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On the Question of offshore
Surf Clam, *Spisula solidissima*,
Resources off New England.

Steven A. Murawski

National Marine Fisheries Service
Northeast Fisheries Center
Woods Hole, Massachusetts 02543

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ABSTRACT

Recent and historical data on the distribution, relative abundance, and fishery potential of surf clams, *Spisula solidissima*, in New England waters are reviewed. Long-term yields from New England offshore waters will probably not approach those from traditional Middle Atlantic offshore areas, due to the rugged bottom topography, and sporadic distribution of beds. The magnitude of the surf clam resource on Georges Bank is not presently known.

INTRODUCTION

The surf clam, *Spisula solidissima*, occurs on the northwest Atlantic continental shelf from the southern Gulf of St. Lawrence, to Cape Hatteras, North Carolina. Numerous studies have alluded to the general distribution of surf clams (Merrill and Ropes 1969; Merrill and Webster 1964; Ropes et al. 1969) and the fishery potential in various localities (Belding 1910; Caddy and Billard 1976; Schneider et al. 1977; Serchuk et al. 1979; Murawski and Serchuk 1979). Research vessel clam survey cruises conducted by the National Marine Fisheries Service occupied sampling stations in Southern New England as well as Middle Atlantic Bight waters during several years. The present study considers data derived from various sources on the distribution, relative abundance, and fishery potential of surf clams, particularly as they relate to offshore (> 3 N.mile) waters east of Montauk Point, New York.

Distribution

Merrill and Ropes (1969) charted the locations of surf clam occurrence from Cape Hatteras to Nova Scotia (Figure 1). These distribution records were derived from: (1) records of the U.S. National Museum, and (2) the Museum of Comparative Zoology at Harvard University, (3) sea scallop dredge samples from a Middle Atlantic cruise of the R/V DELAWARE I (Merrill 1962), (4) Campbell grab samples from cruises of the R/V GOSNOLD (Emery et al. 1965, Wigley and Emery 1968), (5) surf clam dredge samples from the 1965 cruises of the R/V UNDAUNTED, and (6) miscellaneous records of bottom samples by the R/V ALBATROSS.

Distribution records are most numerous for the Middle Atlantic areas west of Montauk Pt., due in part to the emphasis on sampling of the most productive commercial clamming areas (Figure 1). East of Hudson Canyon records of occurrence indicate the resource is concentrated inshore. The distribution of surf clams in waters greater than 20 m deep from Long Island to Georges Bank is sporadic. In contrast, from New Jersey to Cape Hatteras clams are distributed much more evenly over the continental shelf (Figure 1). Records of occurrence for the ocean quahog, *Arctica islandica*, also presented by Merrill and Ropes (1969), suggest that this species is widely distributed in offshore waters from Long Island to Georges Bank. Thus the paucity of surf clam samples from the same area implies they are relatively scarce.

Most records of occurrence off New England are from inshore Rhode Island and Massachusetts waters. Surf clam occurrences are numerous in inshore waters from Cape Cod to Cape Ann. Off Northern New England and Nova Scotia surf clams appear to be scarce.

The factors that control larval settling, and recruitment to the adult surf clam populations are poorly understood, nevertheless distribution is probably in part controlled by depth and sediment characteristics.

Merrill and Ropes (1969) report the maximum depth at which live surf clam were sampled as 66 m. The average depth of surf clam occurrence in Middle Atlantic waters, during transect sampling, was 29 m, however, few clams were taken at depths greater than 40 m. Substrate characteristics may also be important as a factor influencing the success of larval settlements. The distribution of median sediment diameters of surface samples from the Atlantic shelf (Emery and Uchupi 1972, Figure 279) is presented in Figure 2. Interestingly, areas where median grain size exceeds 4ϕ appear virtually devoid of surf clams (Figures 1 and 2).

Relative Abundance

Belding (1910) commented on the distribution of surf clams off the Massachusetts coast by posing the question "What is the present extent of the sea clam beds in Massachusetts?" He continued:

"No large beds, as formerly existed at Dennis, Nantucket, and Chatham, are known to the fishermen, although sea clams are found in more or less abundance at several places along the Massachusetts Coast. The largest bed at the present time is at Monomoy Point, Chatham. In Plum Island Sound and Ipswich Bay sea clams are found on the low flats, but the fishing is limited to the low - course tides. Off Nahant, Hull and Winthrop are scattered beds of these large clams, which are occasionally washed ashore after storms. Sea clams are gathered off Plymouth by the fishermen. The numerous bars off Barnstable, Yarmouth, and Dennis on the north side of the Cape furnish all extensive territory, while along the inner side of the Cape small beds are located at Wellfleet, Truro, and Brewster. At Provincetown the fishermen thoroughly dredge the beds at Wood End in their search for bait".

