

FEATURES

HARD-CLAM EXPLORATIONS OFF SOUTHEASTERN UNITED STATES

By Robert Cummins, Jr.*

Hard clams are distributed from New England along the Atlantic coast to Florida and into the Gulf of Mexico. They long have been the basis of a commercial fishery in New England and along the middle Atlantic States. BCF explorations have resulted in the development of a small, offshore, hard-clam fishery which has expanded production in North Carolina. This article gives the latest statistics on the total fishery, exploratory dredging results from North Carolina to Florida, and a description of the new North Carolina fishery.

Hard clams (*Mercenaria mercenaria* and *M. campechiensis*) constitute an important fishery resource of the Eastern United States (table 1). They occur in waters of every Atlantic state from Maine to Florida and into the Gulf of Mexico; however, most hard-clam production occurs in southern New England and the Middle Atlantic States (table 2). Little or no commercial production has been recorded from the Florida east coast, Georgia, South Carolina, Pennsylvania, or New Hampshire. Intermittent fisheries have occurred along the Florida west coast^{1/} and in southern Maine.

1931 to 1948. Since 1949, New England and the Middle Atlantic States have continued as the major hard-clam producing areas of the eastern United States. During this period little change has taken place in capturing gear, marketing structure, or processing procedures. General refinements in the fishery, however, have resulted from recent developments in sanitation, pollution abatement, culture of seed clams, and the production of canned products such as chowder.

Prior to 1959, little was known of the abundance or availability of hard clams offshore south of the Middle Atlantic States. "Offshore" is the open ocean, in water deeper than 2 or 3 fathoms, outside the existing inshore fishery. As part of a resource assessment program, BCF began clam dredging in 1959 with the chartered exploratory fishing vessel *Silver Bay* to determine the commercial potential of hard-clam stocks from North Carolina to Florida. This report summarizes the results.

HARD CLAM EXPLORATIONS

During 7 cruises, from November 1959 to March 1961, the *Silver Bay* dredged at 271 stations. The explorations were made along the coast from north of Cape Hatteras to south of Cape Kennedy, Fla. (fig. 1). Most drags were confined to the 4- to 8-fathom depth range. Preliminary results were summarized in reports of the *Silver Bay* cruises (BCF, 1960a, 1960b, 1960c, 1960d, 1961a, 1961b, and 1961c) and by Cummins, Rivers, Struhsaker (1962).

Table 1 - Annual United States Production of Hard-Clam Meats, 1949-63^{1/}

Year	Quantity ^{2/}
1949	18,856
1950	21,049
1951	20,801
1952	17,573
1953	16,976
1954	13,519
1955	14,385
1956	14,693
1957	14,767
1958	14,280
1959	13,553
1960	14,877
1961	14,604
1962	13,295
1963	14,529
1964	14,925

^{1/}Data taken from Fisheries Statistics of the United States.
^{2/}Thousands of pounds.

Published catch statistics date back to 1879 in New England and 1880 for the Middle and South Atlantic States. More recently, Tiller, Wade, and Stringer (1952) gave a comprehensive report of the Atlantic Coast fishery from

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 Carpenter, James S. (MS), History of Scallop and Clam Explorations in the Gulf of Mexico.

Table 2 - Atlantic Coast Hard-Clam Production and Value by States, 1949-64

States	Quantity of Hard-Clam Meats Produced in:																Total	Average
	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964		
	(Thousands of Pounds)																	
Maine	590	503	569	424	335	292	250	288	360	253	160	64	13	1	2	2	4,106	256.6
Mass.	1,797	2,014	2,173	1,845	2,070	1,236	1,059	1,302	2,025	1,820	1,619	1,401	1,664	1,319	1,474	1,440	26,258	1,641.1
R. I.	2,135	2,225	3,054	3,248	4,774	4,498	5,020	4,251	3,905	3,246	2,737	3,210	2,608	2,140	2,224	1,827	51,102	3,193.9
Conn.	13	10	49	38	42	18	138	76	224	471	360	370	420	262	287	331	3,109	194.3
Sub-total	4,535	4,752	5,845	5,555	7,221	6,044	6,467	5,917	6,514	5,790	4,876	5,045	4,705	3,722	3,987	3,600	84,575	5,285.9
N. Y.	7,294	7,721	7,072	5,520	4,050	2,452	2,657	3,575	3,582	3,737	3,407	3,888	4,291	4,836	5,311	5,402	74,795	4,674.7
N. J.	4,045	5,085	4,372	3,626	3,341	3,019	3,119	2,885	2,355	2,580	2,011	2,552	1,687	1,340	1,584	1,894	45,495	2,843.4
Del.	249	808	912	501	450	481	444	804	505	322	343	484	582	378	262	418	7,943	496.6
Sub-total	11,588	13,614	12,356	9,647	7,841	5,952	6,220	7,264	6,442	6,639	5,761	6,924	6,560	6,554	7,157	7,714	128,233	8,014.6
Md.	236	192	216	162	130	96	58	124	373	275	243	172	457	383	489	332	3,938	246.1
Va.	1,497	1,378	1,267	1,128	873	729	887	796	725	711	1,690	1,661	1,861	1,690	2,096	2,453	21,442	1,340.1
Sub-total	1,733	1,570	1,483	1,290	1,003	825	945	920	1,098	986	1,933	1,833	2,318	2,073	2,585	2,785	25,380	1,586.2
N. C.	-	836	835	725	445	244	122	148	243	278	340	432	490	247	332	255	5,972	373.3
S. C.	-	7	18	8	12	9	2	2	13	120	111	97	109	59	73	146	786	49.1
Ga.	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	2	0.1
Fla. 1/	-	1	8	1	10	5	6	2/	-	1	2	2	4	3	1	1	45	2.8
Sub-total	-	844	861	734	467	258	130	150	256	401	453	531	603	309	406	402	6,805	425.3
Total	17,856	20,780	20,545	17,226	16,532	13,079	13,762	14,251	14,310	13,816	13,023	14,333	14,186	12,658	14,135	14,501	244,993	15,312.0

