea Bass Caught/Trap			Total Fishing Time (hrs)			C/f SB			C/f FF			M
Blue Crab	Heart Crab	Stone Crab	Blue Crab	Heart Crab	Stone Crab	Blue Crab	Heart Crab	Stone Crab	Mean	Blue Crab	Heart Crab	
5.0	11.6		51.5	187.3		.42	.97		.85	.44	1.06	
2.3	8.2		13.5	49.5		.19	.68		.58	.28	.71	
2.0	6.3		41.3	148.8		.17	.53		.45	.17	.57	
0.0	3.1		45.5	170.2		.00	.27		.21	.00	.66	
16.8	10.7		11.5	44.0		2.13	.89		1.31	2.19	1.22	1.
7.3	13.6		38.5	145.8		.61	1.14		1.03	.69	1.25	1.
11.7	18.5		12.0	44.0		.97	1.54		1.42	.97	1.67	1.
5.0	9.0		41.3	156.8		.42	.74		.67	.42	.95	
1.0	2.5		35.5	137.5		.03	.20		.16	.03	.26	
0.6	1.2		118.5	144.8		.05	.10		.08	.06	.21	
4.7	12.0		27.0	22.5		.39	1.00		.67	.46	1.17	
6.2	.8		15.0	15.0		.52	.07		.30	.52	.18	
1.0	.8		72.5	72.5		.08	.07		.08	1.83	.15	
1.6	5.0		16.3	16.3		.13	.42		.28	.26	1.15	
3.8	6.6		20.0	20.0		.32	.55		.44	.33	.58	
3.4	12.4		67.5	67.5		.28	1.03		.66	.28	1.07	
0.0	7.2		57.5	71.9		.00	.60		.30	.06	.77	
2.5	6.8		57.0	130.3		.21	.57		.45	.40	.59	
6.7	8.8		16.5	30.2		.66	.74		.71	.72	.95	
4.3	7.6		40.3	89.1		.39	.64		.56	.53	.74	
0.0	0.0		11.7	44.0		.00	.00		.00	.00	.03	
0.0	0.0		117.0	143.0		.00	.00		.00	.10	.12	
0.0	0.0		98.0	84.0		.00	.00		.00	.08	.06	
0.0	0.0	0.0	49.2	49.2	9.8	.00	.00	0.0	.00	.22	.45	0.0
0.0	0.0	0.0	46.2	46.2	9.1	.00	.00	0.0	.00	.33	.32	0.0
0.0	0.0	0.0	64.5	80.9	16.7	.00	.00	0.0	.00	.00	.10	0.0
0.0	0.0	0.0	5.3	7.3	1.6	.00	.00	0.0	.00	.04	.00	0.0

Occasionally blue crabs and stone crabs were captured, but not in sufficient numbers to include them in total food fish effort calculations.

Meat Yield Study

To determine the marketable meats per pound at various processing stages, random samples of assorted sea bass were processed as follows: immediately after capture, sea bass were placed in a five-gallon container and weighed. The fish were then counted and iced. After arrival at dock, the fish were weighed again, gutted and weighed, and then headed and weighed. They were then skinned, deboned with needle-nosed pliers, and the resulting fillets weighed.

RESULTS

A total of 540 trap sets were made during this study, producing 2283 sea bass. Heart traps accounted for 311 sets, and blue crab and stone crab traps were used 207 and 22 times.

The average daylight sea bass effort values (C/f_{SB}) for Areas I and II were approximately equal, whereas the C/f_{SB} for overnight sets was 1.8 times greater for Area II than for Area I (Table 3). Consequently, the overall C/f_{SB} for Area II was 1.4 times greater than that of Area I. According to the average food fish effort values (C/f_{FF}), daylight sets in Area I were 1.4 times more productive than those of Area II. The average C/f_{FF} for all overnight sets and for all sets (both daylight and overnight) were approximately equal.

Based on effort calculations, Quadrant 43 of Area II was the most productive for sea bass ($C/f_{SB} = 1.25$) and total food fish ($C/f_{FF} = 1.41$). The three stations (7, 5, and 6) sampled in Quadrant 43 produced 41% of all sea bass trapped in Area II, and produced three of the four highest C/f_{SB} values (1.42, 1.31, and 1.03). The most productive set was made in Area I; Station 26 of Quadrant 19 produced a C/f_{SB} of 1.47 and a C/f_{FF} of 2.62. Quadrants 14, 11, and 19 had the highest C/f_{SB} values for Area I (0.77, 0.71, and 0.72) and produced 74% of the sea bass in 43% of the fishing time expended in this area.

Quadrant 22 of Area I was the least productive for sea bass: 29% of Area I fishing time yielded an average C/f_{SB} value of 0.11. The least productive quadrants for Area II were 51, 49, and 61, having C/f_{SB} values of 0.16, 0.19, and 0.19.