"On the outside of the Cape many shells are found on the beaches, showing that beds exist on the ocean side. At Chatham there is a fine bed at the present time. The south shore of Dennis formerly was a great locality for this mollusk, but few are now found. At Nantucket sea clams are now gathered in many parts of the harbor, principally from a large bed on Hussey shoal. Sea clams are also found near Cape Poge and on the shores of Martha's Vineyard. In certain waters of the Commonwealth the shells of this mollusk form the greater part of the shell deposits on the ocean bed. The principal fisheries are at Chatham, Provincetown, and Plymouth."

Belding's observations are in general agreement with distribution records plotted by Merrill and Ropes (1969). Distribution maps recently issued by the Massachusetts Executive Office of Environmental Affairs confirm the earlier observations. Locations of greatest abundance off Massachusetts are apparently near Horseneck Beach in Westport, the South Beach of Martha's Vineyard, and west of Nantucket. Extensive inshore beds are also located in Wellfleet Harbor, and in Cape Cod Bay*.

Limited sampling of the offshore bivalve resource off Southern New England was accomplished during R/V DELAWARE II shellfish assesment surveys in 1977 and 1978. Relative abundance of surf clams was monitored during these surveys, samples were taken with a 48-inch wide hydraulic shellfish dredge. Stations were either randomly selected within strata (1978), or located along transects and post-stratified (1977) (Figures 3 and 4).

In the area from Montauk Pt. to Nantucket, surf clams were taken at 19% (7/37) of the stations in 1977, and 6% (2/35) in 1978. In contrast, the Delmarva Peninsula area, which supports the bulk of the offshore commercial fishery, yielded surf clams at 56% of the station occupied in 1977. Most of the New England surf clam catches during the two surveys were derived from strata 95 and 41 (Figure 4). The largest single survey catch from the New England stations was 220 individuals.

*Arnold Carr, Massachusetts Division of Marine Fisheries, personal communication

Shell length frequency distributions of surf clams sampled from Southern New England, New Jersey, and Delmarva during the 1977 and 1978 surveys are presented in Figures 5 and 6. A significant proportion of the clams sampled from New England waters were greater than 12 cm shell length, which appears to be the minimum shell size normally taken in the Middle Atlantic offshore fishery (Murawski and Serchuk 1979). However, the modal length of clams > 12 cm long was generally smaller off Southern New England, than further to the south.

Fishery Potential

The first organized fishery for surf clams began in the 1870's off Cape Cod. The meats were use primarily for bait in the handline fishery for cod and haddock. However, the clam resource in the Cape Cod region was severely depleted after the turn of the century (Ropes et al. 1969). Belding (1910) commented on the variability of the Massachusetts inshore fishery:

"If reliance can be placed on historical writing, the present generation perhaps is witnessing the passing of the sea clam. While it is indeed true that the large beds, which once made Chatham, Dennis and Nantucket famous for their bait fishery, have passed away, the lack of authentic statistical figures for the past years, and the erratic nature of the fishery, large beds appearing first in one locality and then in another, lasting only a few years before they become exhausted, render any conclusions indefinite. Comparing the yield of 1907 and 1877 for Cape Cod, as given by E. Ingersoll, we would find a decrease from three thousand barrels to a few hundred, which would imply a serious decline, were it not known that in 1877 the large bed at Dennis was in a flourishing condition. Nevertheless, it has been clearly demonstrated that whenever a large bed in any locality has been discovered it has been depleted in the course of seven years by overfishing. There are several specific examples of the depletion of large natural beds by ill-advised methods of fishing, which have contributed to the decline of the fishery."

Total New England surf clam landings, and the percent of U.S. landings contributed by New England states are presented in Table 1. From 1950-1978 annual New England landings averaged 136,000 lbs, and 0.4% of the U.S. total. The proponderance of distribution data herein reviewed suggest that most of the New England surf clam resource exists in inshore areas (< 3 N. miles from shore), thus it is probable that virtually all New England catches were derived from within state waters. Offshore landings from New England waters during 1978 were reported to be 27,000 lbs. although the accuracy of these figures is unknown (Murawski and Serchuk 1979). Thus, offshore landings may

have been but 3% of the region's 1978 total of 812,000 lbs.