States	Value of Hard-Clam Meats Produced in:																Total	Average
	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964		
	(Thousands of Dollars)																	
Maine	98	94	186	126	107	100	74	89	175	149	90	41	7	1	2	2	1,341	83.8
Mass.	586	644	802	725	755	465	378	454	743	680	756	721	952	741	1,039	1,012	11,453	715.8
R. I.	469	651	992	1,119	1,712	1,709	1,918	1,736	1,649	1,475	1,434	1,407	992	943	1,295	956	20,457	1,278.6
Conn.	6	4	16	11	12	5	44	23	61	166	108	121	176	94	126	138	1,111	69.4
Sub-total	1,159	1,393	1,996	1,981	2,586	2,279	2,414	2,302	2,628	2,470	2,388	2,290	2,127	1,779	2,462	2,108	34,362	2,147.6
N. Y.	2,441	2,809	2,518	2,759	2,025	1,269	1,520	1,975	1,948	1,869	2,099	2,392	2,493	2,926	3,581	4,136	38,760	2,422.5
N. J.	1,450	1,824	1,661	1,414	1,745	1,490	1,249	1,980	824	896	692	900	732	536	635	820	17,848	1,115.5
Del.	76	273	312	112	253	240	154	255	156	104	126	192	232	146	106	185	2,922	182.6
Sub-total	3,967	4,906	4,491	4,285	4,023	2,999	2,923	3,210	2,928	2,869	2,917	3,484	3,457	3,608	4,322	5,141	59,530	3,720.6
Md.	94	96	108	97	72	53	22	39	174	100	106	74	217	178	265	172	1,867	116.7
Va.	641	689	626	674	484	389	489	441	434	426	832	756	865	812	1,012	1,219	10,789	674.3
Sub-total	735	785	734	771	556	442	511	480	608	526	938	830	1,082	990	1,277	1,391	12,656	791.0
N. C.	-	157	192	167	116	72	35	52	98	111	136	173	196	99	130	98	1,832	114.5
S. C.	-	2	7	3	3	2	2/	2/	4	40	37	32	38	20	25	54	267	16.7
Ga.	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	0.1
Fla. 1/	-	2/	4	2/	5	2	1	2/	-	2/	2/	2/	2	1	2/	2/	15	0.9
Sub-total	-	159	203	170	124	76	36	52	102	152	173	205	236	120	155	152	2,115	132.2
Total	5,861	7,243	7,424	7,207	7,289	5,796	5,884	6,044	6,266	6,017	6,416	6,809	6,902	6,497	8,216	7,778	108,663	6,791.4

1/East Coast.

2/Less than 500 pounds or \$500.00.

