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A MARINE FISHERIES SUBPLAN FOR NASSAU AND SUFFOLK COUNTIES

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Nassau-Suffolk Regional Planning Board

A MARINE FISHERIES SUBPLAN FOR NASSAU AND SUFFOLK COUNTIES

1.0 Introduction

1.1 Objectives and Scope

This report, A Marine Fisheries Subplan for Nassau and Suffolk Counties, is concerned with those living marine resources which support Nassau-Suffolk based commercial and recreational fishery activities. The principal objectives of this report are as follows:

1. Recognize the importance of marine fisheries as commercial and recreational resources of the Nassau-Suffolk coastal zone.
2. Develop land use and facility recommendations which take cognizance of the special needs of commercial and recreational fishermen for shoreline facilities and access.
3. Assess the status and future potential of Nassau-Suffolk commercial fishing industry operations in light of current management arrangements and extended U.S. fishery jurisdiction.

The objective of maintaining environmental conditions conducive to the growth and survival of marine fishery populations and related food chain species is not considered in this report. This National interest objective is inherent in the preparation of other segments of the Nassau-Suffolk Regional Planning Board's Comprehensive Coastal Zone Management Plan, of which the subject report is a part. The boundaries of the Nassau-Suffolk coastal zone are based on biophysical criteria which reflect the protection, preservation and restoration of living resources. The Nassau-Suffolk land use plan is based on land and water capability analyses, coastal resource inventories, land use environmental impacts and coastal dependency aspects. Geographic Areas of Particular Concern

(GAPCs) were selected, in part, to include areas of high natural productivity and essential habitat for living resources. The various aspects of marine water quality and waste disposal are considered in the Section 208 Areawide Waste Treatment Management Plan. The dredging subplan is based on criteria designed to minimize adverse marine environmental impacts. These plan segments address the concerns related to development projects that may adversely impact fisheries resources and their associated habitats.

1.2 Goals

The facility and land use recommendations made in this report are designed to 1.) assure that the continued viability of the commercial fishing industry is not constrained by decisions affecting shore land use, and 2.) provide marine anglers with increased opportunities and various forms of access to marine waters that have recreational fishing potential. The development of these recommendations was based on consideration of the National interest as expressed by the following goals of the National Marine Fisheries Service in their National Plan for Marine Fisheries:[1]

- Restore, maintain, enhance and utilize in a rational manner, fisheries resources of importance to the United States.
- Develop and maintain a healthy commercial fishing industry.
- Strengthen the contribution of marine resources to recreation and other social needs.
- Ensure adequate supplies of wholesome seafood products for consumers.

The concerns of the State of New York regarding marine fisheries management are reflected in the following goals of the New York State Dept. of Environmental Conservation, Division of Marine and Coastal

Resources, the agency charged with the stewardship of living resources in the public domain under State jurisdiction:[2]

1. To perpetuate those desirable wild populations of animals and plants inhabiting the marine waters of the State, and which belong to all the people of the State;
2. To provide maximum opportunity for the utilization of the marine resource for both recreational and commercial purposes that are compatible with the overall public interest;
3. To protect and manage the supporting marine environments so that they may continue to produce wholesome crops of finfish, shellfish and crustaceans;
4. To monitor the marine waters for standard indicators of pollution in order to certify the quality of any product coming from these waters.

The National and State interests as reflected in the preceding goal statements are mutually compatible, and by reference are included as goals of the Nassau-Suffolk Marine Fisheries Subplan. An additional goal reflects local concern over the need for comprehensive fishery management plans for important species:

> To develop fishery management plans based on maintenance of maximum sustained yield[3] or optimum yield[4] as determined by estimates of standing crop, growth, recruitment, natural and fishing mortality, and consideration of socio/economic factors.

This goal is currently being addressed in part by the Mid Atlantic Regional Fishery Management Council established under the Fishery Conservation and Management Act of 1976 (P.L. 94-265). It is not yet possible to predict the impacts that the management plans to be developed in the future by this Council will have on the management of the com-

mercial and recreational fishery resources under New York State mandate. The resources that are non-migratory, such as molluscan shellfish, offer an opportunity for unilateral action by New York State alone to achieve this goal.

Further research is required to fill important knowledge gaps. Because of this constraint, this report deals with fishery management problems in only a general fashion. Section 7.0 identifies priority fishery management problems, with particular reference to the hard clam industry. General management recommendations are also made in this section.

2.0 Nassau-Suffolk's Commercial Fishing Industry

This section summarizes available information on New York's marine fisheries in order to show:

1. the range of marine species included in New York commercial landings, historically and at the present time, the relative importance of these species, their use, and life history characteristics;
2. the magnitude of Nassau-Suffolk's marine fishing industry, both in terms of landings and as a segment of the local economy;
3. the locations of commercial fishing industry activity in the Nassau-Suffolk coastal zone and their relationship to shallow and deep-water fishing grounds;
4. the potential Nassau-Suffolk commercial fishing industry opportunities as a result of the extension of United States fishery jurisdiction to the 200 mile limit; and
5. the land use and shore access problems of the industry in Nassau and Suffolk Counties.

Data and information on many aspects of commercial fishing in Nassau and Suffolk Counties are lacking. For example, no rigorous study of

the economics of the commercial fishing industry in New York has ever been completed. This is due in part to the nature of commercial fishing industry operations on Long Island. The industry consists of literally thousands of individual entrepreneurs who catch, sell and in some instances process their catch on an independent basis. The picture is further complicated by the fact that some recreational anglers also sell their catch. For this reason, reliance has been placed on two major sources of information: opinions from individuals with knowledge and/or interests in commercial fishery matters, and reports based on data collected by the National Marine Fisheries Service, Statistics and Market News Division and its predecessors. It should be noted that catch and landing statistics "are not very good indices of abundance of a species, for catches can vary from many causes, such as changes in demand, or fishing effort, competition from other fisheries, and other economic forces."[5] However, these statistics are valuable because they indicate general trends in fisheries and serve as gross indicators of species abundance.

2.1 Review of Commercial Fishery Landings Statistics

Inasmuch as detailed analyses of commercial fishery landings data from 1880 (the year commercial landings surveys were initiated) to the present time for New York and the New York Bight area are available in several published sources,[6] that material is not repeated here. A brief summary is included to provide general background on the history of marine fishery landings in New York State:[7]

> Total landings in 1970, according to published statistics, were only about 10 percent of total landings in 1880, having dropped from about 150,000 to about 15,000 metric tons. For most of this period, however, the history of total landings was largely a history of the menhaden industry. When fish and shellfish used directly as human food are considered sep-

arately the historic pattern is different. Total landings of food and shellfish rose from about 13,000 metric tons in 1880 to a peak of almost 31,000 in 1938, remained relatively high for about a decade, then declined rather steadily to less than 15,000 metric tons in the early 1970's. This decline over the past 20 years or so is even more serious than the trend of total landings suggests, for when historical landings of individual species are examined the record shows a steady shift from one resource to another as catches of individual kinds of fish and shellfish have risen to maximum, then declined, some to very low levels. The reasons for some declines are known; for others no certain explanation is available. The causes probably are complicated. They include overfishing, which is a corollary of bad management, water pollution and other man-made environmental changes, and fluctuations in abundance from natural causes.

Table 1 shows the record commercial landings by year for all New York State commercial fishery species. The uses of the various species as food and/or for industrial purposes are also shown, along with life history classifications which indicate in a general way the environments and habits with which the species are associated. (See table footnotes 3 and 4.) The wide range of species utilized as food reflects in part the success of New York City's Fulton Fish Market - the largest wholesale fish outlet in the United States - in supplying various ethnic groups in the New York metropolitan region with a variety of fishery products.

The relative rankings of major food fish and shellfish species based on average landings for various time periods are shown in Table 2. The decline of oyster production from a position of dominance in the earlier periods is clearly evident. However, the harvest of this resource, taken primarily from private or leased grounds by firms utilizing aquaculture technology has recently been increasing. Average production of hard clams has risen since the early '30s; hard clams now dominate New York State landings. Flounders have always been important foodfish in New York. There have also been relatively high landings of scup and

Table 1 New York State Commercial Fisheries

Record Commercial Landings[1], Recreational Landings[2], Use[3] and Life History[4] by Species

Common Name	Scientific Name	Year of Maximum Landings	Maximum Landings (metric tons)	1970 Recreational Catches, Maine thru New York (metric tons)	Use	Life History
Atlantic Menhaden	*Brevoortia tyrannus*	1880	131,059	-	I	C
Unc. Fish Industrial	-	1964	53,485	-	-	-
American Oyster	*Crassostrea virginica*	1904	9,108	-	F,SF	C
Haddock	*Melanogrammus aeglefinus*	1926	7,720	1,147	F	O
Scup	*Stenotomus chrysops*	1958	6,495	1,041	F,SF	CO
Yellowtail Flounder	*Limanda ferruginea*	1942	5,391	-	F	O
Unc. Fish (not specified)	-	1880	5,238	-	-	-
Bluefish	*Pomatomus saltatrix*	1904	5,177	22,753	F,SF	CO
Weakfish	*Cynoscion regalis*	1908	5,012	746	F,SF	C
Hard Clam	*Mercenaria mercenaria*	1947	4,686	-	F,SF	E
Atlantic Cod	*Gadus morhua*	1938	3,873	16,188	F,SF	O
Mussel	*Mytilus edulis*; *Modiolus demissus*	1908	3,708	-	F,SF	EC
Unc. Flounders	Order Pleuronectiformes	1926	3,417	-	-	-

Table 1 continued, page 2 of 11

Common Name	Scientific Name	Year of Maximum Landings	Maximum Landings (metric tons)	1970 Recreational Catches, Maine thru New York (metric tons)	Use	Life History
Winter Flounder (blackback)	*Pseudopleuronectes americanus*	1938	3,067	11,197	F,SF	CO
Surf Clam (skimmer)	*Spisula solidissima*	1946	2,940	-	F	OC
Atlantic Herring	*Clupea harengus harengus*	1966	2,906	-	SI	CO
Silver Hake (whiting)	*Merluccius bilinearis*	1943	2,686	299	SI,SF	O
Butterfish	*Peprilus triacanthus*	1939	2,380	_	F	CO
Sea Scallop	*Placopecten magellanicus*	1950	2,180	-	F	O
American Shad	*Alosa sapidissima*	1889	1,965	284	F	A
Summer Flounder (fluke)	*Paralichthys dentatus*	1956	1,932	5,267	F,SF	CO
Alewife	*Alosa pseudoharengus*	1966	1,900	-	SI	A
Atlantic Mackerel	*Scomber scombrus*	1947	1,663	18,816	F,SF	CO
Soft Clam	*Mya arenaria*	1880	1,546	-	F,SF	E
Black Sea Bass	*Centropristis striata*	1951	1,266	279	F,SF	CO
Tilefish	*Lopholatilus chamaeleonticeps*	1929	1,199	-	F,SF	O

Common Name	Scientific Name	Year of Maximum Landings	Maximum Landings (metric tons)	1970 Recreational Catches, Maine thru New York (metric tons)	Use	Life History
Northern Puffer (swellfish)	Sphoeroides maculatus	1945	1,065	3,583	F,SF	E
Unc. Scallop	-	1929	1,012	-	F	-
American Lobster	Homarus americanus	1971	812	-	F,SF	CO
Unc. Eel	Family Anguillidae or Congridae	1889	792	-	-	-
Striped Bass	Morone saxatilis	1973	759	20,795	F,SF	A
Squids	Loligo pealei; Illex illecebrosus	1939	745	-	SI	OC
Hard Blue Crab	Callinectes sapidus	1880	737	-	F,SF	EC
Red Hake (ling)	Urophycis chuss	1946	576	-	SI,SF	CO
Bay Scallop	Argopecten irradians	1962	448	-	F,SF	E
White Hake	Urophycis tenuis	1943	368	-	F,SF	CO
Pollock	Pollachius virens	1933	349	2,533	F,SF	O
Minnows (shiners)	Family Cyprinidae	1888	255	-	I	EF

Common Name	Scientific Name	Year of Maximum Landings	Maximum Landings (metric tons)	1970 Recreational Catches, Maine thru New York (metric tons)	Use	Life History
Unc. Fish for Food	-	1949	240	-	-	-
Bonito	*Sarda sarda*	1943	227	-	F,SF	O
Searobins	*Prionotus carolinus; Prionotus evolans*	1888	227	1,063	SI,SF	CE
Spot	*Leiostomus xanthurus*	1926	198		F,SF	EC
Atlantic Sturgeon	*Acipenser oxyrhynchus*	1897	194	-	F	A
Carp	*Cyprinus carpio*	1921	191	-	F	F
Redfish (ocean perch)	*Sebastes marinus*	1939	184	-	F	O
Atlantic Croaker	*Micropogon undulatus*	1940	182	-	F	EC
Conch (scongilli)	*Busycon canaliculatum, B. carica*	1943	172	-	F	E
American Eel	*Anguilla rostrata*	1943	168	1,436	F,SF	A [5]
Atlantic Bluefin Tuna	*Thunnus thynnus thynnus*	1929	147	-	F,SF	O
Hakes, Unc. (Red & White)	-	1938	147	-	SI	CO

Common Name	Scientific Name	Year of Maximum Landings	Maximum Landings (metric tons)	1970 Recreational Catches, Maine thru New York (metric tons)	Use	Life History
Swordfish	*Xiphias gladius*	1929	147	-	F,SF	O
Atlantic Tomcod	*Microgadus tomcod*	1890	140	-	F,SF	CE
Conger Eel	*Conger oceanicus*	1944	138	-	F	O
Atlantic Silverside	*Menidia menidia*	1950	136	-	I	EC
Chub Mackerel	*Scomber japonicus*	1940	135	-	F,SF	O
Ocean Pout	*Macrozoarces americanus*	1943	131	-	F	O
White Perch	*Morone americana*	1880	114	-	F,SF	A
Sharks, Grayfish	Genera *Mustelus* and *Squalus*	1975	101	212	SI,SF	CE
Suckers	*Catostomus* spp.	1901	99	-	F	F
Tidewater Silverside	*Menidia beryllina*	1908	90	-	I	E
Striped Mullet	*Mugil cephalus*	1889	87		I	CE
King Mackerel	*Scomberomorus cavalla*	1890	84	-	F	OC
Tautog	*Tautoga onitis*	1889	83	7,089	F,SF	EC

Common Name	Scientific Name	Year of Maximum Landings	Maximum Landings (metric tons)	1970 Recreational Catches, Maine thru New York (metric tons)	Use	Life History
Catfish	Ictalurus spp.	1901	79	-	F	F
American Plaice	Hippoglossoides platessoides	1944	78	-	F	O
Skates & Rays	Class Chondrichthyes	1908	76	84	SI,SF	CE
Frigate Mackerel	Auxis thazard	1943	73	-	F	O
Striped Anchovy	Anchoa hepsetus	1950	72	-	I	EC
Shrimp [6]	-	1931	72	-	I	E
Sand Shrimp	Crangon septemspinosus	1940	71	-	I	E.
Northern Kingfish	Menticirrhus saxatilis	1908	70	1,568	F,SF	C
Striped Killifish	Fundulus majalis	1901	64	-	I	E
Cusk	Brosme brosme	1932	61	-	F	O
Soft Blue Crab	Callinectes sapidus	1935	57	-	F,SF	EC
Little Tunny	Euthynnus alleteratus	1949	45	-	F,SF	O

Table 1 continued, page 7 of 11

Common Name	Scientific Name	Year of Maximum Landings	Maximum Landings (metric tons)	1970 Recreational Catches, Maine thru New York (metric tons)	Use	Life History
Goosefish (anglerfish)	Lophius americanus	1944	42	-	F	OC
Witch Flounder	Glyptocephalus cynoglossus	1937	40	-	F	O
Spanish Mackerel	Scomberomorus maculatus	1891	34	-	F	O
Bloodworm	Family Glyceridae	1929	34	-	I	CE
Catfish & Bullheads	Ictalurus spp.	1951	32	-	F	F
Misc. For Bait	-	1908	29	-	I	-
Sandworm	Nereis spp.	X [7]	26	-	I	CE
Atlantic Halibut	Hippoglossus hippoglossus	1933	24	-	F	O
American Sand Lance	Ammodytes americanus	1932	17	-	I	C
Banded Rudderfish	Seriola zonata	1940	16	-	F	OC
Unc. Sharks	Class Chondrichthyes	1943	16	2,175	-	OE
Turtles	-	1938	16	-	F	OCEF

Table 1 continued, page 8 of 11

Common Name	Scientific Name	Year of Maximum Landings	Maximum Landings (metric tons)	1970 Recreational Catches, Maine thru New York (metric tons)	Use	Life History
Atlantic Wolffish	*Anarhichas lupus*	1946	13	-	F	O
Yellow Perch	*Perca flavescens*	1937	13	-	F	F
Horseshoe Crab	*Limulus polyphemus*	X	10	-	I	E
Hickory Shad	*Alosa mediocris*	1921	10	-	F	A
Sheepshead	*Archosargus probatocephalus*	X	10	-	F	C
Jonah Crab	*Cancer borealis*	1975	8	-	F	CO
Razor Clam	*Ensis* spp.	X	7	-	F,SF	E
Sunfish	*Lepomis* spp.	1901	6	-	F	F
Cunner	*Tautoglabrus adspersus*	1946	4	868	F,SF	CE
Pike or Pickerel	*Esox* spp.	1891	4	-	F	F
Rainbow Smelt	*Osmerus mordax*	1929	4	88	F	A
Bullheads	*Ictalurus* spp.	1958	3	-	F	F

Table 1 continued, page 9 of 11

Common Name	Scientific Name	Year of Maximum Landings	Maximum Landings (metric tons)	1970 Recreational Catches, Maine thru New York (metric tons)	Use	Life History
Groupers	Family Serranidae	1938	2	-	F	CO
Gray Snapper (red snapper)	*Lutjanus* spp.	1938	2	-	F	CO
Sturgeon Caviar	-	1901	2	-	F	-
Cero	*Scomberomorus regalis*	1901	1	-	F	CO
Blue Runner	*Caranx crysos*	1943	* [8]	-	F	C
Rock Crab	*Cancer irroratus*	X	*	-	F	CE
Crappie	*Pomoxis* spp.	X	*	-	F	F
Dolphin	*Coryphaena hippurus*	X	*	-	F,SF	O
Unc. Drum	Family Sciaenidae	X	*	-	F	EC
Black Drum	*Pogonias cromis*	X	*	-	F	EC
Red Drum	*Sciaenops ocellata*	1937	*	-	F	EC
Harvestfish	*Peprilus alepidotus*	1973	*		F	C

Common Name	Scientific Name	Year of Maximum Landings	Maximum Landings (metric tons)	1970 Recreational Catches, Maine thru New York (metric tons)	Use	Life History
Pigfish	Orthopristis chrysoptera	1932	*	-	F	CE
Pilotfish	Naucrates ductor	1921	*	-	F	OC
Pompano	Trachinotus carolinus	X	*	-	F	C
Atlantic Salmon	Salmo salar	1901	*	-	F	A
Tarpon	Megalops atlantica	1974	*	-	F	CE
Unc. Tunas		1974	*	1,683	F	O

Footnotes:

1. Commercial and recreational landings data taken from McHugh, J. L. and A. D. Williams. 1976. Historical Statistics of the Fisheries of the New York Bight Area. New York Sea Grant Institute, NYSSGP-RS-76-013. 73p. Commercial landings are given in metric tons, rounded to the nearest ton. 1 metric ton = 1000 kilograms = 2,204.6 pounds. Molluscan shellfish are given as weights of meats, shells removed.