Research survey data suggest that the abundance of surf clams may be relatively high in some offshore locations south of Cape Cod. Surf clams from these areas are of a commercially usable size (greater than 12 cm), although modal sizes of harvestable clams are smaller off Southern New England than in the traditional offshore surf clam beds off New Jersey and the Delmarva Peninsula. Although some survey stations exhibited relatively high densities, the frequency of occurrence of *Spisula* in dredge samples off Southern New England was less than in the commercial fishing areas off New Jersey and Delmarva. Long-term landings from Southern New England offshore waters will probably not approach those from traditional offshore fishing grounds due to the relatively high risk of damaging harvesting gear and the sporadic distribution and ephemeral nature of the surf clam resource in this area (Belding 1910). The bottom topography of New England waters north of Cape Cod clearly obviates large-scale dredging operations with traditional surf clam gear used in the Middle Atlantic fishery (Emery and Uchupi 1972; Dept. of Commerce 1971). Although few survey data exist for offshore waters north of Cape Cod, the probability of a significant harvestable resource in this area is remote (Merrill and Ropes 1969). The magnitude of the surf clam resource on Georges Bank is presently unknown.

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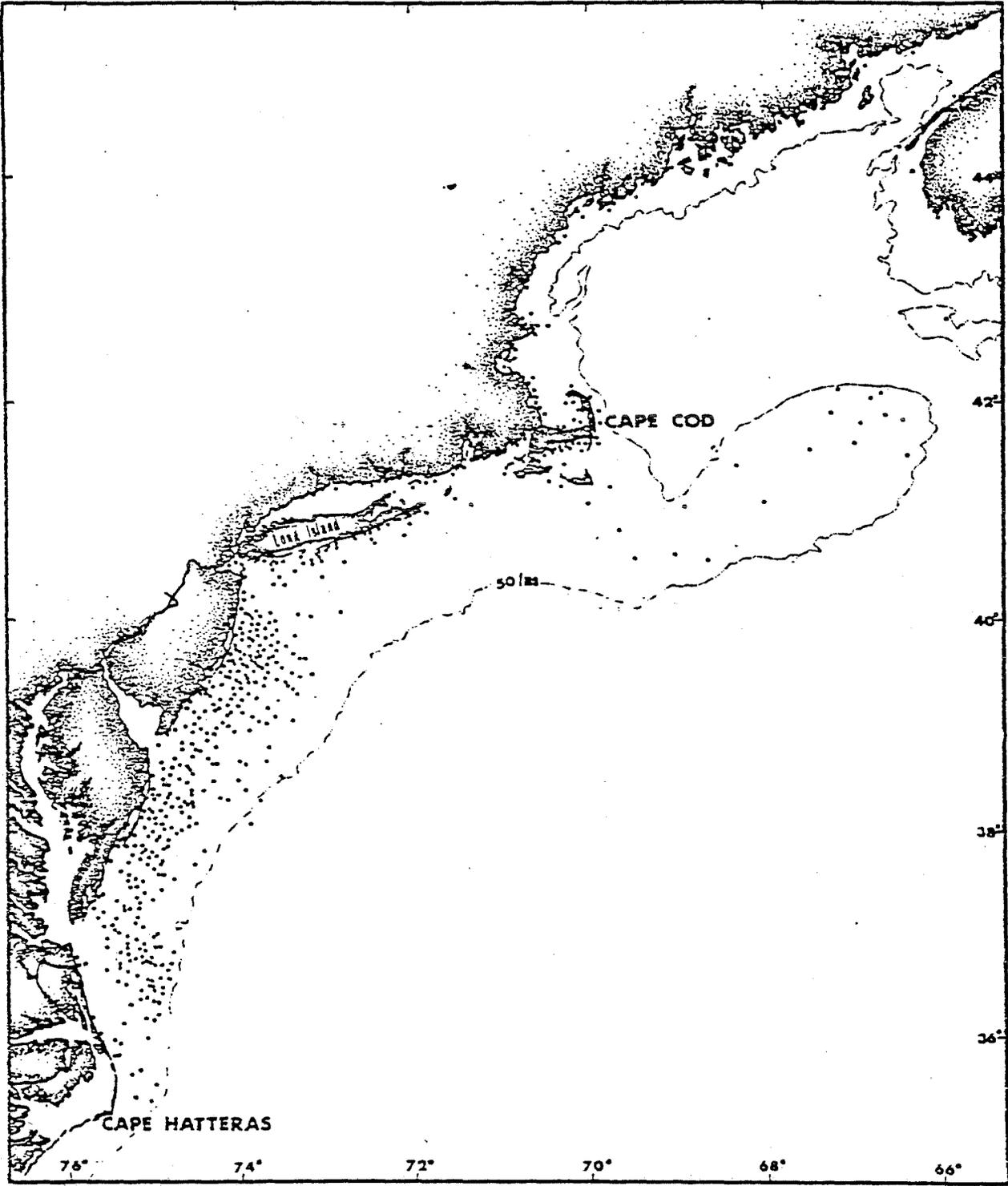
Table 1. Amount (thousands of pounds of meats, #) and percentage (%) of total USA surf clam landings, reported from New England, 1950-1978.