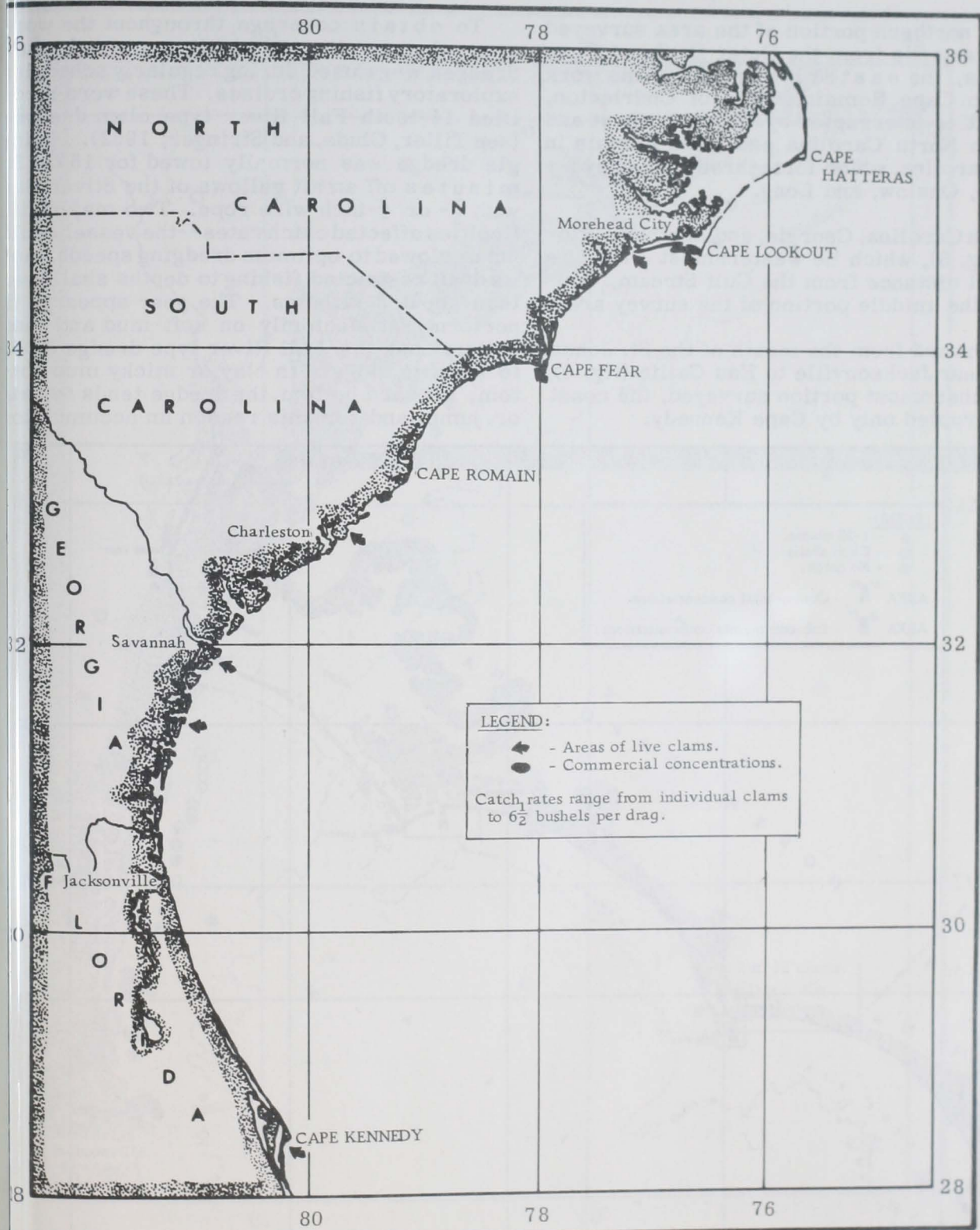


Fig. 1 - Area of Silver Bay hard-clam explorations from north of Cape Hatteras, N. C., to south of Cape Kennedy, Fla.

Area Surveyed

The northern portion of the area surveyed (fig. 2) extends from the Outer Banks at Cape Hatteras, the eastern most part of the work area, to Cape Romain, north of Charleston, S. C. It is interrupted by Capes Lookout and Fear in North Carolina and Cape Romain in South Carolina, which form three large bays--Raleigh, Onslow, and Long.

South Carolina, Georgia, and northern Florida (fig. 3), which lie westernmost and the greatest distance from the Gulf Stream, constitute the middle portion of the survey area.

Southward from the mouth of the St. Johns River near Jacksonville to Eau Gallie (fig. 4), the southernmost portion surveyed, the coast is interrupted only by Cape Kennedy.

Gear and Methods

To obtain coverage throughout the work area, whenever the opportunity occurred, clam dredges were used during regularly scheduled exploratory fishing cruises. These were modified 14-tooth Fall River type clam dredges (see Tiller, Glude, and Stringer, 1952). A single dredge was normally towed for 15 to 30 minutes off an aft gallows of the Silver Bay with $\frac{7}{8}$ - or $\frac{3}{4}$ -inch wire rope. Two major difficulties affected catch rates--the vessel could not be slowed to optimum dredging speeds, and its draft restricted fishing to depths shallower than about 3 fathoms. The gear appeared to perform satisfactorily on soft mud and sand bottom, but the Fall River type dredge tends to become clogged in clay or sticky mud bottom. On hard bottom, the dredge tends to skip or jump, and for this reason an accumulator