2. Estimates of sport fish catches for the North Atlantic Region (Maine through New York) do not include estimates of recreational catches of invertebrates, or catches of minor finfish species.

Footnotes: (Continued)

3. Use classifications based on information contained in McHugh, J. L. Fisheries and Fishery Resources of New York Bight, NMFS Circular Series, in press; Mohr, Peter T. 1976. Marine Sport Fisheries of New York State. Thesis presented to Graduate School, SUNY at Stony Brook, Marine Environmental Studies Program; and Silbajoris, R. A. 1975. Underutilized Marine Fishery Resources of New York State. Thesis presented to Graduate School, SUNY at Stony Brook, Marine Environmental Studies Program.

   Commercial fishery landings are utilized for human food (F) or industrial purposes (I) (production of fish meal, oil, and animal food; and for bait). Species classified as semi-industrial (SI) have been used for food and industrial purposes, depending on market conditions at the time of landing. Additional sport fishes (SF) of recreational interest to New York marine anglers include skipjack tuna, crevalle jack, blue marlin, white marlin, and various sharks.

4. Life history classifications for each species taken directly from Table 1 in McHugh, J. L. and Jay J. C. Ginter. Fisheries, MESA New York Bight Atlas Monograph 16, New York Sea Grant Institute, in press.

   O = oceanic; C = coastal, not migrating in substantial numbers more than 12 miles offshore; E = estuarine; A = anadromous, i.e., spawning in freshwater but spending most of life at sea; F = strictly freshwater (after heavy rains, freshwater species may be flushed out into estuaries, where they are caught by marine gears).

5. American eel is catadromous, i.e., it spawns in saltwater, but spends most of its life in freshwater.

6. New York State commercial shrimp landings are comprised of small species used only as bait.

7. X indicates more than one year.

8. * indicates less than half a metric ton.

Table 2 Average Annual New York State Landings (metric tons) of Food Fish and Shellfish for Various Periods[1]

Rank	1887-1926		1929-1935		1938-1951		1952-1970		1971-1975	
1	Oyster	6,085	Oyster	3,180	Flounders	4,405	Scup	4,040	Hard clam	3,719
2	Bluefish	2,360	Flounders	2,950	Oyster	3,270	Flounders	2,860	Flounders	3,435
3	Weakfish	1,315	Haddock	2,045	Haddock	2,770	Hard clam	2,250	Surf clam	1,656
4	Flounders	1,180	Cod	1,180	Hard clam	2,495	Silver hake	1,135	Scup	1,180
5	Cod	1,090	Sea Scallop	910	Scup	2,360	Sea scallop	1,045	Silver hake	923
6	Shad	865	Tilefish	865	Cod	1,405	Surf clam	910	Weakfish	651
7	Hard clam	770	Butterfish	680	Butterfish	1,225	Butterfish	770	Oyster	630
8	Alewife	410	Scup	590	Silver hake	1,180	Oyster	500	Striped Bass	559
9	Butterfish	305	Hard clam	545	Surf clam	1,135	Cod	454	Bluefish	506
10	American eel	365	Weakfish	454	Sea scallop	1,045	Squid	410	Lobster	474

[1]Based on data in Table 1, McHugh, J.L. 1972. Marine Fisheries of New York State. U.S. Dept. Commerce, Natl. Marine Fish. Serv., Fish. Bull. 70(3):590; and on U.S. Dept. of Commerce fishery statistics for the years 1971-1975.

silver hake (whiting) during the last 25 years.

Industrial fish landings in New York have always been dominated by menhaden. The decline of the fish meal industry on Long Island (The large processing plant located at Promised Land closed in the late '60s.) has resulted in part to the low New York menhaden landings in recent years. However, most menhaden caught in New York State waters - estimated at 13,000 metric tons (30 million pounds) - are now landed at processing plants in other states by out-of-state vessels.[8] The lack of fish processing facilities on Long Island is also a factor why vessels registered in New York State land their catches of other species at Cape May, N. J. and New Bedford, Mass.

New York State's commercial fishing industry is predominantly based in Nassau and Suffolk Counties. Table 3 indicates that 84% by weight of the fish and 97% by weight of the shellfish landed in New York State in 1975 were landed in Nassau-Suffolk ports. The 15,000 metric tons (33 million pounds) of fish and shellfish reported as landings in Nassau-Suffolk in 1975 had a dockside value of $27 million. Only 10 other states had landings with dollar values more than that of Nassau-Suffolk in 1975.[9] Alaska ranked number one with landings at about $144 million. Hard clams ranked as the number one species in Nassau/Suffolk in terms of both weight and landed value. This fishery is of national importance in that Nassau-Suffolk's harvest of hard clams in 1975 accounted for 59% of the total national production of this species. Of the 16 species with a landed value of more than $100,000, two (hard clam, bay scallop) are classified as estuarine, two are coastal (oyster, weakfish), six are coastal oceanic (lobster, fluke, scup, butterfish, bluefish, blackback flounder), three are oceanic

Table 3 1975 Nassau and Suffolk County Commercial Fishery Landings and Comparison with Total New York State Marine District Landings

	Nassau-Suffolk Landings		Nassau-Suffolk Percentage of NYS Landings		Nassau-Suffolk Landings Ranking	
Species	Metric tons	dollars	by wt.	by dollars	by wt.	by dollars
Hard clam (meats)	3,932	14,301,382	100	100	1	1
Oysters (meats)	956	5,176,007	100	100	5	2
Amer. Lobsters	302	1,390,346	99.3	99.3	13	3
Flounders, fluke	1,238	1,071,022	84.8	83.5	4	4
Scup, unc.	1,648	1,030,177	94.8	95.7	3	5
Surf clams (meats)	2,002	740,331	96.4	96.4	2	6
Bay scallops (meats)	201	713,044	100	100	17	7
Striped bass	425	501,063	82.4	81.9	11	8
Flounders, yellowtail	588	342,131	99	99.1	7	9
Butterfish	525	302,693	93.5	92.6	8	10
Weakfish	604	289,480	97.4	97.7	6	11
Bluefish	365	150,416	90.4	90.1	12	12
Whiting	384	150,227	41	43.6	10	13
Cod	178	128,604	91.2	91.5	18	14
Squid	225	116,695	87	87	16	15
Blackback flounder	244	107,386	93	92.6	15	16
Soft clams (meats)	28	76,307	100	100	30	17
Atlantic Mackerel	151	58,205	93.3	92.3	19	18
Sea bass, unc.	56	53,258	95	95.1	21	19
Sea mussels (meats)	48	45,084	100	100	24	20
Menhaden	488	42,135	100	100	9	21
Conchs (meats)	49	37,850	100	100	23	22
Sharks, grayfish	91	32,957	90	90.5	20	23
Eels, common	44	31,866	100	100	25	24
Silversides(spearing)	36	28,010	100	100	28	25
White perch	37	19,481	100	100	27	26
Sea herring	56	10,789	99.3	99.4	22	27
Anglerfish	30	10,680	84.7	83.8	14	28
Tautog	39	8,463	77.6	77.1	26	29
Skates	27	7,825	83.9	83.8	31	30
Red hake	30	6,236	26.7	29.6	29	31
Launce	12	5,737	100	100	35	32
Jonah crab	8	5,400	100	100	34	33
Bonito	11	5,000	63.1	62.1	33	34
Flounders, gray, sole, unc	6	4,873	100	98.6	36	35
Sea robin	18	3,730	88.7	89.9	32	36
Flounders, lemon sole	3	2,675	100	100	38	37
Bluefin tuna	3	2,459	68.6	69.1	39	38
Swellfish	2	2,270	97.7	97.8	41	39
Flounders, dab, sea, unc	4	1,264	96.2	95.8	37	40
Sharks	3	1,253	77	76.3	40	41
Razor clams (meats)	1	1,076	100	100	44	42
Conger eels	2	1,061	100	100	43	43
Pollock	2	804	100	100	42	44
Sturgeon	1	597	79.2	80.5	45	45
White hake, unc.	1	537	91.4	91.6	46	46
Haddock, unc.	*	388	100	100	47	47
King whiting or kingfish	*	63	100	100	51	48
Spanish mackerel	*	60	100	100	49	49
Wolffish	*	40	100	100	48	50
Alewives	*	15	100	100	50	51
Tilefish	*	3	.14	.22	53	52
Shad	*	2	7.1	4.3	52	53
Total fish	7,455	4,415,935	84.4	86.8	-	-
Total shellfish	7,752	22,603,522	97.1	98.1	-	-

[1] Data from U.S. Dept. of Commerce. 1976. New York Landings, Annual Summary 1975. Current Fisheries Statistics No. 6912, National Marine Fisheries Service, Washington, D.C. 6 p.

[2] No 1975 landings in Nassau and Suffolk Counties were reported for sea scallops, blue crabs, sheepshead, swordfish, tarpon, little tuna, or tuna, unc.

*indicates landings of less than half a metric ton.

(yellowtail, whiting, cod), two are oceanic coastal (surf clam, squid) and one is anadromous (striped bass). In general, the estuarine species are harvested by utilizing gear and boats with shallow water capabilities; gear and vessels associated with deeper water environments are utilized to catch the non-estuarine species.

2.2 Locational Aspects of Nassau-Suffolk Commercial Fishing Activities

Two locational aspects are of interest in the examination of Nassau-Suffolk commercial fisheries: 1. Where do the commercial fishermen dock their boats and vessels, store their gear and land their catch?; and 2. Where are the various species of commercial importance caught? Before proceeding with the general answers to these questions, some brief comments are necessary on the various gear utilized by Nassau-Suffolk fin-and shellfishermen.

The major gear types utilized by Nassau-Suffolk finfishermen are the otter trawl, purse seine, pound net, haul seine, gill net, hook and line (longline and rod and reel), and spear.[10] Otter trawls are used to capture fish on the bottom or in the water column; most groundfish are caught with this gear. Purse seines are used by the menhaden fishermen operating in New York waters (none are now based in the State). Pound nets are located in Long Island Sound, the Peconics, Gardiners Bay, Great South Bay, and in the ocean just east of Fire Island Inlet. Haul seines are utilized in the Peconics and Long Island Sound and along the Atlantic Ocean shoreline; the nets can be retrieved on the water or on the shore. Gill nets are employed in the nearshore ocean, the bays and Long Island Sound. Longlines are utilized offshore for tilefish and cod; rod and reel are sometimes used by commercial fishermen to catch striped bass. Many fish reach the commercial market as the result of

sales made by anglers and charter and head boat owners who also utilize rod and reel. Spears are used primarily to catch American eels in creeks and bays.

Hand operated tools, mechanical dredges, and various types of fixed gear (pots and traps) are used to take shellfish and crustaceans. Hard clams are harvested by rakers who operate from the shore in shallow water (on a commercial as well as recreational basis). Tongers and deepwater rakers operate from boats. Lease holders and owners of bay bottom harvest clams by means of mechanical dredges. Recreational harvesters also take clams by treading. Some commercial clammers utilize skin diving equipment. Hand tools are utilized to take soft clams and razor clams from nearshore mud flats exposed at low tide. Outboard motors are used to churn or blow soft clams from soft bottom not exposed at low tide. Commercial surf clam harvesters rely on mechanical dredges for their catch. Hand tools are utilized on a small scale in Long Island Sound. Tongs are utilized to harvest blue mussels. Commercial and recreational harvesters utilize scoop nets, dredges and rakes to catch bay scallops. Sea scallops, which are a commercial resource only, are taken in waters greater than 10 fathoms in depth by means of dredges and nets. Oysters are taken by tongs, rakes, dredges and by hand. The primary means of harvest is the use of mechanical dredges on leased bottom. There are both commercial and recreational lobster fisheries; fixed gear - pots and fish traps - are utilized. Lobsters are also taken by otter trawl. Pots are utilized by commercial fishermen to take blue claw crabs, while recreational fishermen use scoop nets and crab traps. Rock and jonah crabs are an ocean resource of commercial interest only. Lobster pots and otter trawls are main gears. Conchs are taken by fixed gear and as

an incidental catch in otter trawls.

The commercial fishing industry in Nassau-Suffolk can be divided into deepwater and shallow water segments. This arbitrary division is convenient when evaluating the land use and support facility requirements of the industry as a whole. The deepwater segment consists of the offshore operations in Long Island Sound, Gardiners Bay and the Atlantic Ocean, which require the use of relatively large, deep draft vessels and related gear to catch a variety of finfish, shellfish and crustaceans with oceanic or coastal oceanic classifications. The deep draft vessels require port facilities with channels of sufficient draft, or naturally occurring deep water near shore, to provide ready and safe access to offshore fishing grounds. Fishing activity in the shallow water segment is focused in estuaries, such as Great South Bay and the Peconics, and along the shorelines of the deeper bodies of water. The primary target species in this segment are the hard clam and oyster. Access to deep water is not a major factor in the shallow water segment, as most activity occurs in nearshore waters. Although large vessels equipped with mechanical dredges are used in harvesting clams from private or leased grounds, independent clammers using tongs, rakes, and shallow draft boats that are either docked in marinas and along the numerous creeks tributary to the bays, or trailered to the water on a daily basis, dominate the clam industry. Large mechanical dredges working private and leased grounds are the primary means of harvesting oysters.

Statistical data on the distribution of boats and vessels in the Nassau-Suffolk commercial fishery are limited; the National Marine Fisheries Service, however, does maintain data on commercial fishing

vessels with ratings of five tons or more. A breakdown of 1975 vessel related information is shown in Table 4. As far as resident vessels (New York State registration) are concerned, Montauk, Shinnecock, Greenport, Great South Bay and Freeport are the major harbors/areas. Analysis of the distribution of gear types associated with the vessels utilizing these harbors indicates that several clam and oyster dredges are found at Greenport and Great South Bay. These vessels are part of the shallow water segment of the industry. The seven clam dredges at Freeport support the Nassau-Suffolk offshore surf clam fishery. Considering only those vessels connected with the deepwater segment of the industry, Shinnecock ranks as the leading resident port (with 23 vessels) followed by Montauk, Freeport, and Greenport. Greenport ranks as number one as far as transient vessel use is concerned, although not all of the vessels indicated may fish New York State waters in a given year. Other sources of information indicate that there are 5 to 10 additional resident vessels utilizing Nassau-Suffolk ports in 1976 that are not accounted for in Table 4,[11] and that three to four transient vessels frequently use the Shinnecock Inlet area for catch offloading in the summer months.[12]

Similar data on the location (home port) and characteristics of the boats used in the shallow water segment of the industry in support mainly of the hard clam fishery are not available. However, shellfish permit data imply that most of these boats are found in the Great South Bay area.

The second major locational aspect associated with the commercial fishing industry is where the various species of fish and shellfish are caught. Figure 1 shows the location of subdivisions 5Ze and 5Zw and

Table 4 Commercial Fishing Vessels Utilizing Long Island Harbors in 1975 [1]

	Resident Use [2]				Transient Use [3]			
Harbor/Area	No. of Vessels	Range of Length(ft)	Full Crew Total	Gears [4]	No. of Vessels	Range of Length(ft)	Full Crew Total	Gears
Montauk	18	35-80	47	3 Lpo 2 Lpi 13 otf	3	45-74	9	1 otl 2 otf
East Hampton	2	41	4	1 Lpo 1 otf				
Sag Harbor	1	34	2	1 otf				
Shinnecock	23	33-71	53	1 LL 3 Lpo 3 Lpi 14 otf 2 otl				
Greenport	26	33-112	90	7 od 1 chs 12 otf 3 pnf 1 Lpi 2 otl	34	27-82	113	8 otl 26 otf
Shelter Island	2	27-45	2	1 otf 1 pnf				
Mattituck	6	34-47	11	3 Lpi 3 otf				
Port Jefferson	3	32-36	6	3 Lpi				
Smithtown	1	38	2	1 Lpi				
Huntington	1	28	1	1 Lpi				
Oyster Bay	8	34-77	23	2 Lpi 4 od 2 cd				
Great South Bay	28	37-60	72	1 od 1 pnf 18 cd 8 otf				
Freeport	18	36-67	36	7 cd 2 Lpi 9 otf				
Sheepshead Bay	10	38-61	20	10 otf				
Brooklyn	2	43-48	4	1 cd 1 otf				
New York, N.Y.	2	60-91	24	2 ssd				
Totals	151		397	28 cd 7 Lpo 18 Lpi 73 otf 1 LL 4 otl 12 od 1 chs 5 pnf 2 ssd	37		122	9 otl 26 otf

[1] This table, based on information supplied by Messrs. F. Blossom and E. Hasbrouck, NMFS, Patchogue, N.Y., contains statistics on commercial fishing vessels with ratings of at least 5 tons; it does not account for smaller boats utilized for commercial fin- or shellfishing.

[2] Most vessels listed under "Resident Use" utilize their home port as their shipping port, as most fish landed on Long Island is shipped on consignment to the Fulton Fish Market.

[3] Transient vessels are those that utilize Long Island harbors to sell their catch, even though their home ports are in other areas. Most transient vessels are registered in North Carolina; a few are registered in Connecticut and New Jersey. Vessels registered in New York also sell their catch in New Jersey, Rhode Island and Massachusetts.