Forty-eight percent (Figure 5) of Area I sets were made in depths of 20-30 ft (6.1-9.1 m) and produced 69% of the sea bass for that area. Twenty-four percent of Area II sets were made in depths of 40-50 ft (12.2-15.2 m), producing 40% of Area II sea bass, and an additional 47% of sea bass production, accomplished in 65% of the expended fishing time, occurred in depths of 20-39 ft (6.1-11.9 m).

Population Structure

Length-frequency distribution curves (Figure 6) for unsexed sea bass in respective capture areas and separated into two depth categories (20-38 and 48-64 ft: 6.1-11.6 and 14.6-19.5 m) were similar. Most sea bass were between 155 and 185 mm, with the mode being 175 mm. The bimodality of the Area I curve was not apparent for Area II. In Areas I and II sea bass ranged from 115 to 285 mm, and from 125 to 345 mm, the largest being males. These sea bass are smaller than the New York and New Jersey *C. s. striatus* populations which range from 160 to over 440 mm, with a mode of 280 mm (Lavenda, 1949). Although no significant statistical correlation was found between size and depth, the largest sea bass were captured in the deepest water.

Figures 5a and 5b show the percentage of marketable (>200 mm) and nonmarketable sea bass caught in each capture depth and area. Since sea bass are generally marketed in the round, nothing less than 200 mm is acceptable. The figures show that the percent of sea bass greater than 200 mm increases with depth. Approximately one-third of the sea bass trapped in Area I were marketable, whereas those in Area II ranged from 20% in depths of 20-30 ft (6.1-9.1 m) to 59% in depths of 40-45 ft (12.2-13.7 m). In Areas I and II total sea bass greater than 200 mm were 29% and 37%.

Gear Selectivity and Production

The Caribbean heart-shaped fish traps caught the smallest as well as the largest sea bass and produced the largest sea bass

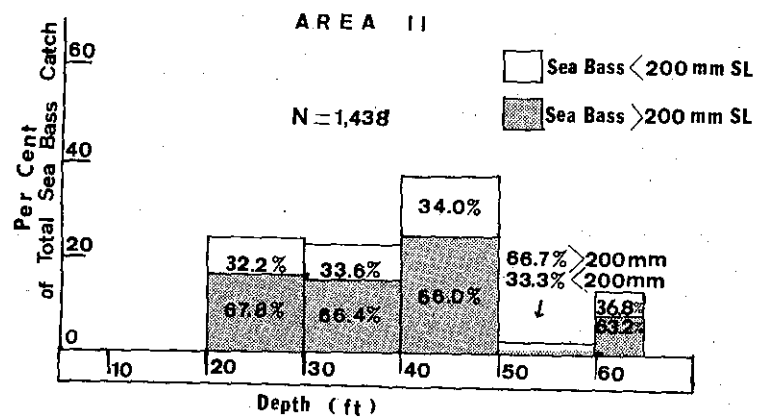
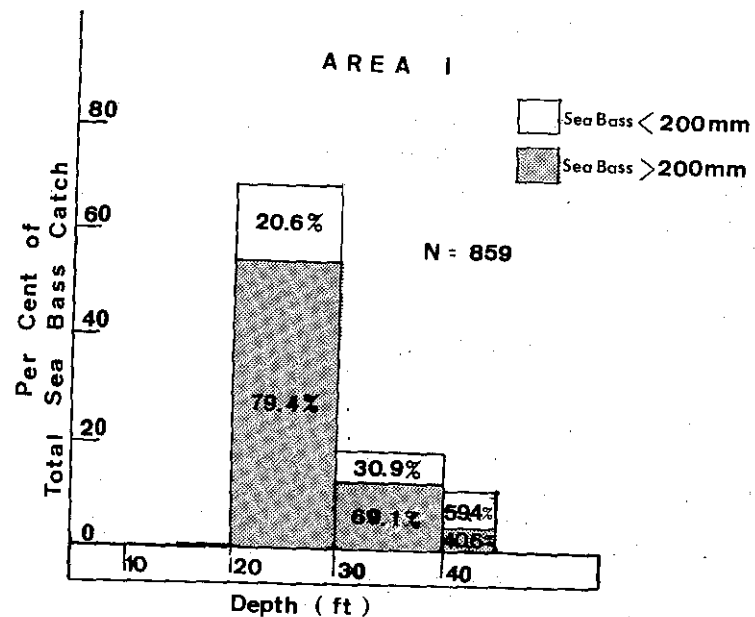


Figure 5. Histogram of percent sea bass caught in Areas I and II with respect to depth and the percentage of sea bass greater or less than 200 mm (8 in) within respective capture depth categories.