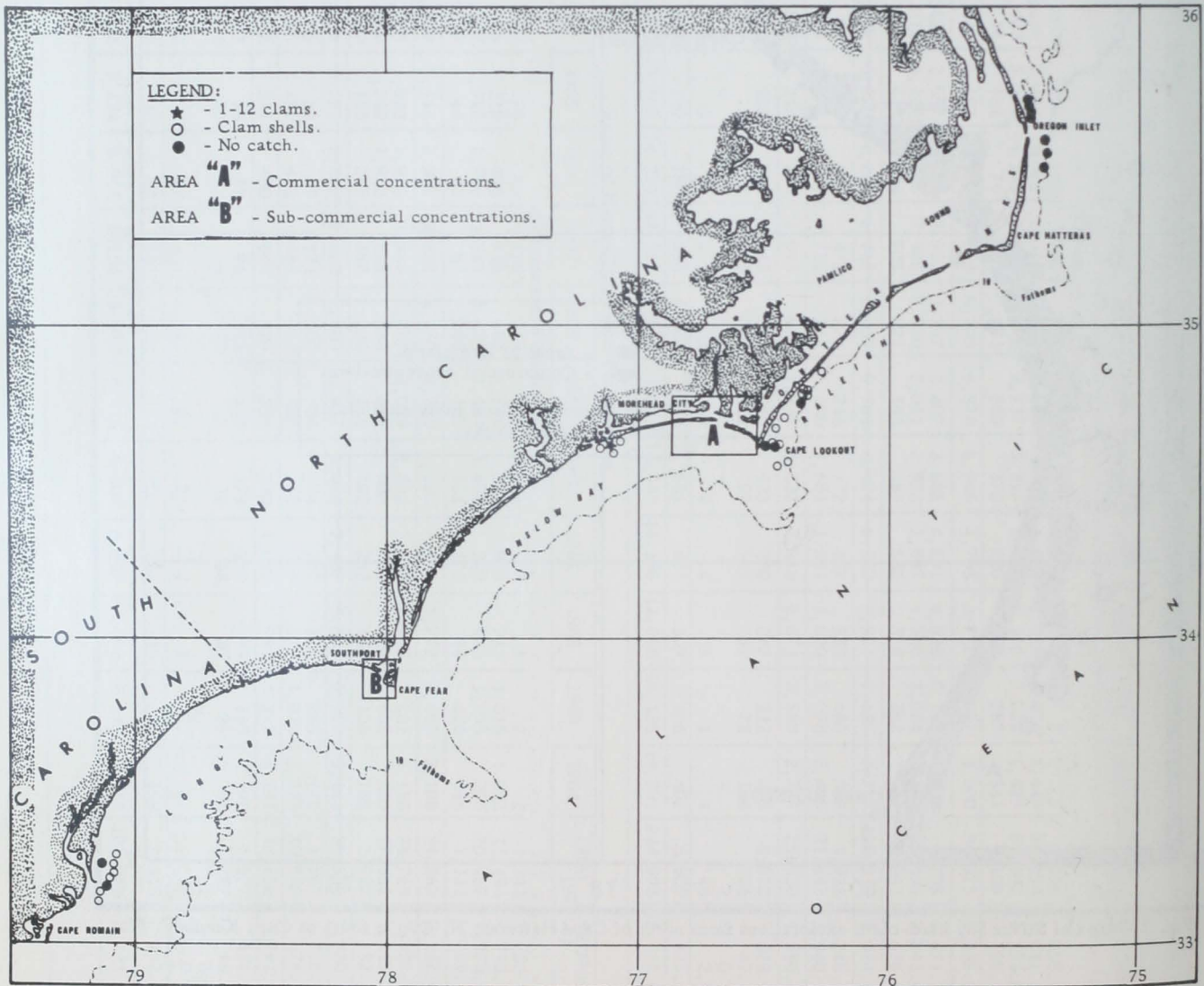


Fig. 2 - Silver Bay clam dredging stations from Oregon Inlet, N. C., to Cape Romain, S. C.