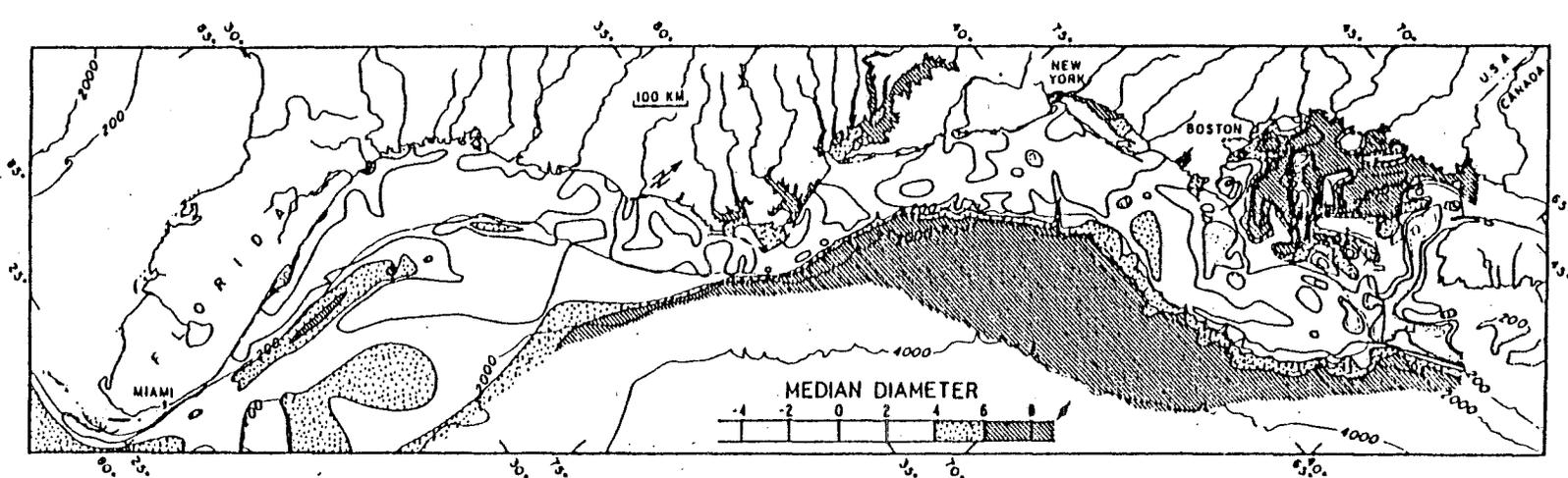
Year	%	#
1950	0.5	43
1951	0.3	34
1952	<0.1	5
1953	0.0	-
1954	3.0	359
1955	0.3	36
1956	1.2	190
1957	<0.1	6
1958	<0.1	2
1959	<0.1	3
1960	<0.1	5
1961	0.1	19
1962	0.1	15
1963	0.0	-
1964	0.1	20
1965	<0.1	1
1966	0.1	55
1967	0.1	25
1968	0.1	28
1969	<0.1	20
1970	0.4	253
1971	0.5	268
1972	0.4	249
1973	0.1	96
1974	0.1	63
1975	0.1	110
1976	0.3	165
1977	2.0	1,055
1978*	2.0	812