[4] Codes for gears:

Lpo	= lobster pot offshore	od	= oyster dredge
Lpi	= lobster pot inshore	chs	= common haul seine
otf	= otter trawl fish	pnf	= pound net fish
LL	= longline	cd	= clam dredge
otl	= otter trawl lobsters	ssd	= sea scallop dredge

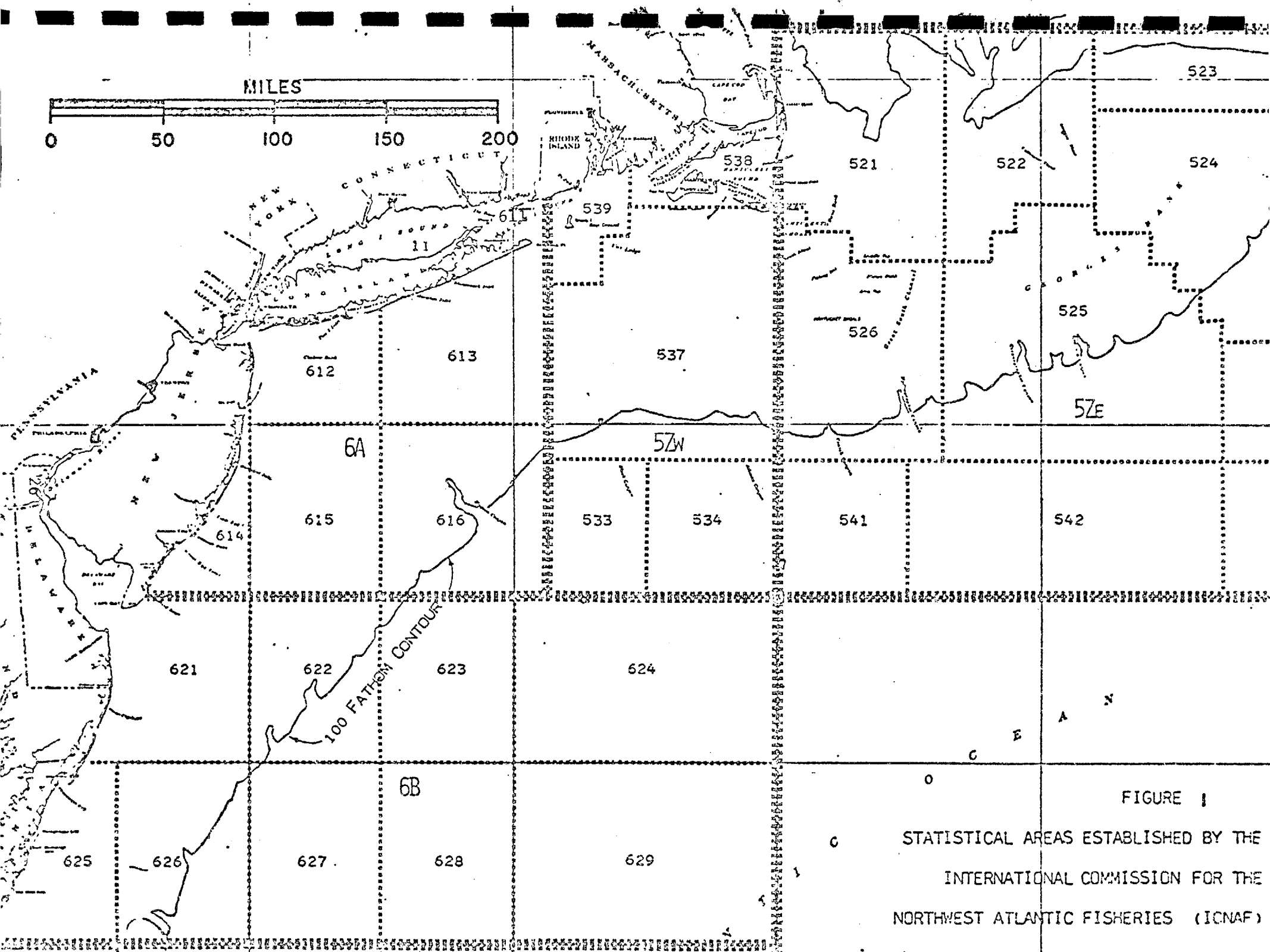

FIGURE 1

STATISTICAL AREAS ESTABLISHED BY THE INTERNATIONAL COMMISSION FOR THE NORTHWEST ATLANTIC FISHERIES (ICNAF)

divisions 6A and 6B - areas established by the International Commission for the Northwest Atlantic Fisheries (ICNAF) for regulatory and statistical purposes - off the Middle Atlantic coast. Also shown are some of the water code areas within each subdivision or division that are used by the National Marine Fisheries Service to key species catch statistics by area. Table 5, which should be interpreted in conjunction with Figure 1, shows the percentage by weight of the total 1975 New York State landings for each species caught in the various water code areas. This table indicates the following:

1. Over 90% of the total hard clam production (from both public and private grounds) came from Great South Bay. This makes Great South Bay the most important hard clam "factory" in the nation, as well as the world. The other primary target of the shallow water segment, the oyster, was taken primarily in Gardiners, Peconic and adjoining bays and in Long Island Sound. Total bay scallop production also originated in Gardiner-Peconic Bay region.
2. Long Island's surf clam industry depended entirely on area 612. Catches of other important species that are part of the deepwater segment were taken primarily from areas 612 and 613. The Block Island Sound/Montauk Point region (area 611) and Georges Bank (areas 524, 525 and 526) were also important. Half or more of the total landings of fluke, whiting, weakfish, butterfish, striped bass, squid and cod were caught in areas 612 and 613, and 40% or more of the scup, yellowtail and

Table 5 Percentage of 1975 New York State Commercial Species Catch by Water Area[1]

Species	1975 N.Y. Landings in metric tons	Average price/lb. in dollars[4]	Percentage of Total Species Catch by Water Code Area[2,3]																	
			11	32	33	34	36	37	611	612	613	615	616	625	524	525	526	533	537	539
Hard clams	3,065	1.65	6	89		5	1													
Surf clams	2,077	0.17								100										
Scup	1,738	0.28	8			0	33		17	13	27	0					0		1	0
Flounder, fluke	1,466	0.40	0				3		27	29	41	0			0	0			0	
Whiting	1,179	0.13	0				0		8	76	15					0	0		1	
Oysters	956	2.48	22	1	0	1	77													
Hard clams (private)	866	1.66	4	96																
Gray Sea Trout	620	0.22	1			0	29		19	15	35								0	
Flounder, yellowtail	594	0.26							1	7	42	1			13	28	8			
Butterfish	562	0.26	1				33		16	23	27								1	
Striped bass	516	0.54	1			0	20		27	27	24									0
Menhaden	488	0.04	2				89			2	6									
Bluefish	403	0.19	3				20		42	17	17								1	0
Lobster	304	2.09	34						5	3	0		57			1	1			
Flounder, blackback	263	0.20	3			3	19		24	10	36	2			1	0			1	0
Squid	258	0.24	0				17		11	37	33								1	
Bay Scallops	201	1.61					100													
Cod	195	0.33	0						20	23	54			0	0	1	0		0	1
Atl. mackerel	162	0.18	0				56		3	29	11									
Sea scallops	118	1.44										100								
Red hake	113	0.08	1						1	91	7									
Sharks, grayfish	101	0.16	1				22		16	43	17								1	
Sea bass	59	0.43	2			0	5		15	27	51									
Sea herring	56	0.09	71			1	9		0	10	8									
Tautog	50	0.10	7				29		30	28	6									
Conger	49	0.35	2	36			62													
Sea mussels	48	0.43	52	2		45														
Common eels	44	0.33		9		13	5	73												
White perch	37	0.24				100														
Angler fish	36	0.16					0		25	29	45								1	
Silversides	36	0.36				100														
Skates	32	0.13	1				0		17	30	51								0	
Soft clams	28	1.22	57			16	27													
Sea robin	20	0.09	2				32		10	39	18									
Bonito	17	0.22	8				13		23	50	6									
Tautog	12	0.22				100														
Jonah crabs	8	0.30											100							
Flounder, gray sole	7	0.34								3	41				31	17			7	
Flounder, dab, sea	5	0.13							4	9	83					4				
Bluefin tuna	4	0.36							42	37	20									
Sharks	4	0.21							59	32	9									
Flounders, lemon sole	3	0.39									36				19	45				
Swordfish	3	0.41	18				43		10	13	18									
Pollock	2	0.16							8	8	60					14				10
Tilefish	2	0.27																100		
Conger eels	2	0.24							34		56						9			
Stugeon	2	0.20							3	35	62									
Razor clams	1	0.36				100														
White hake	1	0.22							4	11	59				11	15				
Haddock	*	0.43									67					33				
Wolffish	*	0.08								60	40									
Spanish mackerel	*						100													
Shad	*	0.15								100										
King whiting/kingfish	*						50				50									

[1] Table derived from data contained in printout entitled, "Conversion of Monthly Landings Data to General Canvass Catch Data," dated 9 March 1976, supplied by Mr. F. Blossom, NMFS, Patchogue, N.Y.

[2] Definition of water code areas: 11 - Long Island Sound; 32 - Great South Bay; 33 - South Oyster Bay; 34 - Moriches Shinnecock Bays; 36 - Gardiners, Peconic & adjoining Bays; 37 - Assorted other inland bays; 611 - Block Island Sound/Montauk Pt. region; 612, 613, 615, 616, 625, 524, 525, 526, 533, 537, 538 and 539 are ICNAF statistical regions which are shown in Figure .

[3] Percentages are rounded to nearest percent. * indicates less than 0.5 metric tons.

[4] The price quoted for hard clams is depressed due to the inclusion of low prices for chowders and cherrystones in calculating the average value.

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blackback flounders were caught here. Block Island Sound was an important area for bluefish, and substantial yellowtail and other flounder catches by New York fishermen occurred at Georges Bank. Lobsters were caught mainly in Long Island Sound and in the vicinity of the Hudson Canyon, which is in area 616.

2.3 Economic Aspects of the Nassau-Suffolk Commercial Fishing Industry

No comprehensive studies have been made to date on the economics of the commercial fishing industry in Nassau and Suffolk Counties. This section uses available information on the dockside value of commercial fishery landings, the results of economic studies conducted in Rhode Island, and commercial fishery license and permit data to illustrate, in a gross fashion, the magnitude of commercial fishing activities in Nassau and Suffolk Counties - both in terms of the number of people employed and the value of these acitivities and related operations, such as sea food transportation and processing, marine supplies, etc., to the economy. Public policy decisions that affect commercial fishing should be made with an awareness of the impact of this industry on the Nassau-Suffolk region. This impact is focused on those communities where the industry has traditionally been a large employer.

The only available data on the dockside value (money received by fishermen for their catch) of fish and shellfish landed in Nassau and Suffolk Counties are those published by the National Marine Fisheries Service. New York State commercial fishery landings in 1976 amounted to over 15,000 metric tons valued at $32.1 million. From this total fish and shellfish valued at approximately $31 million were landed in Nassau and Suffolk Counties. This figure probably underestimates the

total amount of money received by fishermen for their products, but it is not known by how much. This income to fishermen is only the initial stage of the process by which economic benefits from the industry accrue to people and businesses in the region and the state. To estimate the total impact of commercial fisheries on the economy, multipliers derived in studies conducted for the State of Rhode Island and for the Town of Southold, Suffolk County will be utilized.

An input-output analysis conducted by University of Rhode Island investigators to determine the economic impact of commercial fisheries in Rhode Island determined that for each $100 in fish landings, $424 of economic activity was generated in the state.[13] This corresponds to a multiplier of 4.24, which measures the effect of direct fishermen income, the income received by businesses and individuals that provide goods, services and labor to commercial fishermen, and the income of those businesses using fish in their operations. It does not include retail activities. This multiplier was also found to be much higher than that associated with the "average" industry in the state, because the fishing industry depends on, in essence, a local natural resource base, while most other industries must import inputs from out of the state in order to produce outputs in a process of stages characterized by add-on value. Assuming that the same general multiplier impacts occur in the New York region, and that a conservative estimate of this multiplier for New York is 4.0, then the Nassau-Suffolk commercial fishing industry has an impact valued at $124 million for the state as a whole.

To estimate the impact of the commercial fishing industry on the

economy of Nassau-Suffolk the results of a study conducted in the Town of Southold are used.[14] This study determined the direct community impact of commercial fisheries by using a multiplier of 2.79. By applying a more conservative multiplier - 2.5 - to the Nassau-Suffolk region, we find that commercial fisheries have an impact valued at $77.5 million on the regional economy. Again, this does not account for retail sales. The processed value of 1975 New York State landings has been estimated at about $100 million.

In order to estimate the number of people in Nassau-Suffolk who earn their livings, either on a full time or part time basis by commercial fishing, reference is again made to National Marine Fisheries Service data and permit data of the New York State Department of Environmental Conservation. A National Marine Fisheries service report states that there were 3,231 full time and 6,264 part time (total 9,495) fishermen in New York State in 1975.[15] Indications are that these numbers are too low. Commercial fishery permit data found in Table 6 show that nearly 10,500 permits of various types were issued to New York State residents for commercial lobstering, shellfishing and crabbing. This does not include the number of resident finfishermen, because they are not required to obtain permits. There are roughly 350 people engaged in commercial finfishing. Therefore, we can say that about 11,000 people are engaged as full or part time commercial fishermen in New York State; most of these people are located in the Nassau-Suffolk region. These people have invested significant amounts of capital in the boats, vessels and gear which support fishing operations. An estimate of the replacement value of this equipment is over $77 million.[16]

Hundreds of Nassau-Suffolk residents are involved in activities

Table 6 Number of Marine Commercial Fishery Permits Issued by the New York State Dept. of Environmental Conservation

Permit Type[1,2]	1970	1976
Shellfish Digger	5,547	9,792[3]
Resident Lobster[4]	508	637
Non-Res. Lobster	71	77
Resident Crab	4	33
Non-Res. Crab		39
Menhaden Fish. Ves.	10	23
Non-Res. Fd. Fish. Ves.	6	44
Bed (N.Y. State Lands)	12	15
Shellfish Hatchery		5
Off-Bottom Culture		2

[1]A total of 1272 shipper's permits of various types were issued by NYSDEC in 1976.

[2]No NYSDEC permits are required for resident commercial finfishing.

[3]In 1976, 9,691 Shellfish Digger permits were issued to Nassau-Suffolk residents.

[4]Various types of permits are required for non New York State residents who take lobsters, crabs, and food fish from waters under New York State jurisdiction.

which depend directly upon the commercial fishing industry, such as fish packing and transportation (See footnote 1, Table 6) and fish processing. Greenport is the major fish (fish fillet and meal) and shellfish (oyster, scallop, surf clam) processing area in Suffolk County. Point Lookout is the shellfish processing center in Nassau County (surf clam). Other processing operations are located at Sayville. Many of the 222 processing plants and fish wholesale plants in New York State, which employ over 4,600 people on full and part time basis, rely on the fish and shellfish landed in Nassau-Suffolk ports.

2.4 The Future of the Nassau-Suffolk Commercial Fishing Industry Under Extended U.S. Fisheries Jurisdiction

The United States assumed jurisdiction over the management of fishery resources within 200 miles of the Nation's shores on March 1, 1977, pursuant to P.L. 94-265. The regulatory actions of the U.S. government in implementing P.L. 94-265, e.g., the granting of permits to foreign nations, which allow fishing operations for certain species within specific areas to be conducted under a catch quota system, are based on a management program designed to: 1. allow overfished stocks of commercial fish to recover; and 2. revive the U.S. fishing industry. This section considers the potential impacts of the management program and extended jurisdiction on the Nassau-Suffolk commercial fishing industry. First, however, the projected national impacts of extended jurisdiction are reviewed.

In the recent past, foreign catches of fisheries resources within 200 miles of the U.S. coast greatly exceeded the total catch of our domestic fleet.[17] In 1972 the foreign catch within 200 miles of the U.S. was 3.6 million metric tons; total U.S. domestic catch was 2.1 million metric tons, of which 2.0 million metric tons was caught within

200 miles. In 1975, the U.S. imported 62% of its supply of edible fishery products and 36% of its industrial fish products at a cost of $1.6 billion. During the same year, the U.S. exported fishery products worth only $0.3 billion.

In 1973, the average per capita consumption of edible fishery products in the U.S. was 12.6 pounds. When industrial fish products that enter the human food supply indirectly as animal foods are considered, per capita consumption increases to 48.7 pounds. To meet the expected increase of U.S. consumption of edible fishery products by 1985 without increasing imports, the present U.S. catch of edible fish will have to be doubled, and, when considering industrial fish needs, the total U.S. catch must be increased by 50 percent. Increased U.S. landings would be accomplished by: 1. restoring fish stocks that are presently depleted; 2. increasing the domestic catch of those species currently being exploited by foreign nations; and 3. developing fisheries, products, and markets for resources that are unutilized or underutilized. Projections of the impact of extended jurisdiction on total domestic landings show an increase from the present level of 2.1 million metric tons to 2.5 million metric tons by 1985 at a minimum, or to a maximum of 4.9 million metric tons if the domestic fishing industry is government subsidized to the extent that most foreign fishing is eliminated within the 200 mile limit. The number of jobs in the commercial fishing and related industries may increase by 30,000.

In order to assess the impacts of extended jurisdiction on the Nassau-Suffolk commercial fishing industry, a review of foreign catches in those offshore areas accessible to New York fleets must be made. Table 7 shows 1975 foreign catches made in New York Bight statistical areas (Figure 1), as well as New York and New Jersey landings, by species.