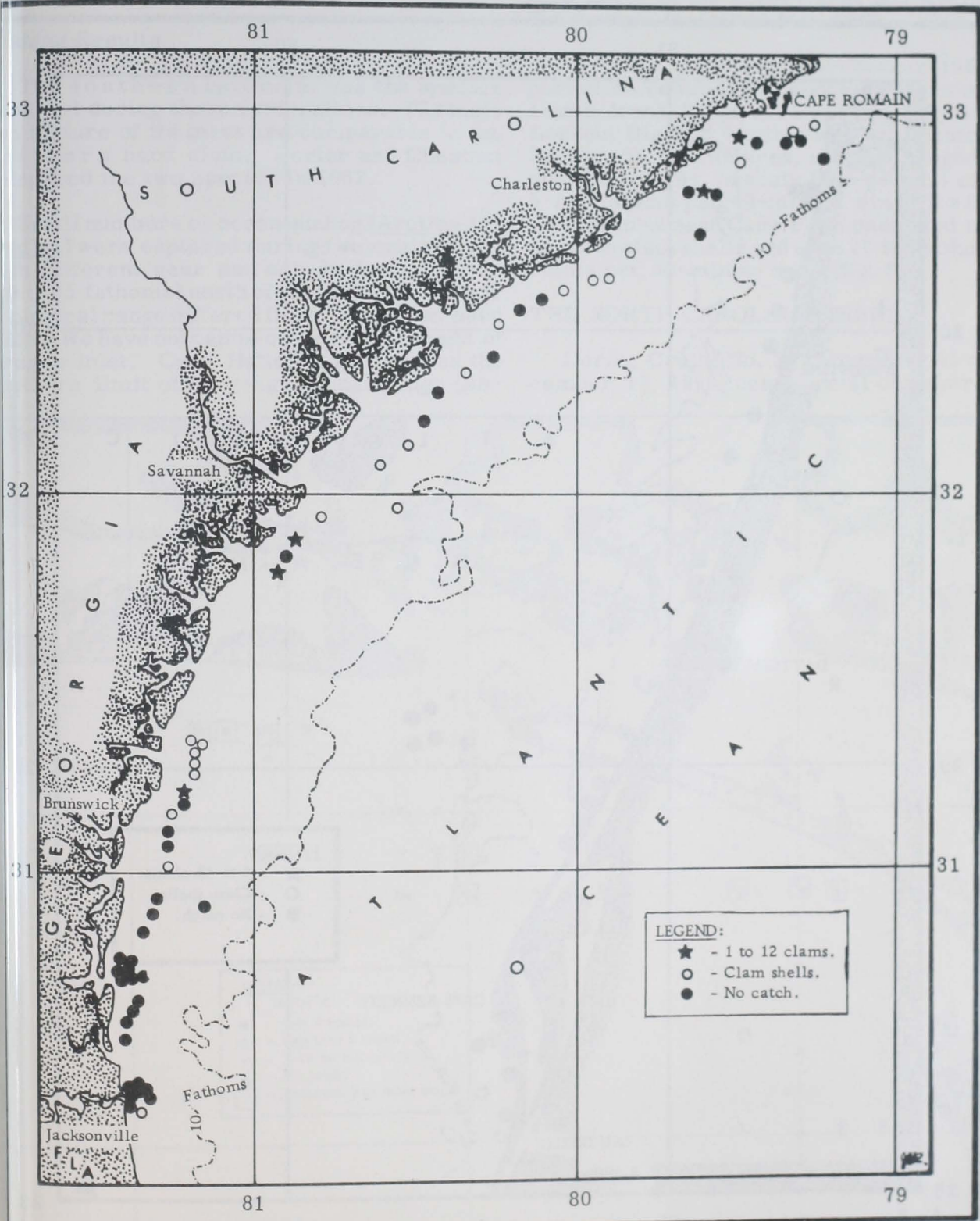


Fig. 3 - Silver Bay clam dredging stations from Cape Romain, S. C., to Jacksonville, Fla.