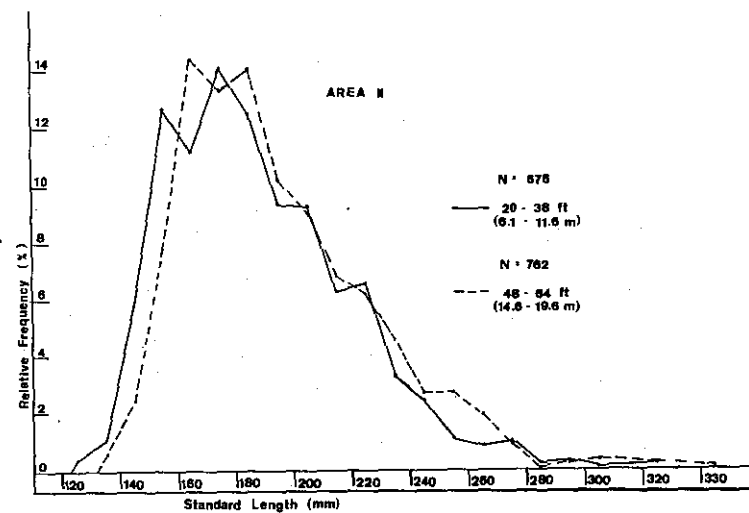
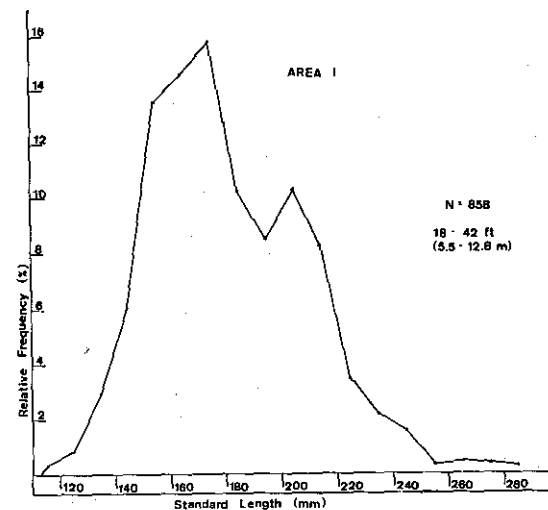


Figure 6. Length-frequency distributions for all unsexed sea bass trapped in Areas I and II. Area II sea bass are segregated into two capture depths.

2.1 times more often than the Cedar Key blue crab traps (Figure 7). Catch curves, however, were generally similar.

Heart traps were more productive than blue crab traps in overnight sets in Areas I and II, but daylight yields were approximately equal. Area I mean C/f_{SB} values for heart traps were similar to blue crab trap values, but mean C/f_{FF} values were 1.7 times as large. Area II mean C/f_{SB} and C/f_{FF} values for heart traps were approximately 1.6 times greater than those for blue crab traps. A heart trap produced the greatest single catch of 39 sea bass (Area II: Quadrant 63, Sta. 8) while the best blue crab trap catch was 24 (Area II: Quadrant 43, Sta. 5).

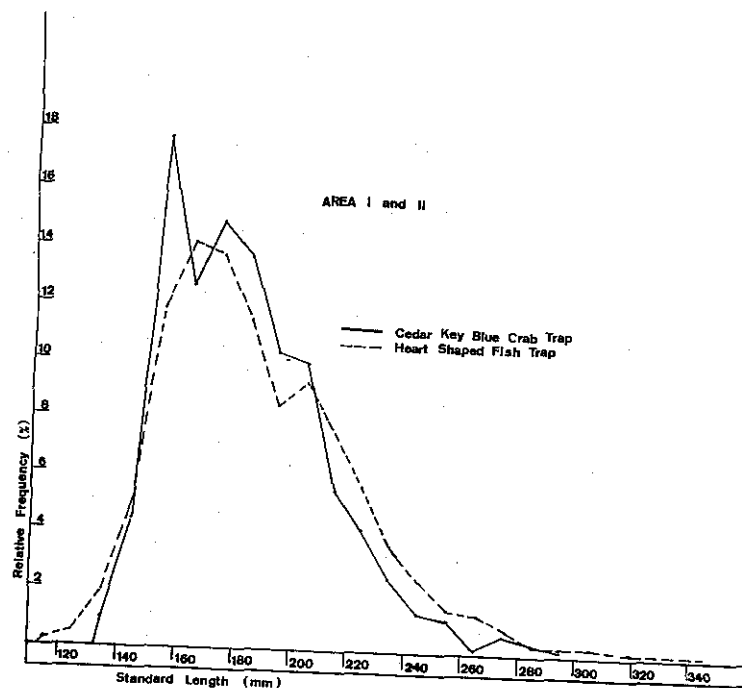


Figure 7. Length-frequency distributions for all unsexed Area I and II sea bass captured by Caribbean heart-shaped fish traps and Cedar Key blue crab traps.