*Preliminary Data

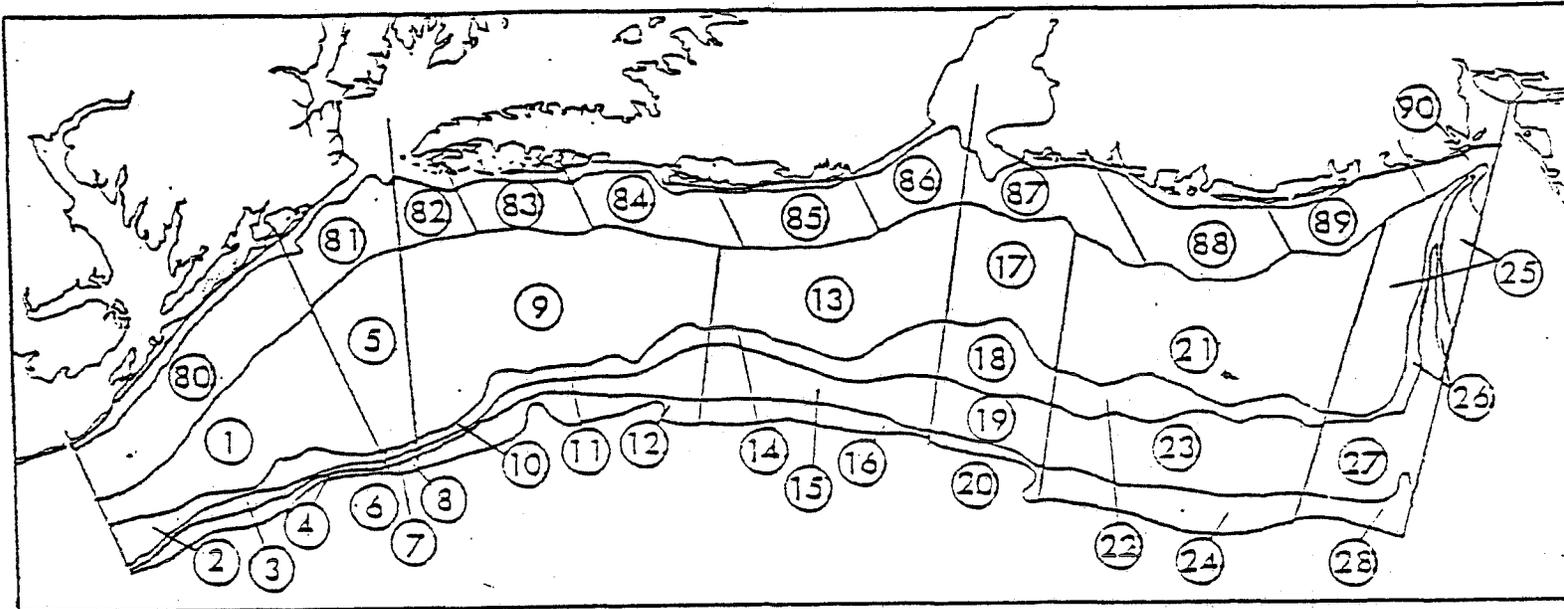
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OFFSHORE AND INSHORE STRATA
CAPE HATTERAS TO HUDSON CANYON
SCALLOP - CLAM SURVEY



Offshore

Strata No.	Square Miles	Depth (fms)	Strata No.	Square Miles	Depth (fms)	Strata No.	Square Miles	Depth (fms)
1	1163	15-25	10	152	25-30	19	274	30-40
2	175	25-30	11	229	30-40	20	120	40-60
3	126	30-40	12	204	40-60	21	1650	15-25
4	117	40-60	13	1127	15-25	22	312	25-30
5	453	15-25	14	219	25-30	23	714	30-40
6	62	25-30	15	394	30-40	24	476	40-60
7	46	30-40	16	211	40-60	25	648	15-25
8	74	40-60	17	749	15-25	26	188	25-30
9	2171	15-25	18	249	25-30	27	451	30-40
						28	149	40-60