Table 7 Comparison of 1975 Foreign Catches with Domestic Commercial Landings in the New York Bight Region[1]

Species	Foreign Catches Subdivision 5Ze	Subdivision 5Zw	Division 6A	Domestic Landings New York	New Jersey
Alewife	1,801	632	947	*	4
Argentine	1,322	76	3		
Bluefish	86			403	581
Butterfish	1,514	1,854	3,270	562	388
Cod, Atlantic	8,610	151	195	195	140
Cusk	440				
Flounders:					
Unspecified	138	24			
Halibut	31				
Plaice, American	174		34	4	
Winter	528	1	48	266	48
Witch	129	5	84	7	6
Yellowtail	83	1	3	594	41
Goosefish	2,404	144		36	1
Grenadier, roundnose	42	15			
Haddock	1,424			*	
Hakes:					
Red	14,948	1,077	9,928	113	403
Silver	58,427	11,181	21,994	1,179	2,933
White	129			1	22
Herring, Atlantic	135,624	1,179	4,470	56	100
Mackerel, Atlantic	119,109	46,998	67,130	162	679
Menhaden, Atlantic	83		5	488	not available
Pollock	4,875	1		2	2
Pout, ocean	3				*
Redfish	1,429	57			*
Saury, Atlantic	490				
Scad, roûgh		1			
Sculpins	36	13			
Scup	292	62	308	1,738	2,843
Searobins	232	323	269	20	*
Sharks:					
Dogfish	11,206	5,095	1,833	101	1
Porbeagle		60			
Skates	2,951	259	6	32	
Tunas:					
Bluefin			295	4	1,141
Skipjack			11		2
Yellowfin			51		
Wolffishes	49	10		*	
Groundfish, unspecified	191	258	199		
Pelagic species, unspecified	966		357		
Other species, unspecified	11,278	1,819	1,590		
Invertebrates:					
Lobster, American	219			304	386
Scallop, sea	61,536			122	322
Shrimps	5	2			
Squids:					
Longfinned	5,492	787	6,362		
Shortfinned	3,326	1,084	1,208		
Unspecified	4,473	583	1 163	258	427

[1]Data from: McHugh, J.L. and A.D. Williams. 1976. Historical Statistics of the Fisheries of the New York Bight Area. New York Sea Grant Institute, NYS SGP-RS-76-013. 73 p. Catches and landings are in metric tons; *indicates less than half a metric ton.

For many of the species listed (with the exception of a few species with coastal or coastal oceanic classifications), the total foreign catches dwarf New York and New Jersey landings combined. The foreign catch of Atlantic herring is almost 1000 times greater than NY/NJ landings; the Atlantic mackerel foregin catch to domestic landing ratio is 275:1; for silver hake (whiting) the ratio is 23:1. The high levels of foreign activity in the Mid Atlantic Bight are shown by the number of foreign vessels (trawlers, process and support vessels) fishing for mackerel and squid during January 1975: Soviet Union 41, Poland 34, East Germany 10, Bulgaria 4, Spain 6, Japan 6, Italy 5 - a total of 106 vessels.[18] Thus, for certain species, there appears to be a large potential for domestic fleets to increase their landings if in fact the capability of the industry is enhanced to the point where the level of foreign fishing is reduced. The potential is measured better by the various quotas established in preliminary fishery management plans for selected species under P.L. 94-265.

The potential catch for selected species available to Long Island and other domestic fishermen is shown in Table 8 under the "1977 Total Allowable Catch Quota" column. Because the domestic fishing industry has not developed the capacity to fully utilize the available surpluses, foreign vessels will be allowed to fish by permit for the various species in designated areas until the quotas in the column "Total Allowable Level of Foreign Fishing" are reached. The designated areas for the hakes, Atlantic mackerel, Atlantic herring and the squids are shown in Figure 2. As can be seen in this figure, the south shore of Long Island has a geographical advantage in comparison with other areas for locating shore facilities supporting those fisheries offering the most

Table 8 Commercial Fishery Catch Quotas for Selected Species Established Under the Fishery Conservation and Management Act of 1976

	1977 Total Allowable Catch Quota[1]	Total Allowable Level of Foreign Fishing[2]	U.S. Commercial Catch Allocation
Butterfish	18,000	5,500	12,500
Red hake	44,000	34,900	9,100
Silver hake	120,000	85,500	34,500
Atlantic herring	33,000	22,000	11,000
Atlantic mackerel	75,000	69,000	6,000
Squid, longfinned	44,000	19,000	25,000
Squid, shortfinned	35,000	23,500	11,500

[1]Data supplied by Mr. William Gordon, Director, Northeast Region, National Marine Fisheries Service at the annual meeting of the L.I. Fishermen's Assoc., on 2/25/77 in Hampton Bays, N.Y. Total Allowable Catch (TAC) quotas established under the Fishery Conservation and Management Act of 1976 set limits on the commercial catch of certain species by both foreign and domestic fishermen. The TACs listed above represent the potential catch available to Long Island fishermen in the New York Bight region (the Atlantic Ocean north of Cape Hatteras within the 200 mile limit). The TAC for all species covered in 1977 is 550,000 metric tons; domestic fishermen have been allocated 228,000 metric tons and foreign fleets, 222,000 metric tons. Foreign nations are prohibited from taking Continental Shelf Resources, such as lobster, surf clam, ocean quahog and red crab.

[2]Total allowable level of foreign fishing figures represent the surplus available to foreign fishermen. Source: 50 CFR Chapter VI 611.20.

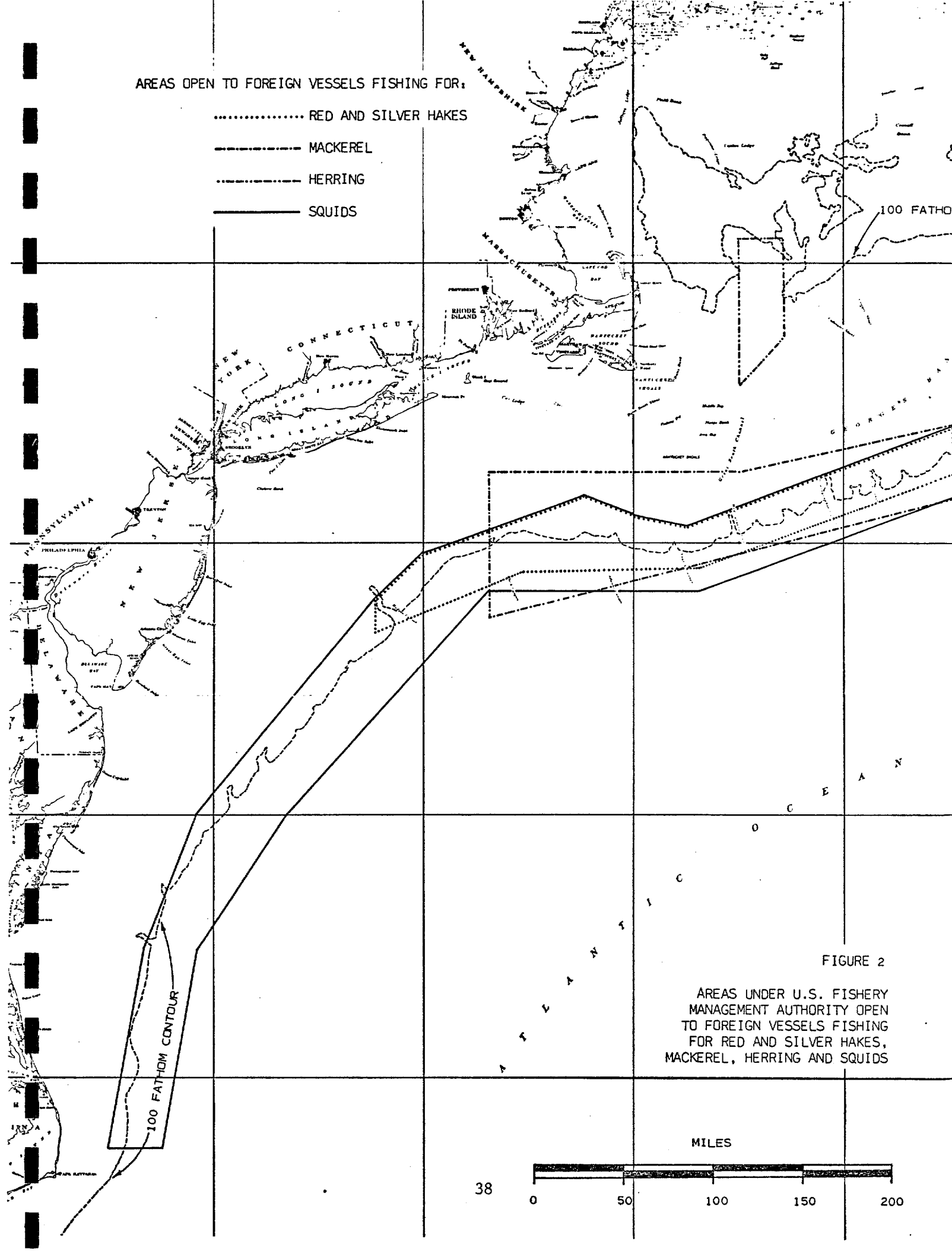


FIGURE 2

AREAS UNDER U.S. FISHERY MANAGEMENT AUTHORITY OPEN TO FOREIGN VESSELS FISHING FOR RED AND SILVER HAKES, MACKEREL, HERRING AND SQUIDS

potential as a result of extended jurisdiction. Long Island fleets could intercept these species - red hake, silver hake, Atlantic herring, Atlantic mackerel, longfinned squid, shortfinned squid - during their annual migrations.

The question arises, "Why haven't Nassau-Suffolk fishermen, or U.S. commercial fishing fleets in general, developed the capability to take advantage of these species in the past?" A partial answer to this question is that domestic fleets have concentrated their efforts on catching species which bring high per unit prices. Relatively small volumes of these species, e.g. lobster, can be handled, yet the economic returns are high. To take advantage of low cost, underutilized species (mackerel, herring, etc.), large volumes must be caught and handled. Larger vessels may be necessary to do this. Another factor is the traditionally low domestic demand for these species.[19] However, foreign demand may provide the incentive for domestic expansion. For example, if the technical problems associated with the processing of the squids can be addressed, and a high quality product can be assured, large markets in Spain could be supplied by exports from the U.S.

Management under extended jurisdiction may allow previously depleted stocks of yellowtail, haddock and cod to recover. If this occurs over a number of years, Nassau-Suffolk fishermen could benefit as there would be more of these traditionally caught fish to land.

Another area offering potential to the Nassau-Suffolk fishing industry is the diversification of fishing effort to increase the harvest of unutilized stocks of the following species: ocean quahog, blue mussel, red crab, jonah crab, rock crab, dogfish, ocean pout, goosefish, various skates, searobins, and American eel.[20] Adequate markets and processing facilities would have to be developed to meet this potential.

Fish processing research is currently being conducted on Long Island by the New York State Sea Grant Institute.[21] A pilot project investigating fish deboning apparatus and product development is underway at Amagansett. This apparatus separates fish flesh from bone and scale and the product - minced fish - can be marketed in a variety of forms. Species under consideration include the hakes, goosefish, searobins and sharks. This, as well as other research conducted by Sea Grant on such topics as the use of fish processing waste, and the extraction of industrial enzymes, nutrients and various proteins from process wastewater, could help Long Island develop the processing facilities required to take advantage of opportunities resulting from extended jurisdiction. Cooperative arrangements between fish processing interests and the Long Island duck processing industry, e.g. use of the duck processing and freezing plant in Eastport for fish processing, may also be possible. It should be pointed out that the economic benefits to Nassau and Suffolk Counties derived from commercial fishing could be increased substantially in the future if fish processing facilities are expanded on the Island. Most fishery products landed in Nassau-Suffolk ports are sold as fresh fish. The value added to fish in the processed form, plus additional jobs represent the benefits to be derived from an expansion of this activity.

2.5 Commercial Fishing Industry Land Use and Facility Problems

Background on current land use and facility problems affecting both the shallow and deepwater segments of Nassau-Suffolk's commercial fishing industry was obtained through meetings with New York State Sea Grant Advisory Service personnel, Long Island Fishermen's Association representatives, and baymen's organizations. In general, the principal problems of the deepwater segment involved adequate channel access and the

availability of pier/docking facilities. In many cases, commercial fishing vessels are being forced to leave dock facilities because of incompatibility with pleasure boating interests and price considerations. The problems most frequently mentioned by the shallow water segment included the lack of a sufficient number of boat ramps to insure access to coastal water and to avoid conflicts with recreational boaters and the general public, the inadequacy of catch transfer sites, and the burden imposed by zoning regulations that restrict shellfish processing operations and gear storage in residential areas.

Mr. Richard Miller, Executive Secretary, Long Isalnd Fishermen's Association provided a priority listing of the problems, as seen by the deepwater segment of the industry.[22] The major problems encountered at various Nassau-Suffolk harbors are listed below:

1. Shinnecock Inlet (Hampton Bays) - lack of adequate docking/product transfer facilities for both resident and transiet vessels at existing privately maintained fish packing operations; lack of adequate area for gear storage and repair; and dangerous navigation conditions at Shinnecock Inlet.
2. Greenport - lack of dock space due to competition from recreation oriented boating; shoaling at entrance to Sterling Basin.
3. Lake Montauk Harbor - lack of dock space for transient vessels; shoaling in vicinity of the two Town of Easthampton piers reserved for commercial fishing vessel use.
4. Mattituck Inlet - inadequate area for docking, packing and parking.
5. Fire Island Inlet/Great South Bay - ice conditions in Great South Bay during winter prevent vessels from unloading their catch at packing houses on Orowoc Creek; no formal arrangement exists between fishermen and the Long Island State Park Commission for use of the

Captree Charter Boat Basin for catch unloading and safe harbor during periods of heavy ice.

6. Port Jefferson Harbor - no dock space officially designated for use by charter boats or commercial fishing vessels in the Harbor; no special permits granted to charter boats or commercial fishing vessels that currently use Town of Brookhaven marina facilities.

7. Jones Inlet/Freeport Area - little room available at Woodcleft Canal for commercial fisheries expansion; no provision for additional fisheries facilities should the need arise.

These problems were evaluated and are addressed by the facility, land use and channel dredging recommendations contained in section 3.1.

Meetings were held with representatives of the N.Y.S. Dept. of Environmental Conservation, various town baymen associations, as well as other government and private groups interested in shellfish cultivation and management, to determine the land use and facility problems of the shallow water segment of the industry. (Water pollution and public health questions relating to shellfish are not in the scope of this report. See section 1.1.) The problems identified at these meetings[23] are listed below:

1. Blockage of public access through traditional right of ways to the waters of both Georgica Pond and Hog Creek in East Hampton.

2. Lack of access to waters in Town of Huntington. Restricted parking along shoreline roads in Town of Huntington.

3. Inadequate boat ramp facilities in Napeague Harbor, Suffolk County Peconic Dunes Park, and Town of Huntington.

4. Shortage of docking space for commercial shellfishermen in Greenport and Town of Huntington.

5. Difficulty encountered by self-employed shellfishermen in obtaining permits for the construction of upgraded scallop shucking facilities on residential property.

6. Town of Southold actions against individual fishermen who store commercial fishing gear on residential property.

7. Need for town recognition of the shoreline access problems faced by shellfishermen and shellfish buyers.

8. Need for evaluation of the present status and future potential of aquaculture as a marine industry in Nassau and Suffolk Counties.

9. Need for policy decisions by New York State, Suffolk County, and the various towns in Nassau and Suffolk Counties regarding the leasing of underwater lands for the purpose of aquaculture. Closely related to this problem is the resolution of the status of shellfish leasing activities and underwater land rights in the Peconic and Gardiners Bays.

Problems one through seven involve matters that are basically the purview of the local towns and villages in the Nassau-Suffolk region which exercise zoning and land use controls and also have authority to implement bay management programs. State or Suffolk County construction of access facilities, such as boat ramps and/or docks that are designed to address the problems of the shellfishermen might very well conflict with shellfish programs at the local level, because such facilities could not be restricted on the basis of local residency requirements.

Problems eight and nine involve state, county and local governments. Heated public debate surrounds the issue of leasing public bay bottom to private interests for the purposes of either shellfish or finfish propagation. Public land shellfish harvesters and finfishermen fear the restriction of access to fishing grounds associated with a leasing program. Private firms wishing to extend or retain lease holdings point out the advantages of controlled harvesting activities on leased grounds, in helping to maintain market prices and in facilitating the conduct of pilot projects to determine the potential of aquaculture as a means of increasing food production from the sea. The issue is rather clear-cut concerning the future of Long Island's oyster industry since without a leasing

program, the oyster industry would probably collapse. At present the industry relies on the transplant of seed oysters from Connecticut waters or from hatcheries to company owned or leased growing grounds in Long Island waters. The issue is more clouded regarding the hard clam industry. Information is needed to evaluate the relative rates of hard clam production from leased vs. public bay bottom. The benefits of both approaches to hard clam production - harvesting from public land and harvesting from leased grounds - should be determined. Also, investigations on the potential of other types of aquaculture in Nassau-Suffolk waters appear necessary to provide information needed for rational decisionmaking.

Shellfish leasing activities in the Gardiners and Peconic Bays are the purview of Suffolk County. Chapter 990 of the Laws of New York State entitled, "An Act to Cede Lands Under Water of Gardiners and Peconic Bays to Suffolk County, and in Relation to the Management of Such Lands for the Cultivation of Shellfish," and approved in 1969, ceded underwater lands in these bays to Suffolk County for the purpose of shellfish cultivation. Titles granted under previous laws for oyster cultivation were confirmed. The law also requires preparation of an accurate survey map by the County showing the location of, among other things, proposed plots for leasing. The County is empowered to lease lands for the purpose of shellfish cultivation which are located more than 1000 feet from the high water mark and do not include areas "where bay scallops are produced regularly and harvested on a commercial basis." Additional laws and prior statutes protecting natural shellfish grounds found in the bays may also apply. The County is also directed to adopt regulations governing the leasing process and the use of lands not leased. Chapter

990 provides that 75% of the lease fees collected by the County are to be returned to the towns within which the leased lands are located. To date the provisions of this law have not been carried out. No funds have been appropriated for the required survey work. Section 3.2 contains the recommendations covering the leasing question and the other problems associated with the shallow water segment of the industry.

3.0 Commercial Fishing Industry Facility, Land Use and Dredging Recommendations

The facility, land use, and dredging recommendations for the Nassau-Suffolk commercial fishing industry are described in this section. Two sets of recommendations are made; one for the deepwater segment of the industry and the other, for the shallow water segment.

3.1 Deepwater Segment Plan Recommendations

3.1.1 Dock and Pier Facilities at Shinnecock Inlet/Bay

The highest priority need of the deepwater segment of the industry is the provision of additional dock and pier facilities for commercial fishing vessels in the Shinnecock Inlet/Bay region. These facilities are needed to meet present demands. However, additional facilities capable of servicing vessels larger (length, beam, draft) than those characteristic of the Nassau-Suffolk fleet may be necessary at Shinnecock Inlet/Bay in order for Long Island to take advantage of opportunities arising from extended U.S. fisheries jurisdiction.

There are three alternative options for facility construction and operation:

1. Private construction and operation of facilities on privately owned waterfront land.

2. Suffolk County lease of County owned waterfront land to the private sector or a fishermen's organization, which would provide capital for facility construction and would operate the facility.