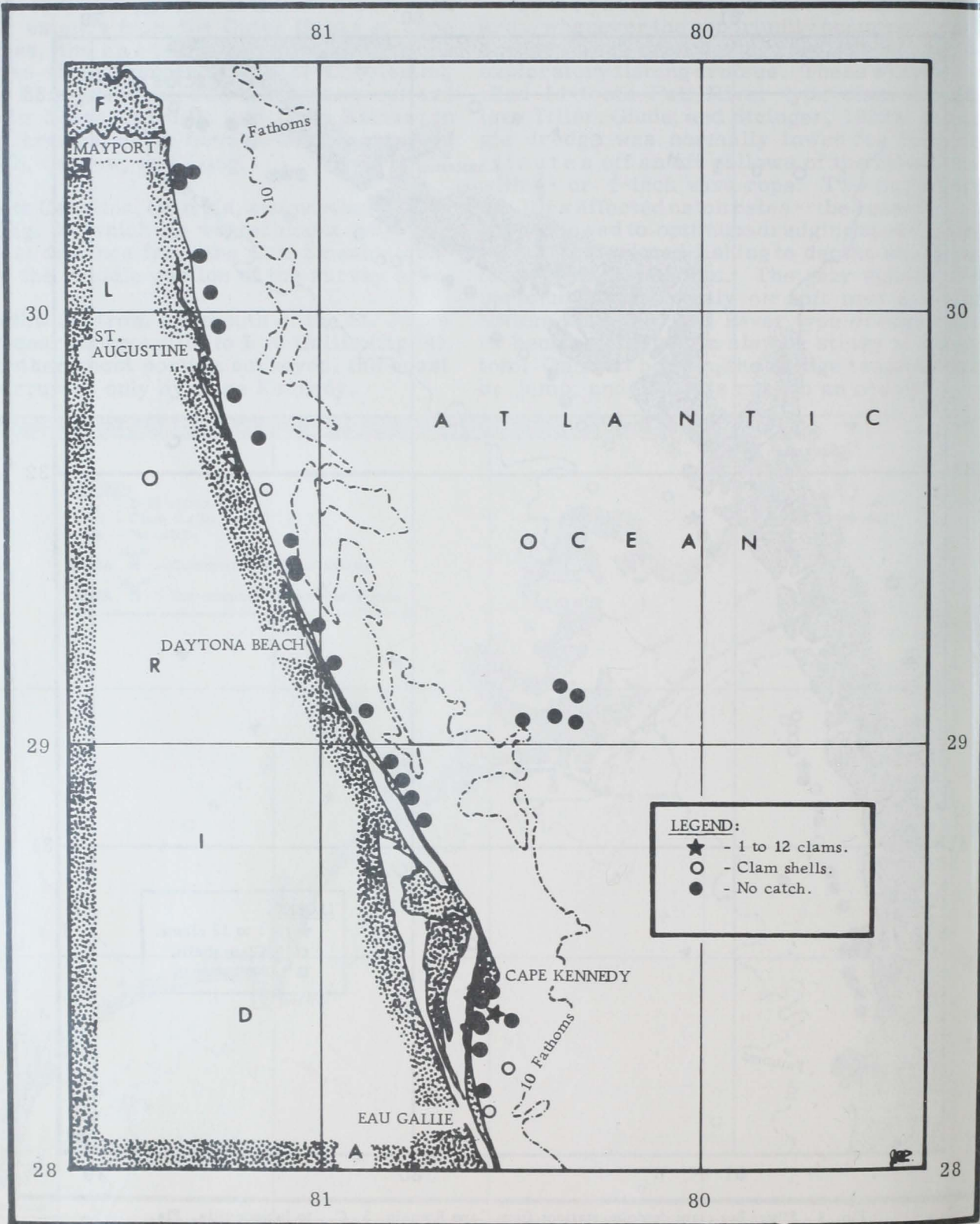


Fig. 4 - Silver Bay clam dredging stations from Mayport, Fla., to Eau Gallie, Fla.

chain (Captiva, 1960) was added; this partially alleviated the problem.

Fishing Results

The southern hard clam was the species captured during these explorations. The taste and texture of its meat are comparable to the northern hard clam. Porter and Chestnut compared the two species in 1962.

Small numbers of ocean quahog (*Arctica islandica*) were captured during two cruises, but with different gear and only in deeper water (20 to 25 fathoms) north of Oregon Inlet. Their ecological range differed from that of the hard clam. We have not captured this clam south of Oregon Inlet. Cape Hatteras is reported the southern limit of its geographical range (Ab-

bott, 1954). It is a common commercial species north of the survey area and Arcisz and Sandholzer described it in 1947.

Cummins, Rivers, and Struhsaker (1962) reported on commercial concentrations of hard clams found in an area extending from Cape Lookout Bight to 4 miles west of Beaufort Inlet (fig. 5). In this area, catches ranged from one clam to 6½ bushels (585 pounds) of 3- to 5-inch clams per 40-minute drag. Catches from an area near Cape Fear consisted mostly of hard-clam shells and up to 77 individual live clams per 30-minute drag (fig. 6).

THE NORTH CAROLINA FISHERY

During Cruise No. 20 (November 21 to December 13, 1959) commercial concentrations