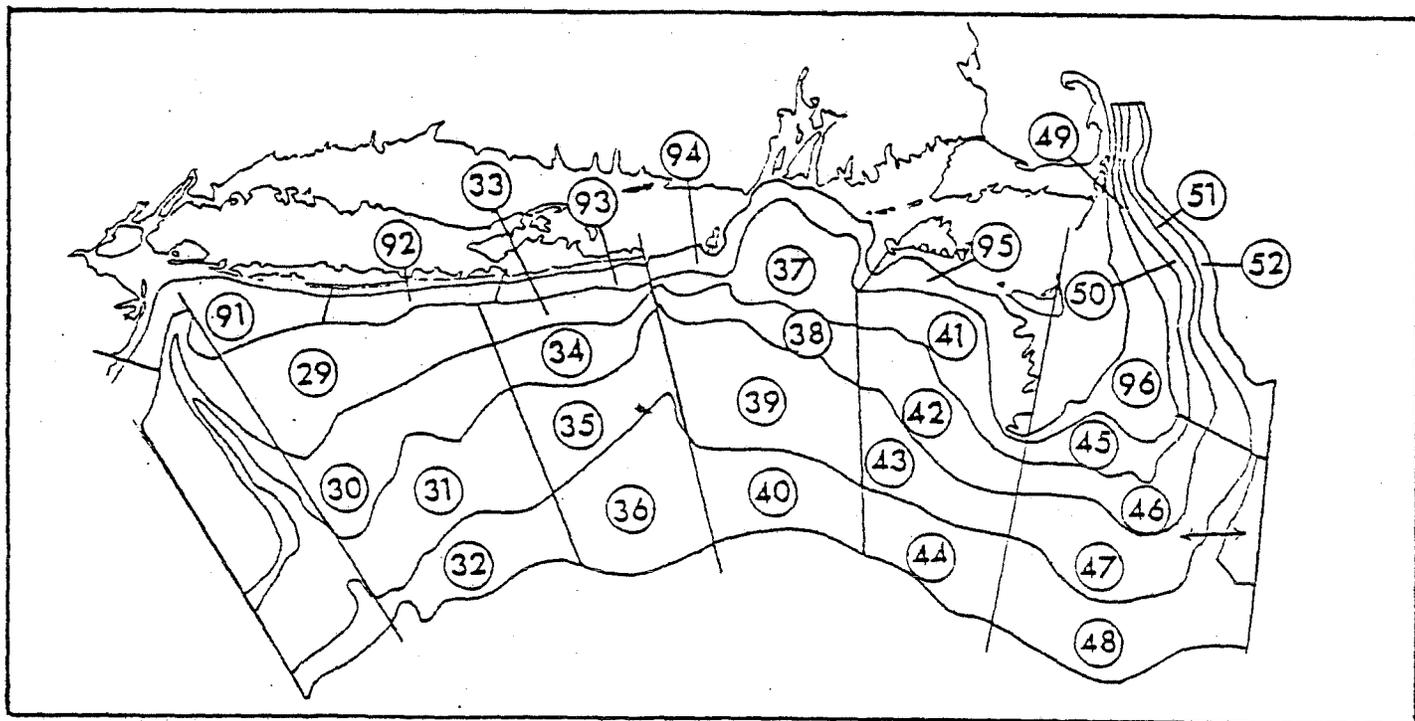
Inshore

80	767	5-15	84	417	5-15	88	578	5-15
81	360	5-15	85	382	5-15	89	382	5-15
82	180	5-15	86	203	5-15	90	182	5-15
83	241	5-15	87	479	5-15			

fathoms		meters
5-15	=	9-27
15-25	=	27-46
25-30	=	46-55

fathoms		meters
30-40	=	55-73
40-60	=	73-110

OFFSHORE AND INSHORE STRATA
HUDSON CANYON TO WESTERN GEORGES BANK
SCALLOP - CLAM SURVEY



Offshore

Strata No.	Square Miles	Depth (fms)	Strata No.	Square Miles	Depth (fms)	Strata Miles	Square Miles	Depth (fms)
29	1096	15-25	37	672	15-25	45	392	15-25
30	669	25-30	38	280	25-30	46	416	25-30
31	932	30-40	39	967	30-40	47	871	30-40
32	627	40-60	40	513	40-60	48	1109	40-60
33	363	15-25	41	602	15-25	49	244	15-25
34	203	25-30	42	343	25-30	50	150	25-30
35	601	30-40	43	432	30-40	51	139	30-40
36	694	40-60	44	383	40-60	52	307	40-60

Inshore

91	340	5-15
92	191	5-15
93	83	5-15
94	229	5-15
95	446	5-15
96	495	5-15

fathoms	meters	fathoms	meters
5-15	9-27	30-40	55-73
15-25	27-46	40-60	73-110
25-30	46-55		