3. Suffolk County capital project funding for facility construction on County owned waterfront land; Suffolk County lease of pier facilities to individual fishermen with the County responsible for operation, or Suffolk County lease of pier facilities to a fishermen's organization or the private sector, which would be responsible for operation.

It is recommended that a solution to commercial fishing vessel facility problems at Shinnecock Inlet/Bay be implemented utilizing one or a combination of the options listed above. Private and/or public projects providing needed dock/pier space at Shinnecock Inlet/Bay should be implemented as soon as possible. (Public works of this nature usually take on the average four to five years to complete.)

Option number one is constrained by the location and use of privately owned waterfront land in the Shinnecock Inlet/Bay region. This option, however, may minimize public expenditures, while maximizing private investment opportunities. A site on Shinnecock Bay near Shinnecock Canal has been proposed for the location of new, privately financed dock and pier facilities for commercial fishing vessels. Conclusions as to the suitability of this site and of the developer's plans and intentions must await the preparation of an engineering analysis of channel dredging requirements and consequent costs to the public if public dredging projects are involved, as well as the formal review evaluations made by local government. This private project has potential for meeting the current need for vessel dock and pier facilities; however, its location in relatively shallow waters may necessitate the future provision of additional dock and pier facilities for larger vessels seeking offshore species (hakes, Atlantic mackerel, Atlantic herring, and squids) at a second location.

Options two and three above involve public subsidy. This subsidy is limited to the use of public land in option two, while it includes

the use of public lands and public funding of facility construction in option three. These options allow flexibility in site selection for a dock and pier facility that meets current and long-term vessel facility needs. The public sibsidy for the financing of construction can be recouped over time through user fees. The public options can also be structured to guarantee the existence of commercial fishing vessel docks and piers in the Shinnecock Inlet/Bay region in the long-term future. The details of a proposed public commercial fishing facility at Shinnecock Inlet are given below.

The best site for a public commercial fishery facility in the Shinnecock Inlet/Bay region is on a three acre site owned by the County of Suffolk and held for general purpose use. The land is located on the north side of Dune Road on the barrier beach just to the west of Shinnecock Inlet. The facility should be constructed in two phases. Phase One would involve the construction of a "T" pier 165 ft. long, and 12 ft. wide with a 65 ft. "T" capable of accommodating 20 fishing vessels; a 300 ft. bulkhead; and a 60 car parking lot. The parking lot and bulkhead would be constructed to accommodate heavy truck access adjacent to the bulkhead. The dock facility would accommodate access to docked vessels by light truck only. Phase Two would include the construction of a second "T" pier with the same dimensions as those stated in Phase One, and the addition of a fish packing shed. Phase Two would proceed only after the need for docking facilities in excess of those provided in Phase One is documented. The packing shed would be constructed if there is a need for such a facility in the Shinnecock Inlet/Bay area. In essence, Phase One of the project deals with existing access docking problems for the commercial fishermen at Shinnecock. At the present time roughly 3 million pounds of fish with an estimated dockside value of $800,000 are landed each year at Shinnecock. Added to this are lobster and sea scallop

landings each year with an estimated value of $200,000. Using a multiplier of 2.5, the impact of present Shinnecock operations on the local economy is $2.5 million/year.

Implementation of Phase One will assure that the benefits of commercial fishing at Shinnecock are not constrained in the future by land use decisions that in effect exclude the fishermen from this area. Phase Two of the project is geared toward meeting potential commercial fishing industry facility needs resulting from extended U.S. jurisdiction, as well as providing fishermen from other Long Island harbors with an alternative home port location. It is not prudent to provide municipal docking facilities for all commercial fishing vessels in various Nassau and Suffolk ports. The Shinnecock Inlet facility may serve as an alternative for those vessels displaced from other areas because of future market decisions involving the use of shorefront land.

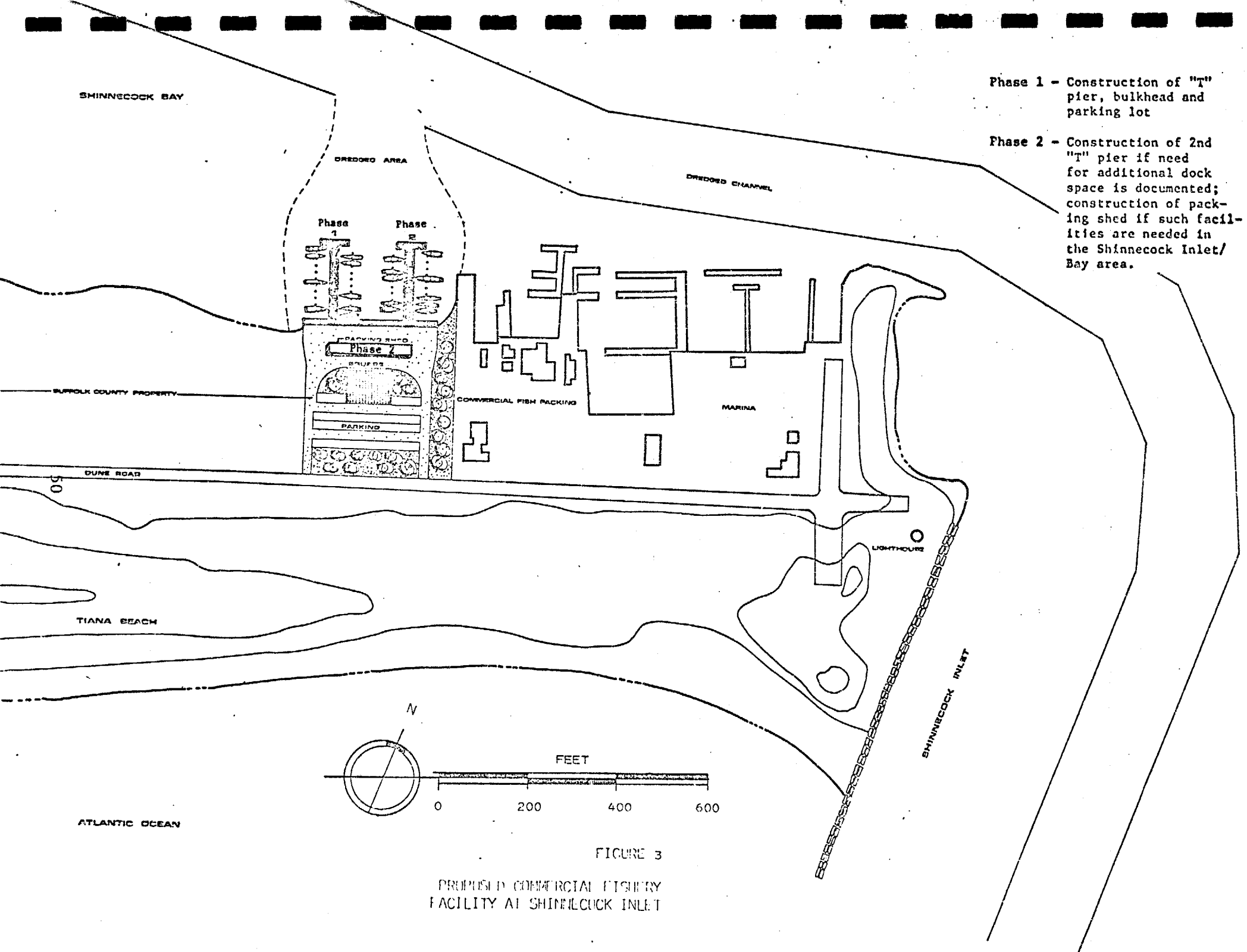
Shinnecock offers many advantages as the site for such a commercial fishing facility. Shinnecock is closer to the prime fishing grounds off the south shore of Long Island in water 30 to 100 fathoms deep than New York City, other Long Island ports, and ports in Rhode Island. Vessels stationed at Shinnecock are also close to those fishing grounds offering potential under extended jurisdiction (See Figure 2.). Vessels have year-round access to offshore fishing grounds since tidal currents at Shinnecock Inlet prevent severe icing conditions.

There are other advantages to local fishermen should Phase One be implemented. Additional docking facilities will permit more efficient catch unloading, fueling, etc. at the existing facilities (C&N Fisheries, Joe's Lobsters). It has been projected that with these constraints eliminated, commercial vessel use of Shinnecock could double.[24] Grouping the vessels at a single facility would enhance security for both vessels

and gear. Also, Phase One facilities may provide an incentive for the creation of a fishermen's cooperative. It should be noted that the rehabilitation of piers at Point Judith, R.I. was a major factor in renewing interest in Rhode Island's offshore fishing industry and in the creation of the Point Judith Fishermens Cooperative Association, Inc. in 1947 with a charter membership of 65 people operating 20 vessels.[25] Fisheries related educational programs at the University of Rhode Island were also a factor in this renewed interest.

A plan view of the proposed Shinnecock facility is shown in Figure 3. This site was chosen over other alternative sites further to the west because of dredging and wetlands considerations. Review of New York State Dept. of Environmental Conservation tidal wetlands maps indicated that wetlands destruction would be minimized if the facility were built adjacent to existing privately owned commercial development near Shinnecock Inlet. Use of sites further to the west and near the Ponquogue Bridge would involve the destruction of larger areas of intertidal marsh. Only a small amount of high marsh would be sacrificed at the proposed site. Deep water is also closer to shore at the proposed site; this minimizes the littoral zone dredging associated with creation of the access channel and boat basin. The main channel shown in Figure 3 is a modified version of the channel described in the U.S. Army Corps of Engineers Shinnecock Inlet Navigation project. Plan recommendations concerning this project and other navigation channels are described later in this section.

Shore real estate values and pier construction costs are so high that the commercial fishing industry cannot provide the front-end costs of financing the proposed facility. The key to the entire project is



Phase 1 - Construction of "T" pier, bulkhead and parking lot

Phase 2 - Construction of 2nd "T" pier if need for additional dock space is documented; construction of packing shed if such facilities are needed in the Shinnecock Inlet/Bay area.

FIGURE 3

PROPOSED COMMERCIAL FISHERY FACILITY AT SHINNECOCK INLET

the willingness of the County of Suffolk to commit the land at the site for commercial fisheries facility development. This land was acquired for general purpose use; it is not a parks acquisition, although it is under stewardship of the Suffolk County Dept. of Parks, Recreation and Conservation. Commercial fishermen have expressed their willingness to pay user fees required to make the operation self-sustaining. Estimated costs for completing Phase One development are shown below:

1.	Land acquisition (about 2 acres)	- none
2.	"T" pier	- $100,000
3.	Bulkhead	- $100,000
4.	Parking lot	- $ 20,000
	Total	$220,000

Annual maintenance costs are estimated to be 2% of construction costs ($4,400) beginning the 10th year after construction. The life expectancy of the pier facility is 40 years. The initial dredging and maintenance of the access channel from the facility to deep water has not been included in this cost analysis. It is assumed that required dredging would be performed by the Suffolk County Department of Public Works as part of its waterway maintenance program.

Funding for Phase One of the project could come from either a State or County public works bond issue. Using an interest rate of 7% over 40 years, the total construction cost would be $656,231 ($220,000 - principal plus $436,231 - interest). If the pier facilities are leased to 20 individual fishermen, and maintenance charges are taken into account, the monthly fee that would have to be collected from each fisherman to amortize all costs would be $86. This cost could be reduced

considerably if low interest loans or grants for project construction are obtained.

The U. S. Department of Commerce, Economic Development Administration does provide financial assistance for construction projects to areas designated on the basis of certain economic criteria. Suffolk County is eligible for this assistance, and piers are acceptable projects. Applications for assistance would have to be made through the appropriate New York State EDA representative; the applications are processed at the regional EDA office in Philadelphia. Another potential source of funds is the program authorized by the Commercial Fisheries Research and Development Act of 1964, P.L. 88 - 309, as amended. This act gives the National Marine Fisheries Service the authority to provide funds for projects designed for research and development of commercial fisheries resources of the nation. Other projects relating to fisheries can also be considered.

The option selected for operation of the facility should be based on the concept of maximizing the benefits of the facility for the largest number of people possible. Therefore, if the private sector is responsible for operation of the facility, covenants must be in place that will protect the right of the fishermen to market their catch in the manner they see fit. Dock leases should not be tied to marketing arrangements which restrict the economic independence of the fishermen.

3.1.2 Land Use

Shoreline sites are required for the support of the deepwater segment of the commercial fishing industry. Recommendations are made for the reservation of selected parcels of land in Nassau and Suffolk Counties for marine commercial use in anticipation of future industry needs. All

of the parcels are located on the waterfront and therefore are ideally suited for docking and product transfer activities. Sites were selected on the basis of available land, access to deep water and existing use. There are three options available for reserving the selected sites:

a. use of local zoning powers and the recommendation that sites be placed in a marine commercial zone;

b. public acquisition and land banking; and

c. policy committment for marine commercial use of those sites that are now publicly owned.

The land use recommendations are described below:

1. Village of Greenport - two sites in the Village of Greenport, shown in Figure 4, should be reserved for marine commercial use. One site, which is presently zoned waterfront commercial is located near the mouth of Stirling Basin; the other site, presently zoned one and two family residential, is located adjacent to 4th Street.

2. Village of Port Jefferson - Figure 5 shows the one site located in the Village of Port Jefferson that is recommended for marine commercial use. This site is located on Beach Street and is the site of oil terminal operations that are being phased out. It is recommended that this site be used for the construction of a docking facility that would accommodate the existing commercial vessels utilizing the recreation facilities at the head ofthe Harbor. This facility could be used not only by commercial fishing vessels, but also by charter boats, open boats, and research vessels. Such use would be compatible with present zoning (marina waterfront district).

3. Town of Hempstead - The four sites shown in Figure 6 are recommended for marine commercial use in Nassau County. It is recommended that the site located ajacent and east of the Long Island Sea Clam Co. and Brown Bros. Lobster Co. at Pt. Lookout, which is

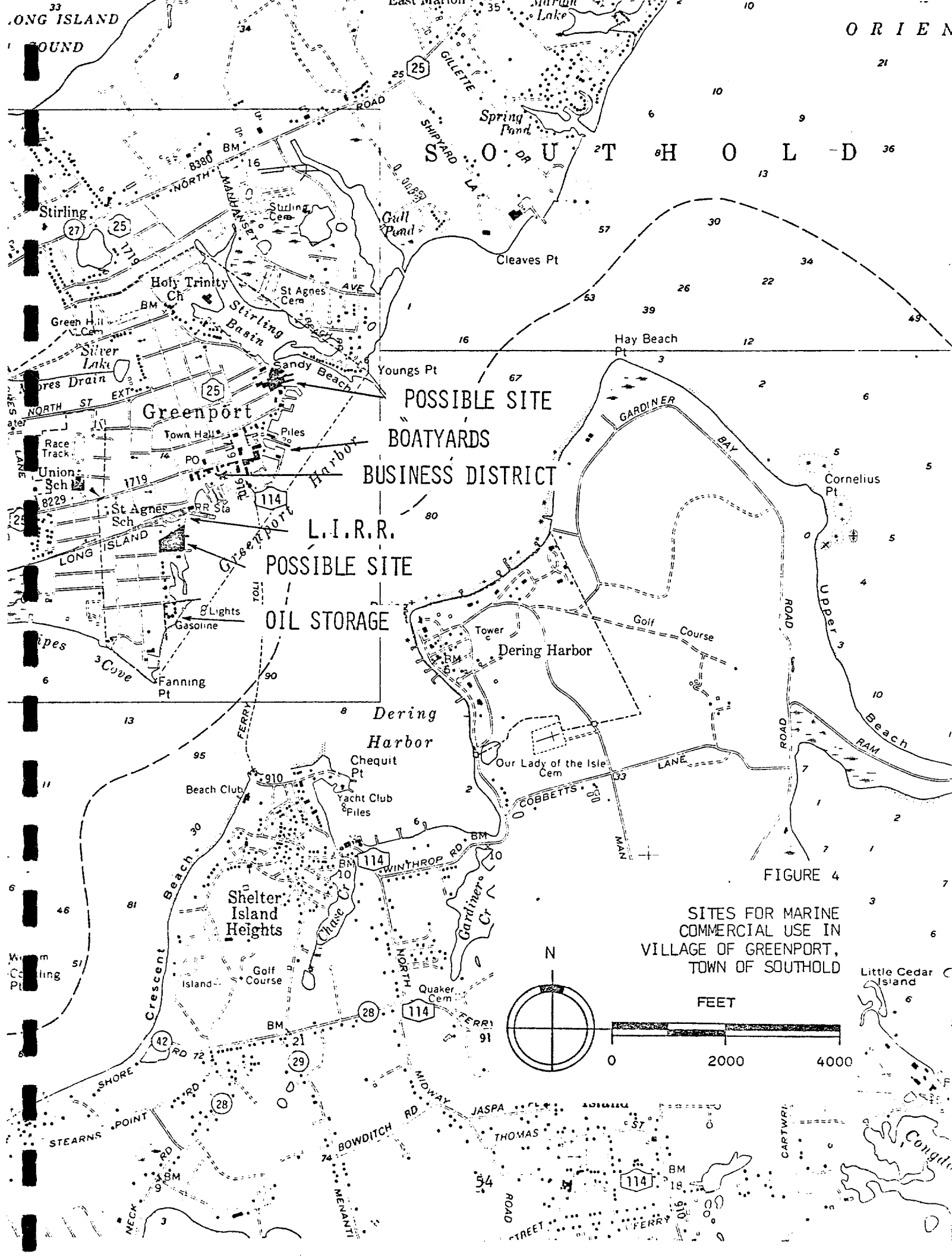
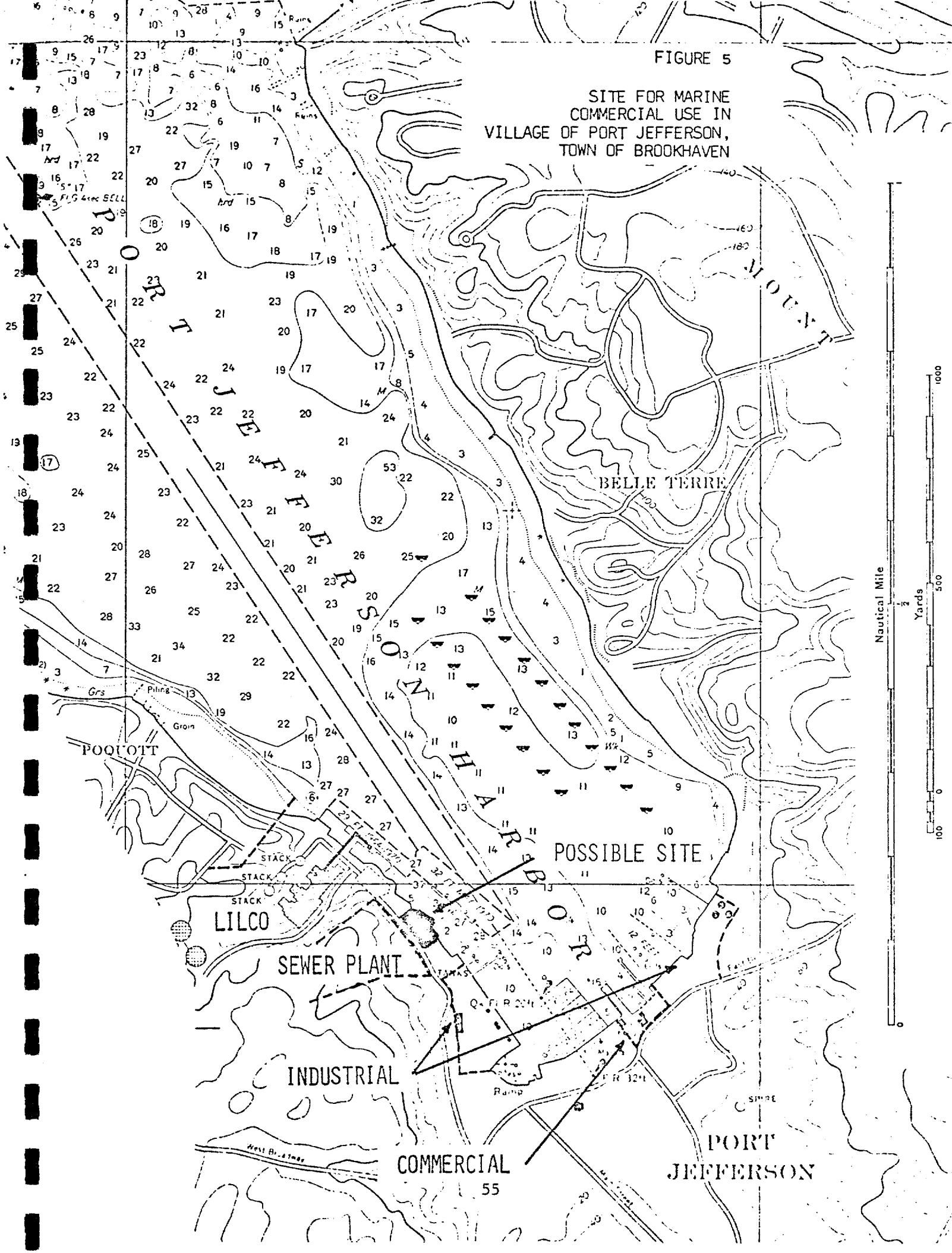