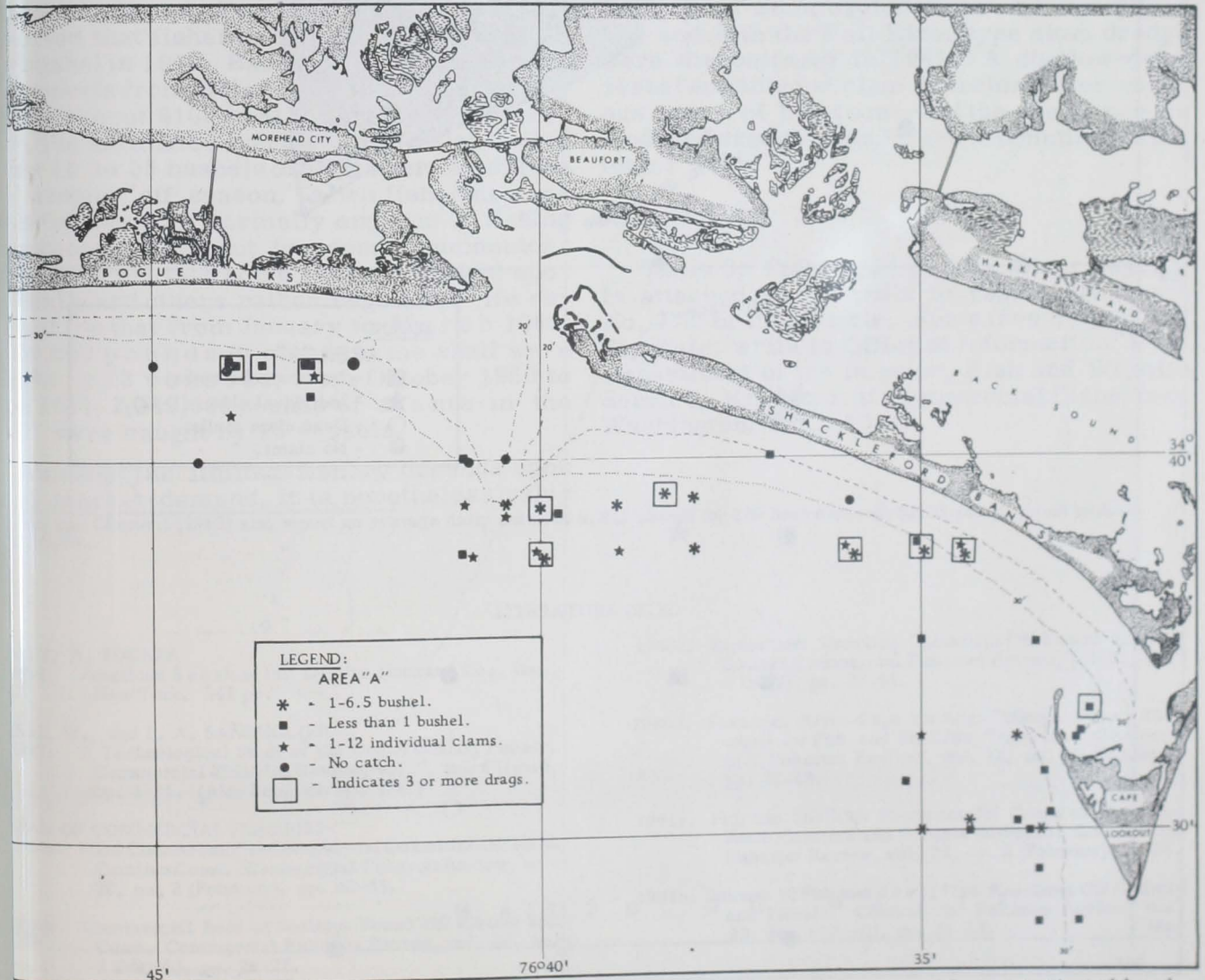


Fig. 5 - Silver Bay clam dredging stations from Cape Lookout to Bogue Banks, N. C., showing commercial concentrations of hard clams.