The greater fishing success of the heart traps may be attributed to a better ability to retain fish. Catches of smallest and largest individuals and the greater overnight effort values support this possibility.

Only one Cedar Key stone crab trap was used in this study and it was set 22 times, producing 31 sea bass (Area I) with effort values ranging from 33 to 50% of blue crab trap values.

TABLE 4. SEA BASS MEAT YIELDS FOR FIVE PREPARATION STAGES

Preparation Stage	Weight (lb)	Lb/Fish
Before icing	18.5	0.47
At dock (after icing)	18.7	0.48
After gutting	17.5	0.46
After heading	10.3	0.29
After skinning and deboning	6.3	0.16

Sea Bass Meat Yield Studies

Yield of marketable sea bass per pound at various processing stages was obtained from a random sample of 38 assorted sea bass. Heavy seas prohibited weighing the fish at capture, and they were frozen and weighed approximately 38 hours after capture. After weighing, the fish were iced and processed 12 hours later (Table 4). Deboned sea bass fillets yield an average of 33% of total sea bass weight. Because of its small size sea bass is retailed in the round and the average price per pound ranges from 29 to 39¢.

In 1967, approximately 500 lb of sea bass were purchased from a local wholesaler. Marine Laboratory personnel filleted the fish and sent the meats to a major seafood company in Apalachicola to determine the economic feasibility of using sea bass in fish stick production. The management stated that the meats were of excellent quality but the yield was not sufficient to compete with northern cod.

Fishing Considerations

A depth recorder is an invaluable aid in locating bottom types that sea bass and other reef fish inhabit. This device decreases the time required to seek out productive fishing grounds. Time is

particularly important in the peak fishing months during winter and autumn when good fishing weather is infrequent.

Trap line floats should be easily visible and the line (preferably dacron or nylon) long enough to prevent submergence in strong currents. When fishing in areas of swift currents, extra weight such as bricks, steel, or cement should be added to traps to retard movement.

For maximum production traps should be fished no longer than 20-45 minutes. They should be strategically positioned about reefs and fresh bait used. The short fishing interval will minimize shark damage and time wasted on unproductive bottoms. Usually a considerable amount of time is needed to retrieve traps and this will determine the length of fishing time between setting and retrieving traps. Sufficient trash fish are captured with sea bass to supply a constant source of fresh bait.

The stomach is the first part of the sea bass to spoil and in turn contaminates the other meats. Ideally, fish should be gutted and iced immediately after capture.

SUMMARY

1. During 1968, the Florida Department of Natural Resources Marine Research Laboratory conducted an extensive trapping program to assess the commercial potential of the sea bass in the northeastern Gulf of Mexico.
2. The southern sea bass is plentiful offshore from Dunedin to Carrabelle. Commercial exploitation is minimal and New Port Richey is the primary production center on the west coast of Florida. Most sea bass are shipped to out of state markets because no local markets exist. In order for this fishery to attain its potential, local markets should be established and more efficient processing methods developed to minimize waste. With the advent of new commercial fish-meat extracting equipment, utilization of sea bass in fillet and fish stick production may prove profitable and significantly increase fishing pressure.
3. Area II (Suwannee River to Carrabelle) produced more and larger sea bass than Area I (Dunedin to Chassahowitzka). However, trapping in Area I was not conducted in depths greater than 42 ft (12.8 m). Therefore, exploratory efforts in Area I were not sufficient to verify the presence of larger sea bass and locate denser populations.

4. Sea bass were readily captured in traps and the Caribbean heart traps were the most successful. They captured larger fish and greater quantities of fish than Cedar Key stone crab and blue crab traps, and retained fish better.
5. Sixty to eighty percent of the trapped sea bass were under marketable size, but the percent of marketable sea bass (greater than 200 mm) increased with depth.
6. An average yield of 33% by weight was realized after filleting and deboning a random sample of assorted sea bass.

ACKNOWLEDGMENTS

I wish to express my gratitude to Messrs. Robert M. Ingle and Martin A. Moe, Jr. for their direction, advice, and encouragement throughout this study. Special thanks to Marine Captain Earl W. Girard and Marine Laboratory personnel who served on the R/V *Hernan Cortez* during the course of this study. I also wish to thank Mr. Frank H. Hoff and Miss Ruth Ann Weber who assisted in preparation of figures, and Mrs. Anchor Damgaard who provided information pertinent to a review of the fishery. Messrs. Edwin A. Joyce, Jr. and Robert W. Topp reviewed the manuscript and offered editorial assistance.

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