FIGURE 4

SITES FOR MARINE COMMERCIAL USE IN VILLAGE OF GREENPORT, TOWN OF SOUTHOLD

FIGURE 5

SITE FOR MARINE COMMERCIAL USE IN VILLAGE OF PORT JEFFERSON, TOWN OF BROOKHAVEN



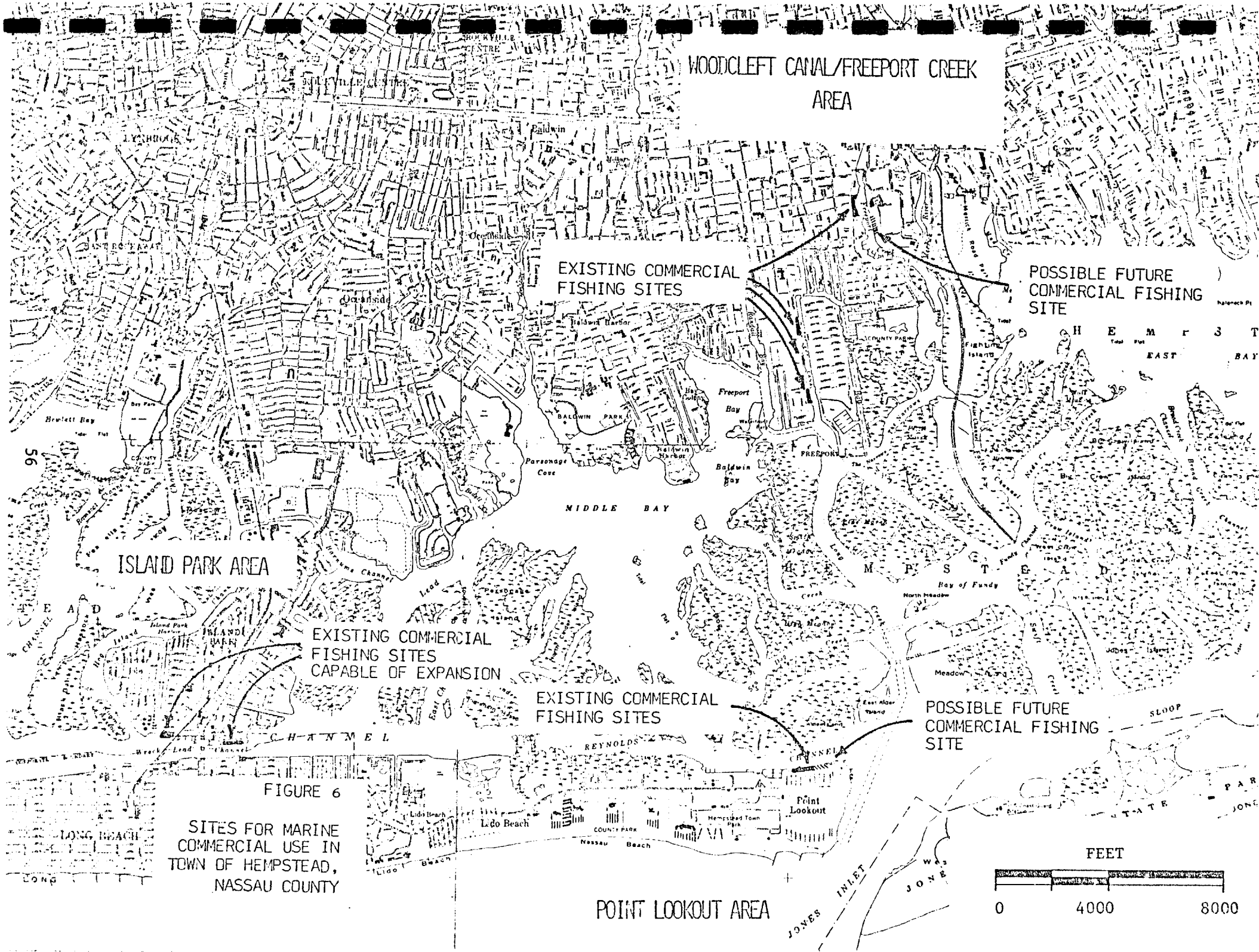


FIGURE 6

SITES FOR MARINE COMMERCIAL USE IN TOWN OF HEMPSTEAD, NASSAU COUNTY

currently zoned residential, be reserved for commercial fishery related use. This site has excellent access to deep water through Jones Inlet; it is currently used for commercial and marina uses. No space is available for expansion of commercial fishery uses at Woodcleft Canal. However, another site in the Village of Freeport - a parcel owned by the Town of Hempstead on the east side of Freeport Creek - offers opportunity for commercial fishery expansion in the future. Two sites located in the Island Park area, which are now used for commercial fishery purposes, offer opportunity for the location of additional facilities. The commercially zoned site to the west of Austin Blvd. in the Village of Island Park is utilized by the Pan American Dynamic Corp., which has converted two abandoned oil tanks into cold storage facilities. The Jordon Lobster Co. uses the industrially zoned site located east of Austin Blvd. Vacant land is available here for future commercial fishery development. Both sites have deepwater access on Reynolds Channel.

This plan encourages the expansion of fish processing facilities in Nassau and Suffolk Counties that provide for maximum product utilization and recovery. Although processing plants could be established or expanded at the sites described above, it is not necessary that such plants be located at the shore; they can easily be accommodated on inland industrially zoned property with good transportation access. Maximum utilization implies a diverse product line, such as human food, pet food, fish meal and fertilizer. Product recovery at each processing stage minimizes waste disposal problems.

3.1.3 Channel Dredging

The Nassau-Suffolk Regional Planning Board's dredging subplan addresses channel navigation requirements for all Nassau-Suffolk water-

ways in detail. Portions of that subplan that relate to waterways utilized by most of the deep draft vessels associated with offshore fishing are included as recommendations in this report. Project descriptions follow:

1. Shinnecock Inlet. The authorized Corps of Engineers navigation project for Shinnecock Inlet should be amended by increasing the depth in that portion of the channel adjacent to the proposed Shinnecock Inlet fishery facility, as well as in the Inlet proper to a depth of at least 15 ft. mlw. The design of this channel should consider how flow between the ocean and Shinnecock Bay should be channelled in order to reduce potential adverse impacts on shellfish caused by changes in bay salinity. Studies are also required on the impact of channel dredging on: 1. normal and storm tidal ranges within the bay; 2. wetlands, and 3. aquifer saltwater intrusion. A system of sand bypassing at the Inlet should also be implemented to insure viability of channel access. Specific attention should be paid to the removal of dangerous shoals at the entrance to the Inlet in the Atlantic Ocean.
2. Lake Montauk Harbor. The Corps of Engineers navigation project for Lake Montauk Harbor should be amended by increasing channel depth to 15 ft. mlw. Local interests should maintain adequate depths at existing commercial pier facilities. These facilities should be expanded, pending the favorable outcome of an environmental impact assessment, to provide adequate shoreline access for the transient vessels utilizing Lake Montauk Harbor on a regular basis.
3. Greenport. The Corps of Engineers navigation project for Greenport and the Stirling Basin area should be maintained at authorized project dimensions. The shoaling prolbems at the entrance to Stirling

Basin require additional attention by the Suffolk County Department of Public Works (SCDPW). SCDPW should maintain the entrance to a depth of 12 ft. mlw. Should the site adjacent to Stirling Basin identified on Figure 4 be utilized for additional commercial fishery activities, the SCDPW project should be expanded to provide adequate access to this site.

4. Mattituck Inlet. The Corps of Engineers navigation project for Mattituck Inlet should be maintained at authorized dimensions.

5. Fire Island Inlet. The Corps of Engineers Fire Island Inlet navigation project should be maintained at authorized dimensions. Should a 12 ft. draft in this Inlet be required in the future, the Corps of Engineers should conduct a study to determine how changing Inlet configuration would impact tidal ranges, wetlands, salinity levels, and shellfish populations in Great South Bay. If adverse impacts appear likely, the concept of deepening the channel should be abandoned. (Note: The Suffolk County Dept. of Environmental Control has submitted a proposal to the U.S. Environmental Protection Agency for a study to determine the probable impacts of sewering in the Southwest Sewer District No. 3 on salinity levels in Great South Bay.)

6. Jones Inlet. The Corps of Engineers navigation project for Jones Inlet should be maintained at authorized dimensions. Channels servicing Woodcleft Canal and Freeport Creek should be maintained with depths of 12 ft. mlw. Reynolds Channel should also be maintained to a depth of 12 ft. mlw.

It may be necessary to re-evaluate these channel dredging recommendations in the future if Long Island fishermen utilize deeper draft vessels that can't be accommodated in the channels with dimensions

specified as above. The use of vessels with deeper drafts than those currently associated with the Nassau-Suffolk fleet may be necessary to take advantage of the opportunities of extended U.S. fishery jurisdiction and fish processing on Long Island.

3.2 Shallow Water Segment Plan Recommendations

The most pressing problems faced by the shallow water segment of the industry are those related to the management of shellfish resources, and the availability of these resources in light of pollution and public health considerations. General management/research recommendations are made in section 7.0. This section contains the recommendations addressing the land use/facility problems of the shallow water segment. The recommendations are different from those contained in section 3.1, mainly because onshore facilities supporting the shallow water segment are not concentrated at a few major ports, as is the case with the deepwater segment. Also, the shallow water shellfisheries do not have deepwater access problems. The recommendations are as follows:

1. The Towns of Huntington, Brookhaven, Southold, Shelter Island, East Hampton, Southampton, Islip, Babylon and Oyster Bay should prepare and implement shoreline access plans supporting the commercial shellfishing activities of their respective baymen. These access plans, prepared with the advice of baymen's associations, shellfish commissions, and state, county and town environmental organizations should provide adequate boat ramps and year round parking space for commercial shellfihermen and other means of physical access to the water. Product transfer sites at appropriate locations within each township, including the use of sites within facilities reserved for recreational use, should be identified and established. The Towns of Islip,

Babylon and Brookhaven have designated or are in the process of designating such sites.

2. The towns mentioned above should investigate options for the storage of commercial fishing gear, including boats, trailers, nets, traps, etc. These options include the granting of variances in order to permit individual storage on residential property, individual storage on industrial or commercial property, cooperative storage on industrial or commercial property, and cooperative storage in town owned facilities. In those towns where land use problems relating to the establishment of shellfish processing facilities are apparent, options for utilizing a centralized process facility on a cooperative basis should be investigated. Solution to the gear storage and shellfish processing problems may require zoning code amendments.

3. New York State, Suffolk County and the towns in Nassau and Suffolk Counties should adopt policies on aquaculture and related activities in Long Island marine, fresh and brackish waters. These policies should be based on an analysis of the potential of aquaculture as an aquatic based industry in Nassau and Suffolk Counties, and the social and economic costs and benefits of implementing alternative management strategies. Some of the information supporting this analysis is not readily available to decisionmakers.

The culture of oysters on Long Island bay bottoms controlled by private interests has been very successful, and this activity supports an important local industry. The artificial or controlled propagation of other marine species should be the subject of additional research.[27] This research should identify the phys-

ical, chemical, and biological marine environments suitable for various types of aquaculture. Other questions that should be addressed include

1. What opportunities exist for the artificial or controlled propagation of shellfish, finfish, marine plants, and other species in Nassau-Suffolk marine waters?; 2. How does shellfish (oyster, hard clam) production on leased ground compare with natural shellfish production on public underwater lands?; 3. Is there a demand for additional leased underwater acreage for aquaculture purposes in the Nassau-Suffolk marine environment?; 4. What are the costs to the public (both in terms of monetary cost, e.g., restricted access of commercial fishermen and aquaculturists to work specific areas, and non-monetary cost to other traditional users) attributable to the implemention of a leasing program?; and 5. What are the benefits in terms of jobs, income, and food production that are expected to accrue to the region should an aquacultural program be encouraged and broadened?

Since definitive information on these matters is not readily available, this plan recommends that the appropriate authorities reserve the option of allocating a portion of their respective marine areas for oyster culture and the conduct of other aquaculture projects under public and private management. Potentially productive marine areas should be reserved and maintained for sole use by the two groups - the general public and aquaculturists.

4. Suffolk County should implement that portion of Chapter 990 of the Laws of New York State pertaining to the preparation of a

survey map showing titles to underwater lands in the Peconic and Gardiners Bays. The principal benefits of survey, title search, and mapping would be the identification of underwater tracts covered under previous grants, and the identification of underwater lands open to full public access.

4.0 Long Island Recreational Fishing Activity

This section describes recreational fishing activity on Long Island in terms of where, when and how anglers catch various target species. The impact of this activity on the Nassau-Suffolk recreation/tourism industry is estimated and the land use and shoreline access problems of angler concern are identified. Again, as is the case with Nassau-Suffolk's commercial fishing industry, published information on recreational fishing activity (finfishing, crabbing, clamming) and its impacts on Long Island is scanty, partly due to the fact that a data base reflecting recreational use of living marine resources does not exist. The following discussion relies heavily on reports published/prepared by the New York State Dept of Environmental Conservation, National Marine Fisheries Service, New York State Sea Grant Institute, Marine Sciences Research Center researchers, and Mr. Nicholas Karas, a noted sportswriter.

4.1 Recreational Fishing Activity by Mode

Recreational fishing activity can be divided into surf fishing; fishing from piers, bulkheads, floats and jetties; bank fishing; and boat fishing. Boat fishing can be further subdivided into fishing from private craft that range in size from small runabouts to large sportsfisherman; from charter and party boats; and from boats rented from livery operations. The angler's choice of mode depends on the degree of his commitment to sportfishing, disposable income, investment in fishing

equipment, and the target species and character of the waters fished.

SURF FISHING-Fishing the surf is a very popular form of angling even though it is the least productive in terms of fish caught. Most of Long Island's surf fishing is done along the South Shore and the Forks. Montauk is one of the most popular surf fishing areas, not only on Long Island, but on the East Coast, equalled only by Cape Cod and Cape Hatteras. Almost all of the beaches on the south side of Montauk Point are open to fishermen; however because progress over sand is difficult on foot, especially for a sportsman loaded down with gear, vehicles equipped for beach travel have come into vogue. Today vehicular accessibility generally determines where the angler can fish. The use of beach vehicles is controlled at Montauk as well as other surf fishing areas by permit systems and regulations imposed by federal, state and town governments.

Surf fishing activity peaks in the spring and fall, when migrating striped bass, bluefish and weakfish pass close to shore. Surf fishing occurs all along the south shore; popular "hotspots" include all of Montauk Point, both sides of Shinnecock Inlet, Moriches Inlet, Fire Island Inlet and Jones Inlet. There is also a large amount of surf fishing activity along the north shore, but it is dispersed over a large area because there are no major points of concentration such as those at the south shore inlets. Fishing the north shore is more difficult because of the lack of access roads; beach travel is limited by numerous small bays and inlets, and glacial erratics - boulders left by retreating glaciers. On the north shore, fishing activity is usually concentrated at prominent points of land that jut into Long Island Sound. From west to east they include Matinicock; Centre Island; Lloyd Neck;

Eatons Neck; Crane Neck; Old Field; Mt. Sinai; Herod, Roanoke, Duck Pond, Horton, Rocky, Terry, Mulford, and Orient Points; and a large number of unnamed lesser points.