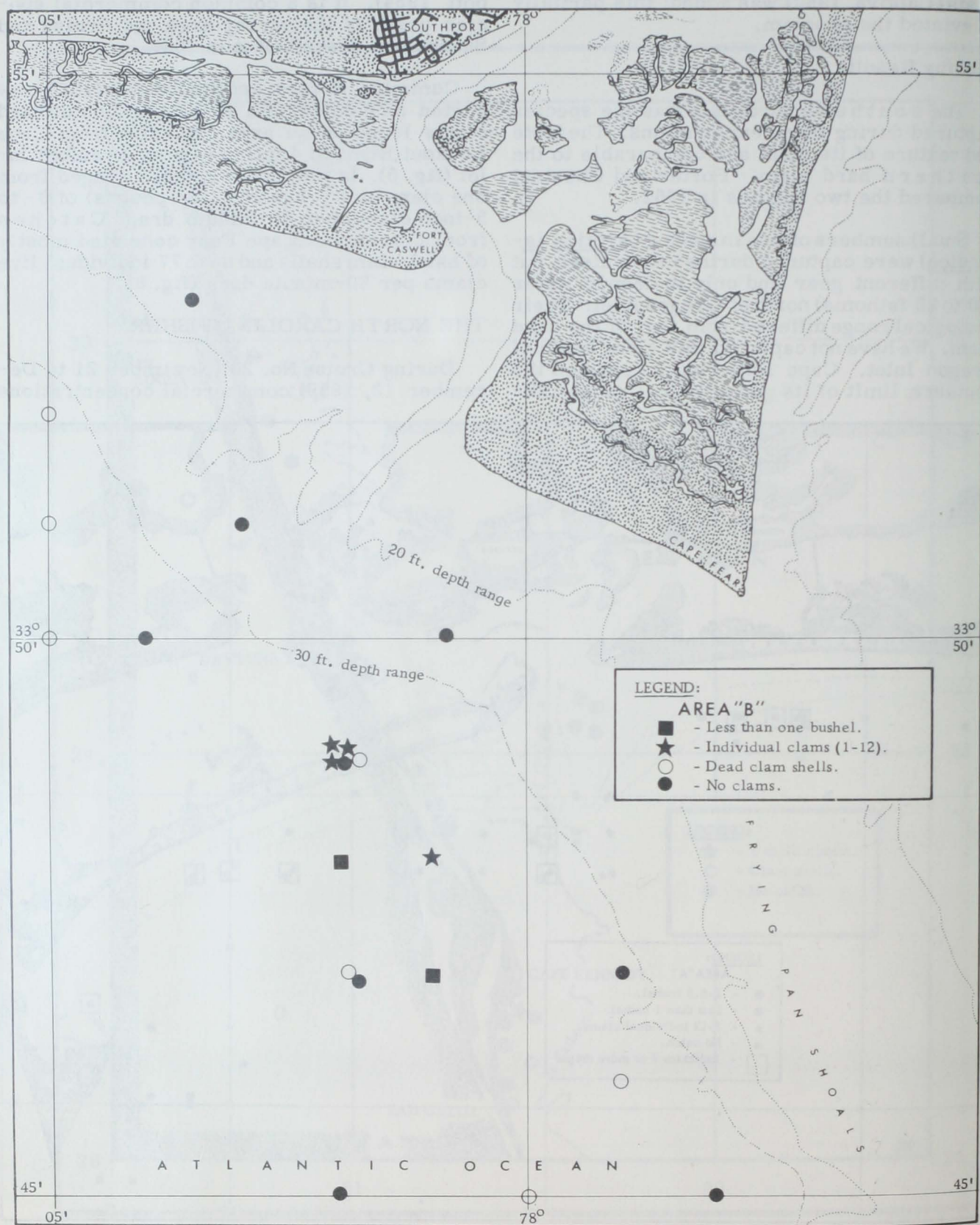


Fig. 6 - Silver Bay clam dredging stations off Cape Fear, N. C., showing small amounts of hard clams.

Hard clams were found in Onslow Bay-- from Cape Lookout to 4 miles west of Beaufort inlet, in the 4- to 6-fathom depth (fig. 5). In this area, the Silver Bay caught 4,200 pounds (7 bushels) of hard clams during simulated commercial fishing with a modified 14-tooth Fall River clam dredge (Captiva, 1960) in 388 minutes of fishing. The catch was landed and sent to a local processing plant, where the clams were processed with satisfactory results. Interested fishermen were given information on gear costs, sources of supply, gear rigging, and handling techniques. Local shrimp vessels were readily and inexpensively converted to the dredging operation. Thus, with Bureau technical assistance, a small winter fishery developed in 1959 (Porter and Chestnut, 1960).

Catch rates were not determined, but they can be estimated. Porter and Chestnut (1962) reported that fishermen were paid about \$2.25 per bushel in 1960. Based on personal contact and reports from fishermen, the boats usually cost about \$100 to \$125 per day.^{2/} Therefore, the estimated average production varied from 44 to 55 bushels of clams per day during the winter "off season," when fishermen and vessels were not normally engaged in fishing operations. Chestnut (personal communication) reported that some vessels worked sporadically and others rather regularly. He reported too that from January to March 1960, 155,000 pounds of clams in the shell were caught by 12 vessels; from October 1960 to the 1961, 2,242,000 pounds of clams in the shell were caught by 15 vessels.

Although the limited fishery depends upon local market demand, it is nonetheless valuable. Porter and Chestnut (1962) also report an average daily catch of 4,831 pounds for 239 boat days--@ \$2.25 per 90 pound bushel = \$120.75.

able because it provided fishermen with another source of income during poor shrimping seasons or during winter months. Hard clams do not appear to be a transitory resource for they have been available since their discovery in commercial quantities in 1959.

Throughout the remainder of the area surveyed, not enough hard clams were found for commercial harvesting. Most catches consisted only of shells or few live clams; however, these catches suggest that hard clams live in or adjacent to most of the area surveyed, possibly in waters shallower than 3 fathoms. The Silver Bay could not explore effectively there. In the tidal marsh zone adjacent to much of the area surveyed, it is not uncommon for individuals to dig hard clams for personal consumption, though they are not usually sold commercially. For these reasons, hard-clam explorations with the Silver Bay and with the Fall River type clam dredge were discontinued in 1961. A shallow-draft vessel suitable for clam searching over various types of bottom--and the use of new or modified dredging gear--are recommended for future work.

APPENDIX

Table 3, Fishing Log--M/V Silver Bay. . . is attached as appendix to reprint (Separate No. 776) of this article. For a free copy of the Separate, write to Office of Information, U. S. Department of the Interior, Fish and Wildlife Service, Bureau of Commercial Fisheries, Washington, D. C. 20240.

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ALUMINUM CATAMARAN PLANNED FOR OCEAN STUDY



An artist's conception of the large twin-hulled aluminum catamaran, presently under construction, to be used for oceanographic research by Johns Hopkins University.

The largest aluminium-hulled catamaran (a 106-foot long, twin-hulled vessel) in the United States is being constructed at a Baltimore shipyard. The construction was made possible by a National Science Foundation design-and-construction grant of more than \$1.5 million. The experimental craft will contain the most modern navigational and oceanographic equipment. The vessel's streamlined, twin-hull design is expected to provide lateral stability and speed never before possible on oceanographic surveys. The 11-foot wide well between the two hulls will provide a sheltered area for ocean-probing instruments suspended from the main deck.

The catamaran will be used for oceanographic research by the Johns Hopkins University. Dr. Donald Pritchard, professor of oceanography and director of the Johns Hopkins Chesapeake Bay Institute said, "Hydrographic research can be extended further on the Atlantic continental shelf and operations within the Chesapeake Bay will be less dependent on the weather." (Reprinted, with permission from *Science News*, weekly summary of current science, copyright 1966 by Science Service, Inc.)