PIER, BULKHEAD, FLOAT AND JETTY FISHING - Unlike New Jersey and states to the south, Long Island does not have a plethora of ocean piers designed strictly for fishing. Heavily used piers are, however, found at Jones Beach, Captree, and Robert Moses State Parks and at Reynolds Channel. As a substitute, anglers here concentrate at the numerous rock jetties and groins used to stabilize inlets and beaches in Nassau and Suffolk Counties. Jetties at Jones, Fire Island, Moriches and Shinnecock Inlets, and at the entrances to Montauk, Greenport, Three Mile, Mattituck, Mt. Sinai, and Port Jefferson harbors provide good fishing opportunities. Large numbers of anglers congregate at bulkheads, floats, and marinas in Long Island's bays and harbors. Crabbing and seasonal fishing for bay species are very popular activities at these locations.

BANK FISHING - Bank fishing, similar to that on a freshwater river, occurs in the deeper portions of Shinnecock, Moriches and Great South Bays where there is deep water adjacent to shore, and where tidal currents are strong. The State boat channel, between Atlantic Beach and Captree State Park is a popular bank fishing area. Deepwater channels in relatively shallow bays not only allow safe boat passage, but their deeper waters attract and hold such species as weakfish, striped bass, fluke and flounder for the bank fisherman. The Shinnecock Canal is another popular bank fishing site. This canal has changed fish migration patterns on eastern Long Island, and large numbers of weakfish, porgies and flounder that once migrated to Peconic Bay by passing around Montauk

Point now are "locked-through" via the Shinnecock Canal. Anglers quickly became aware of this phenomenon when the canal was opened in the 1890's. Each spring it is now one of the first and best places to catch flounder and weakfish.

PRIVATE BOAT FISHING - In 1975, roughly 90,000 motorboats were registered in Nassau and Suffolk Counties (this figure does not include sailboats and other boats without engines). Nassau-Suffolk marine waters are among the most heavily used by recreational boaters in the world. Boat docking and mooring facilities are at a premium. As a result, more and more boaters, especially those with small or mid-range craft, use trailers and boat ramps for water access. Boat ramp bottlenecks have become an obstacle to expanded boating and fishing activity.

The choice of areas used for boat fishing activity is determined by the location of both home port and areas of fish concentration. Boat fishing activity in small craft, 12 to 18 ft. and mid-range craft, 18 to 32 ft. is restricted to relatively calm waters in bays, estuaries and nearshore coastal waters. Most large craft are designed for deep water offshore fishing but they also frequent nearshore coastal waters where tidal and wave conditions are hazardous, e.g., at Plum Gut, Montauk Point and the south shore inlets. Boat fishermen concentrate at these areas because they are conducive to holding fish. On summer weekends, conditions are so crowded as to hinder serious fishing.

CHARTER BOAT, PARTY BOAT AND LIVERY FISHING - Charter boats are large boats hired for the day, usually by appointment, and accommodate from one to six fishermen. Party boats and head boats are also large boats that any angler with the price of a ticket may board on a first come-first served basis. These craft will accommodate anywhere from half-

a-dozen to 50 and 60 anglers. Charter boats often fish offshore or troll for striped bass and bluefish, but also fish the bays for bottom fish. Party or head boats fish the bottom where up-and-down fishing is possible. The species sought include bluefish, blackfish, porgies, fluke, flounder, cod, mackerel, black sea bass and weakfish.

Because of their size, large charter and party boats cannot fish the same waters as smaller craft. However, party boats do fish inside the south shore inlets, in Great South Bay and at Hecksher State Park. Other areas of concentration include Plum Gut, the Race and the Pollack Rip off Montauk, and near Jessup Neck in the Peconics. Table 9 shows the number of charter and party boats located at various harbors in the Long Island region. Montauk, Greenport, Captree, Freeport and Sheepshead Bay are the primary centers of charter/party boat activity. Party boat fishing activity along Nassau County's north shore occurs between Hempstead Harbor and Centre Island; these boats are based at City Island and College Pt.

Rowboat liveries accommodate the occasional or transient angler who wishes to fish in the protected bays, channels and harbors. Most are associated with bait and tackle shops, otherwise called fishing stations.

Boat fishing activity on Long Island, though intense, can still be expanded. The waters of Long Island Sound from Port Jefferson east to Orient Point offer potential for increased boat fishing activity. Bays and harbors on the south shore are heavily used by boat fishermen. Fishing activity along the south shore is extending to deeper water areas offshore, necessitating a larger investment in boats and related equipment.

An additional mode of sportfishing not previously mentioned is that

Table 9 Charter and Party Boat Activity in the Long Island Region[1]

Harbor/Port	Number of Party Boats	Number of Charter Boats
Montauk	13	56
Captree	22	16
E. Moriches	-	1
Oakdale	-	2
Sayville	-	2
Babylon	-	8
East Islip	-	1
Hampton Bays	2	12
Amityville	-	1
Mattituck	-	1
Greenport	2	9
Lindenhurst	3	6
Huntington	1	1
Sag Harbor	-	1
Port Jefferson	2	2
Freeport	10	18
Island Park	1	-
Sheepshead	45	8
Howard Beach	-	2
Tamaqua	3	15
Manhattan	1	-

[1]Source: Mr. Peter Sanko, Sea Grant Advisory Service, Stony Brook, N.Y. Table is based on May 1975 secondary and primary field data as updated by Mr. P. T. Briggs, New York State DEC, Stony Brook, N.Y.

of underwater spear fishing by SCUBA divers. SCUBA divers also take lobsters on a recreational basis in Long Island Sound, the south shore inlets, and at artificial reefs. A closely related activity of SCUBA enthusiasts is underwater photography.

4.2 Recreational Fishing Activity - By Target Species, Location and Season

The Long Island marine environment offers a wide variety of fish and shellfish to the recreational angler. The area is considered one of the best fishing areas in the world, not only because the quality of the fishing is high (and fishing opportunities exist at all times of the year), but also because it is accessible to many millions of people.[28] Table 1 shows the variety of fish and shellfish that are sought on a "sportfish" basis in New York and adjoining marine waters. (See use classification in column 6.) Of particular interest to this study are the species which frequent or inhabit the relatively shallow, near-shore waters. These are the species offering recreational opportunities to the largest number of people. This interaction of fish and people also results in resource management problems in the coastal zone. Descriptions of the availability of the major species follow.[29]

BLACKFISH - Blackfish are found on rock, gravel or sand bottom and around shellfish beds, wrecks, jetties, breakwaters and pilings, and are the major species attracted to artificial reefs. Located in near-shore waters to depths of 120 ft. during the period April-November, fishing is best in May and peaks again in September-December. Because of their gregarious nature and relatively short migrations, blackfish constitute one of the largest fisheries available to Long Island anglers and SCUBA divers as well.

BLUEFISH - Bluefish are pelagic, schooling, migratory fish which frequent the surf, rip tides and turbulent water. The first bluefish usually appear offshore in late May and then begin an inshore migration in June. Normally July through October are the best months for fishing. The south shore inlets, Montauk and Orient Point, and Long Island Sound are consistent producers of this fighting gamefish. Bluefish spawn offshore

and their fry, called "snappers," move inshore in great numbers to feed and grow in the bays and estuaries. Snapper fishing peaks in August and September; they are easy to catch and are accessible to shore and boat anglers.

CODFISH - This bottom dwelling species dominates the New York offshore recreational fishery during the cold weather period of December-March. Charter and party boats concentrate on this species at this time, when it ventures closer to shore during migration. In waters deeper than 150 ft. east of Montauk cod are taken all year. Tomcod, a closely related fish, is also sought by anglers in the winter months and is far more attainable. Seldom over a pound in weight, tomcod migrate into the bays and estuaries during the fall and are taken from bulkheads and piers and by ice-fishing. Best fishing occurs during the period October-December.

BLACKBACK FLOUNDER - Dining appeal and availability make the blackback or winter flounder a prime angling target during the period March-May, and again in October-December. They come well inshore, inhabiting mud-sand bottoms near eelgrass beds, where they are easily caught from shore as well as from boats. Boat liveries are a major form of access for this type of fishing.

FLUKE - Fluke, or summer flounder, migrate into nearshore waters at about the end of April; fishing is best from late May to mid-September in water 5-65 ft. deep. Fluke prefer the deeper parts of bays, harbors and sounds, and therefore can be caught at only a few places from banks, bridges and bulkheads. Bottom fishing while drifting in boats is the most productive form of fishing.

ATLANTIC MACKEREL - This pelagic, schooling species first appears in New York waters during their spring spawning run. Nearshore fishing peaks in late April or early May, and large numbers of these fish can be caught from schools in Long Island Sound, the Peconics, and Gardiners Bays. Mackerel avoid Long Island waters in summer, but return for a brief stay in September or October when the waters cool. As mackerel prefer deeper waters, most angling for them is from boats; they are a popular target of charter boat fishing enthusiasts.

POLLOCK - Pollock are often taken in the fall along with striped bass by trolling and jigging in the waters surrounding Montauk Point. This pelagic schooling fish is also taken outside Shinnecock and Fire Island Inlets in water over 60 ft. deep. Pollock fishing begins late in September as the inshore waters begin to cool, reaches its first peak by the end of November and though they are still catchable, for all practicable purposes they disappear until late February. At this time, pollock again make their presence known and some of the best catches are made in April by surfcasters working the beaches along Montauk.

PORGIES - Also known locally as scup, porgies provide some of the bread-and-butter angling for the rowboat fleet. One of their greatest strongholds is Great Peconic Bay. Porgies have undergone a population explosion in New York marine waters in recent years; they are beginning

to rival blackfish and flounder in popularity. Porgies move inshore to shallow water along beaches and in estuaries in the beginning of April, but do not add measurably to the sportfishing catch until May and June. Their numbers and activity decline slightly in July and August, but rise again in September. Most are caught in depths of 10-90 ft. while bottom fishing from anchored or drifting boats.

BLACK SEA BASS - This migratory, gregarious fish frequents reefs, rocky areas, pier pilings and shellfish beds. The popularity of this fish has increased in the last few years due to its increased abundance. They provide steady angling for party boats fishing in waters two to three miles off Long Island's south shore. Moving to waters under 120 ft. in depth during the warmer months, sea bass fishing activity begins in May and lasts through the summer. Small fish are taken in the south shore bays.

STRIPED BASS - The striped bass is probably considered the most favored gamefish found in Long Island waters. Its elusiveness and attainment of large size are factors contributing to this high status. Because striped bass can be caught by almost all angling techniques--trolling, casting, jigging-with flies, worms, plugs, spoons, cut and live-fish--they have an appeal to almost every kind of fisherman. Striped bass are anadromous and migratory, and are found mainly in shallow coastal waters. They are seldom found more than two or three miles offshore and are often in the wash of the surf. Because of these habits, striped bass are within easy reach of fishermen with and without boats. The season begins about late April and is at its best during May when the bass are migrating north. Eastern Long Island waters are a part of the striped bass's summering grounds, and fish can be caught here throughout the year by astute anglers. During the summer months, most of the better bass fishing is done at night. Fishing again peaks in the fall, when striped bass that have summered along New England's coast move south. It is at this time of year that the larger fish seem to be taken. A popular boat fishery for striped bass has developed in Nassau-Suffolk waters concentrating at Plum Gut, The Race, Montauk and at all the inlets along the South Shore as far west as the Rockaways. Many rod and reel fishermen regularly sell their catch of bass to local markets.

WEAKFISH - Weakfish numbers in Long Island waters have increased recently, and this species is competing with the striped bass as the number one gamefish. Weakfish are aggressive feeders and will take plugs, spoons and other lures, and can be fished from partyboats, small boats, and also at shore and in the surf. Weakfishing was not always as good as it is today. It was good during the 1920's, and over 100 boat liveries along the shores of the Peconics offered their craft primarily for weakfishing. A decline followed in the early 1930's and lasted until 1970. Weakfish suddenly began to reappear in greater numbers in the early 1970's. During the season, which runs from April to October, weakfish now appear on both north and south shores as well as all east end waters. Weakfish are one of the few gamefish species that spawn in local Long Island waters. Spawning areas include Hecksher flat in Great South Bay, Long Island Sound and Gardiners Bay. Peak fishing occurs during May and June when large

schools of fish are concentrated in these areas.

WHITE PERCH - White perch are anadromous fish that spend most of their lives in salt water, but return to local estuaries to spawn in March and April. The fish inhabit all the estuaries of freshwater streams on both the north and south shores as well as the Peconic River. White perch are taken from boats and also by bank fishing. The amount of white perch fishing in late winter and spring depends on the extent of ice formation on creeks and rivers; ice fishing is possible if the ice is thick enough.

Other species of fish, such as the various types of tunas and sharks, white marlin, dolphin, and swordfish - the "big game species" - are also prime targets of New York marine anglers fishing from private boats and charter boats in deeper offshore waters to the south and east of the Island. Tuna and shark tournaments are common summer events. Fishing for searun trout is also a popular activity at the mouths of Long Island streams, especially the Connetquot, Carmans and Nissequogue Rivers.

Crustaceans and mollusks are also important recreational fisheries resources in nearshore waters. The south shore and eastern bays support a large blue claw crab fishery. This crab is subject to wide fluctuation in abundance, and appears to be very sensitive to changes in environmental factors, such as the amount of runoff, water temperature, and the presence of toxic chemicals. They have experienced a surge in abundance in the last few years. Soft clams, mussels, bay scallops and hard clams are also harvested extensively by "mess-diggers" on a recreational basis.

Populations of various forage species are also very important to recreational as well as commercial fishing interests in that they are major sources of food for important gamefish. All large predatory fish are opportunistic feeders - they feed on what forage is avaialable. Important forage species in the Long Island region include American sand lance, silversides, sticklebacks, pipefish, mummichug, striped killifish,

sheepshead minnow, menhaden, juvenile winter flounder, sand shrimp, and grass shrimp.

4.3 Recreational Fishing Catches

The National Marine Fisheries Service has estimated that 2,980,000 New York State residents participated in marine recreational finfishing and shellfishing during the period mid-June 1973 to mid-June 1974.[30] Although available data are scanty, it is believed that the recreational catch of some species is many times the respective commercial catch, thus leading to the inevitable conclusion that for fishing management programs to succeed in the long run, the impacts of both recreational and commercial catches on fish stocks have to be considered. To be effective, the management program must include recreational as well as commercial fishing activity.

The most recent data available on sport catches for selected species is shown in Table 1. (See column 5 and footnote 2.) The recreational catches shown are for the region including the New England States and New York. A comparison of regional commercial landings and recreational catches in 1970 for important species is shown in Table 10. In 1970, anglers in New England and New York took 53.8% of the total catch (sport and commercial) of the species listed. When industrial species are included, angler catches amounted to 36.4% of the total harvest.

Estimates of the recreational catch of finfish in New York State have been made on the basis of the 1970 data,[31] and allow comparison with reported commercial landings made in the State in 1970. The ratios of sport catch to commercial landings for important species are shown below:

Species	Sport Catches:Commercial Landings
Bluefish	13.8:1
Striped Bass	14.0:1

Table 10 1970 Commercial Landings and Recreational Catches for Major Species in New England and New York[1]

Species	SPORT		COMMERCIAL	
	1970 catch (metric tons)	% of total catch[2] of each species	1970 landings (metric tons)	% of total catch[2] of each species
Bass, Black Sea	279	80.8	66	19.2
Bluefish	22,753	95.8	988	4.2
Catfish	-	-	11	100
Cod	16,188	40.2	24,054	59.8
Eel	1,436	90.4	152	9.6
Flounder	16,463	24.6	50,459	75.4
Haddock	1,147	8.7	12,196	91.3
Hake	299	10.4	2,566	89.6
Kingfish	1,568	98.6	22	1.4
Mackerel, Atl.	18,816	86.6	2,914	13.4
Perch, White	14	12.9	98	87.1
Pollock	2,533	38.8	3,987	61.2
Scup	1,041	33.0	2,118	67.0
Puffer	3,583	100	-	-
Sea Robin	1,063	91.7	97	8.3
Sharks	2,387	97.2	68	2.8
Striped Bass	20,795	94.3	1,261	5.7
Tautog	7,089	98.8	83	1.2
Tunas	1,683	51.4	1,589	48.6
Weakfish	746	83.8	144	16.2
Total of Species Listed Above	119,884	53.8	102,874	46.2
All Species	121,315	36.4	211,935	63.6

[1]Coastal Resources Center. 1976. Fishing and Petroleum Interactions on Georges Bank, Vol. II-Part A (draft). Graduate School of Oceanography, Univ. of Rhode Island, Kingston. p. 191.

[2]Total catch is defined as landings by sport and commercial fishermen combined.

Tautog	90.3:1
Weakfish	2.4:1
Cods (Atlantic Cod and Tomcod)	35.3:1
American Eel	8.6:1
Winter Flounder	4.7:1
Summer Flounder	5.7:1
Atlantic Mackerel	42.2:1
Porgies (Scup and Sheepshead)	0.8:1
Black Sea Bass	3.9:1

Thus, the 1970 angler catch of striped bass in New York was 14 times greater than New York commercial landings of striped bass; the bluefish catch was over 13 times greater than commercial landings, and catches of cods were 35 times greater.

Although the ratios are in part, based on rough estimates of sport catches, they do show the relative sizes of sport and commercial catches landed in New York. Sport catches as a whole and for individual species are very significant. To develop management plans for important species requires documentation of sport catches on a regular basis. Such statistics are not now available.

The 1970 angling survey did not include estimates of the sport catch of molluscs or crustaceans. The hard clam is sought extensively by boaters and others on a recreational basis. The recreational catch of hard clams in Nassau-Suffolk waters may approach the same order of magnitude as the commercial catch.[32] This again shows the importance of recreational catches of fish and shellfish.

4.4 Economic Impacts of Recreational Fishing

Available information on the economic impacts of recreational fish-

ermen is limited. National Marine Fisheries Service data for the Atlantic Coast are used to estimate expenditures in New York State by recreational fishermen.

In 1970 Atlantic coast marine fishermen, excluding recreational shellfishermen, spent $636,380,000 on food, lodging, transportation, equipment, etc. The average expenditure for each fisherman per year was $127. An extrapolated annual marine angler expenditure in New York State of $378,460,000 is derived by multiplying the annual per capita expenditures by the estimated number of marine anglers in New York State (2,980,000). The monetary worth of benefits is somewhat harder to determine. It includes the value of the fish caught by anglers as food as well as the aesthetic and psychological satisfactions of recreational fishing. The food value is indeed high, as pointed out by the magnitude of the recreational fish catch.

The aesthetic and psychological value of recreational fishing can be estimated by determining how much an angler would have to be compensated for deprivation of fishing privileges. This figure is estimated at $13 per recreational day.[33] Total fishermen recreational days in New York State were calculated at 36,314,000 in 1970. Therefore, the aesthetic and psychological value of marine angling is $472,082,000. The total value of marine recreational fishing in New York, including monies received by the purveyors of boats, equipment, etc. as a result of fishermen's expenditures and the aesthetic and psychological benefits enjoyed by fishermen is estimated at $850,542,000. Again, these calculations are based on a 1970 natinal survey that did not include recreational shellfishing values. The accuracy of the numbers is subject to debate; however, the order of magnitude of the estimates shows the importance of

marine recreational fishing to the economy and residents of the State and region.

4.5 Recreational Fishing Land Use/Facility and Management Problems

The problems associated with recreational fishing can be grouped under two broad categories: access and management. Access problems relate to the need for facilities and sites which increase recreational fishing opportunity. Management problems include the need for user information and the development of strategies designed to assure a sustainable yield and an equitable apportionment of fishery resources among recreational and commercial fishing interests.

Recreational fishing activity in New York marine waters is expected to increase in the future; projections indicate that there will be 30% more fishermen in the Long Island region by 1990, as compared to the 1970 level.[34] Private ownership and development of coastal land pose legal and physical barriers to angler access to the shore. This limited access, as well as the intense competition for mooring space in public and private marinas, is one of the reasons for the growth in the charter and open boat industry on Long Island during the past few decades.[35] Available shoreline recreational facilities are used for swimming, picknicking, etc. with the result that fishermen are effectively limited as to time of day and locations when fishing will not conflict with these activities. Night fishing is often restricted because of regulations designed to reduce the threat of park vandalism. Facilities for increasing angler access are required. These include boat ramps, fishing piers, and artificial reefs. Additional shoreline areas are also needed to increase bank and surf fishing opportunities. Charter, open and livery boat operations should be encouraged by local government to meet future demands.

Boat ownership is one solution to the problem of angler access. The vast majority of boat owners are fishermen.[36] At the present time, there are only five boat ramps with parking that are open to the general public in Nassau and Suffolk Counties. They are located at Freeport-Albany Ave.; Heckscher State Park; South Jamesport-Peconic Bay Blvd.; Greenport-Manhasset Blvd.; and Point Lookout. Additional state financed ramps are needed. Part of the need can also be met by county boat ramp/parking facility programs.

The quality of boat angling can be increased through the construction of artificial reefs. Artificial reefs are underwater structures built from a variety of materials - scrap tire/concrete modules, concrete and building rubble, rocks, junk cars, scuttled ships and barges. These structures provide an environment conducive to colonization by fouling and encrusting organisms and the concentration of forage and gamefish.[37] Six reefs have been constructed in the ocean off the south shore of the Island; one reef has been built in Great South Bay near Fire Island Inlet. All are frequented by both private and charter/open craft, and fishing pressures are high. Additional reef sites are warranted.

Other types of access are required to meet the needs of anglers who don't own boats. Piers and docks/bulkheads utilized by fishermen are usually restricted to local residents, or have been constructed primarily for boat accommodation. Boating disturbances and the location of these piers hamper angler success. Only eight fishing piers open to the general public have been built on Long Island; seven of the piers are located in the Jones Beach, Captree, Robert Moses State Park complex; one bay fishing pier is located in the Town of Hempstead. More piers designed specifically for recreational fishing are needed.[38]

Charter boats, open boats and liveries are other forms of access to fishermen who are not boat owners. Over 250 charter and party boats operate out of Long Island ports; nowhere in the U.S. can one find as many boat services for hire concentrated in such a small geographic area.[39] Over 95% of the charter businesses are found on the Island's south shore. Competition for the limited amount of mooring space along the north shore, as well as good transportation to and the availability of dock space in the south shore bays have influenced this geographic distribution. The charter boat industry on the Island is prospering now, and is expected to do so in the future.[40] As demand increases expansion in the industry will most likely occur at the existing charter boat centers. There may be continuation of the trend to invest in larger, faster vessels in the future in order to provide access to better fishing grounds farther offshore.

Development of charter facilities in north shore harbors has been limited by town regulations governing use of municipal piers by commercial interests. To increase charter facilities along the north shore, it appears that new sites, rather than those currently utilized by pleasure craft, will have to be utilized.

Access to shorelands is the major problem of bank and surf fishermen due in part to a lack of physical facilities, such as roads, parking lots and comfort stations. Residency requirements tied to park use also restrict angler access and mobility. Public use of the Long Island Sound shoreline between Mt. Sinai Harbor and Wading River is extremely limited; however this area offers great potential for expanding angling opportunities. Surf fishermen working the south shore barrier beaches and jetty/groin areas also have access problems. Some groin fields

offering fishing opportunities, e.g., at Westhampton Beach, are not accessible due to the lack of access corridors, parking lots and related facilities. At the present time the only practical land access to such areas as Moriches Inlet, the Fire Island National Seashore, Democrat Point, and Shagwong Point, is by means of vehicles equipped for oversand travel. Travel on public beaches is restricted by the rules, regulations and permit systems that have been adopted by the Suffolk County Dept. of Parks, Recreation and Conservation, the Long Island State Park Commission, the Fire Island National Seashore and various townships and that cover required equipment and state the locations where and when traffic is allowed. Mobile sportfishermen organizations, such as LIBBA and GSMSF (Long Island Beach Buggy Association and Great South Beach Mobile Sportsfishermen), believe that controlled beach travel by vehicles should be continued in the future to allow access to inlet areas, as well as to open stretches of beach where potential conflicts with bathers and strollers would be minimized. Continuation of the privilege of vehicular access to portions of the Fire Island National Seashore in the future is uncertain.

It is not now possible to determine whether or not current recreational and commercial fishing pressures are at levels that jeopardize sustained yields of fishery resources in the future. To prevent overfishing and the collapse of major commercial and recreational fisheries, management programs must be devised that consider the impacts of both recreational and commercial harvesting activities. Much of the information on which such management programs must be based is not available. Required information for management and management recommendations are discussed in section 7.0.

5.0 Plan Recommendations for Recreational Fishing

Access to the fishing opportunities provided by shoreline and nearshore waters should be improved by 1) building more fishing piers and boat ramps; 2) developing access programs for selected shoreline areas in public ownership that are not now open to angler use; and 3) acquiring additional shoreline areas for angler usage. Boating access to a high quality fishing experience can be improved by the construction of artificial fishing reefs and by the expansion of charter, party boat, and livery facilities. Expansion of recreational fishing opportunities must be coupled with a fisheries management program designed to assure continued supplies of fish in the future. The first step of such a program is the establishment of a fishing license program covering both recreational and commercial fishermen.

5.1 Fishing Piers

Fishing piers should be constructed at Robert Moses State Park. The fishing potential along the bay side of Robert Moses State Park is excellent and several piers should be constructed between the U.S. Coast Guard station and the Fire Island lighthouse. A fishing pier should be constructed at Shoreham in connection with the LILCO nuclear power plant. The N.Y.S. Dept. of Environmental Conservation should construct fishing piers at New Suffolk, Orient and Napeague Bay. It is also recommended that the Suffolk County Dept. of Public Works proposal for a fishing pier at Hampton Bays in connection with the reconstruction of the Ponquogue Bridge be implemented.

5.2 Boat Launching Facilities

Areas of prime consideration for the construction of boat launching ramps are as follows:

1. Mattituck Creek

2. Northwest Creek Suffolk County Park

3. Shirley Marina County Property

There are no boat ramps open to the general public fronting on Long Island Sound between Mt. Sinai and Orient Point, a stretch of approximately 40 miles. The N.Y.S. Dept. of Environmental Conservation should finance and construct an additional boat ramp with adequate parking at a site on Mattituck Creek in order to increase access to this underutilized stretch of Long Island Sound. Suffolk County should construct a boat ramp at the Northwest Harbor County Park in order to provide angler access to both Gardiners Bay and the Little Peconic Bay. It is recommended that the ramp be constructed on the Northwest Creek inlet sandspit by the Suffolk County Dept. of Parks, Recreation and Conservation. The sandspit and mouth of the Creek have already been subject to dredge and fill activities. The Suffolk County property at Shirley, fronting on both the William Floyd Parkway and the Great South Bay, is also well suited and ideally located for the construction of a boat launching ramp by Suffolk County Dept. of Parks, Recreation and Conservation. Fishermen would have access to both the eastern end of the Great South Bay as well as Moriches Bay and Inlet. The County owned parcel of land is currently unused and has already been subjected to filling, bulkheading and paving.

Other locations in both Nassau and Suffolk Counties that might offer potential sites for the construction of public boat ramps are listed below:

1. Hempstead Harbor Nassau County Park

2. Harbor Arts Suffolk County Park

3. West Meadow Beach, Town of Brookhaven Park

4. Wading River

5. Napeague Bay, State of New York

6. Peconic Bay near Shinnecock Canal

7. Bergen Point or Indian Island Suffolk County Pk. in Town of Babylon

All the above mentioned sites are located on either Nassau or Suffolk County owned property except those at Wading River, Nageague, Peconic Bay near Shinnecock Canal, and West Meadow Beach. The only existing boat launching ramp operated by Suffolk County is at Timber Point County Park. The car and boat trailer parking facilities at Timber Point are inadequate and need to be expanded. The N.Y.S. boat ramp facility at Freeport should also be expanded to meet future needs.

5.3 Shoreline Access

Shoreline access for anglers can also be improved by establishing controlled access programs governing use of shorelands already in public ownership, but which are now closed to fishermen. A model of such a limited access program for anglers that has worked very well is that operated by the Long Island State Park Commission at Caumsett State Park. Nassau County should establish a controlled access program for fishermen at two sites - the Sands Point Naval Devices/Guggenheim complex and the Welwyn estate - both of which are owned by the County and are adjacent to shore fishing areas of high potential.

The Long Island State Park Commission should repair damaged facilities at Parking Field #9 at Jones Beach State Park and reinstate fishermen access at this site. Fishermen use of this area should be limited to night fishing to avoid conflicts during the bathing season. This agency should also investigate the feasibility of establishing additional access points for anglers along the State Boat Channel east of the

Wantagh State Parkway. Small fishing piers, bank fishing sites, and walkways may be acceptable in this area if designed with a knowledge of natural resource capability.

Thousands of surf and jetty fishermen rely on four-wheel drive vehicles for access to high quality fishing grounds. The programs established by the Suffolk County Department of Parks, Recreation and Conservation, the Long Island State Park Commission, the Fire Island National Seashore and other agencies, which allow beach travel under a permit system should be maintained. Regulations governing controlled access at dune crossings, time and season of permitted travel, required equipment, and the prohibition of traffic on dunes, vegetation, or in bird nesting areas should be strictly enforced and approrpiate penalties levied against violators.

The Baiting Hollow GAPC should be acquired by Suffolk County and developed in part to accommodate shore fishing. An inland parking facility located within close walking distance of the shoreline access point would considerably reduce land acquisition and would minimize potential damage to the bluffs. The Suffolk County owned property at Tiana Beach should be developed to accommodate fishermen access to the ocean shore. Should the opportunity arise, a site at Sebonac should be acquired and also developed to accommodate fishermen access.

5.4 Artificial Fishing Reefs and Charter, Party Boat and Livery Facilities

The N.Y.S. Dept. of Environmental Conservation should improve fishery habitats by constructing and/or completing artificial reefs in areas accessible to fishermen. The following sites previously recommended by NYSDEC should be investigated and construction priorities assigned.

Type	Location	Relative Size	Service Area
Offshore	Atlantic Ocean at Long Beach	Medium	Offshore Jones Inlet
Inshore	Great South Bay #2	Small	Central Great South Bay

Inshore	Jones Inlet Short Beach	Small	Freeport, Jones Inlet area
Inshore	Peconic Bay-Great	Small	Peconic Bay
Inshore	Peconic Bay-Little	Small	Peconic Bay
Inshore	Gardiners Bay	Small	Gardiners Bay

The offshore reefs at Fire Island, Moriches and Shinnecock should be completed to design specifications. Work is currently underway by the Smithtown Conservation Advisory Council for the construction of a reef in Smithtown Bay.

Small boat rental facilities with adequate parking should be established at Little Neck Bay. Charter and/or party boat facilities should be established at Port Jefferson Harbor and Mattituck Creek. Charter/open boats currently using recreational facilities at the head of Port Jefferson Harbor should be relocated to the site of the proposed commercial pier shown in Figure 5 on the Harbor's west side. Facilities at Greenport, Montauk, Captree and Freeport should be expanded if warranted by sufficient demand. This expansion should be encouraged by local government.

6.0 Marine Fisheries Recommendations and Geographic Areas of Particular Concern

Geographic Areas of Particular Concern (GAPCs) located in the Nassau-Suffolk coastal zone include, but are not limited to:

- areas of unique geologic or topographic significance to industrial or commercial development;
- areas of urban concentration where shoreline uses are highly competitive;
- areas where developments and facilities are dependent upon the utilization of, or access to, coastal waters; and

- areas of substantial recreation value and/or opportunity.

The purpose of this section is to identify those sites and locations included in the commercial and recreational fishing industry recommendations made in sections 3.0 and 4.0 of this report that are within the boundaries of an identified GAPC. This section, therefore, serves as a checklist for those who would like to determine the relationship of marine fisheries proposals to the overall management scenarios proposed for various GAPCs as described in other Nassau-Suffolk Regional Planning Board reports. The sites/locations of marine fisheries recommendations are keyed below to identified GAPCs.

	Recommendation	GAPC Name
1.	Commercial fishing facility at Shinnecock Inlet	Shinnecock Inlet
2.	Marine commercial sites in Village of Greenport	Greenport
3.	Marine commercial site and pier (for commercial fishing boats and charter/party boats) in Village of Port Jefferson	Port Jefferson
4.	Marine commercial site in Village of Freeport	Freeport
5.	Marine commercial site in Town of Hempstead east of Austin Blvd.	Barnum Island
6.	Fishing pier at Shoreham power plant site	Shoreham-Wading River
7.	Fishing pier at Orient	Orient Pt.
8.	Fishing pier at Ponquogue Bridge site	Shinnecock Inlet
9.	Boat ramp at Mattituck Creek	Mattituck Inlet
10.	Boat ramp feasibility study at West Meadow Beach	Stony Brook Harbor
11.	Boat ramp feasibility study at Wading River	Shoreham-Wading River
12.	Shore fishing site acquisition at Sebonac	Cow Neck
13.	Baiting Hollow acquisition	Baiting Hollow

14.	Development of facilities at Tiana Beach	Shinnecock Inlet
15.	Charter boat facility at Mattituck	Mattituck Inlet
16.	Expansion of charter boat facilities at Greenport	Greenport

It should be pointed out that not all of the sites/locations contained in marine fisheries recommendations are located within the delineated boundaries of specific GAPCs. These sites/locations are, therefore, not shown in the listing above.

7.0 Marine Fisheries Management

Three major problems involving both the commercial and recreational marine fishing industries on Long Island that have not been discussed in previous sections of this report are

1. the development of comprehensive management plans for major fisheries;
2. the impacts of environmental degradation and pollution on the survival of marine species; and
3. restrictions on marine species availability due to public health considerations.

This section identifies the general information requirements and management recommendations needed to address problem number one above, with particular reference to Nassau-Suffolk hard clam resources. Pollution control, land use management, and public health are not within the scope of this report, but are covered in other segments of the Nassau-Suffolk Regional Planning Board's Comprehensive Coastal Zone Management Plan. Of particular concern to local sport and commercial fishermen are restrictions on finfisheries due to PCB and heavy metal contamination and the closure of productive shellfish grounds because of high coliform concentrations. Although these issues are not dealt with further here, they are of utmost significance to the future of Nassau-Suffolk's recreational and commercial fisheries.

7.1 Marine Fisheries Management Information Needs

The goal of developing fishery management plans based on the maintenance of maximum sustained yield or optimum yield (See section 1.2 and footnotes three and four.) is supported by the premise that such an approach to fisheries management will result in more long-term benefits to society as a whole than an approach characterized by little or no control on total harvest by species. The minimum information required to develop a management plan for a particular species includes estimates of the following:[41]

1. standing crop (number and total weight of a species in a given area at any time);
2. growth (increase in individual biomass);
3. recruitment (number of species young that survive each year to reach harvestable size);
4. natural mortality; and
5. fishing mortality from both recreational and commercial harvests.

To be effective, the management program must include estimates of harvesting from all recreational and commercial groups taking the resource, and controls must be based on the natural mechanisms governing resource renewal. To be equitable, both commercial and recreational fishermen must be subject to control if management is to succeed.

The next step in the development of a fisheries management program for a given species is the determination of the total allowable catch on the basis of the above information. The total allowable catch quota should ensure that adequate stocks of the resource remain for reproduction. The total allowable catch would have to be subdivided into commercial and recreational quotas. The recreational quota could be assigned to individual anglers

as a bag limit.

Much of the required information for developing marine fishery management plans is not available. Catch and effort statistics are of prime importance. A starting point for accumulating the required information would be the establishment of marine fishing license programs covering commercial and recreational fishermen. At the present time, New York State residents do not have to acquire licenses for either recreational or commercial marine finfishing. State license programs do cover the commercial harvesting of shellfish and crustaceans, and a state license is now required by those taking lobsters on a recreational basis. All major shellfish producing towns in Nassau-Suffolk have license programs covering the commercial harvest of shellfish and crustaceans; only a few of the towns require a license for recreational shellfishing.[42]

7.2 Marine Fishing License Recommendations

This plan calls for the licensing of all marine recreational and commercial fishing activities. License fees should be set at an affordable level that will cover issuance and administration costs and provide a fund to pay for the development of fisheries management plans and the conduct of fisheries related research. License legislation should be flexible to accommodate means for the acquisition of fishing management data, such as questionnaires and catch logs.

These are two alternative approaches for establishing marine fishing license programs: Federal action and New York State action. Migratory species would probably best be covered by regional fishery management plans encompassing the entire range of the species. Therefore, as far as migratory species are concerned, the best approach would be the es-

tablishment of a Federal license program covering both commercial and recreational fishermen. Such a program would be analogous to that conducted by the U.S. Dept. of Interior in the regulation of migratory waterfowl hunting. Management program activities within the limits of state jurisdiction could be implemented by New York State, provided a portion of the funds received by the Federal government is earmarked for such purposes and returned to the states. Non-migratory species, such as the hard clam, that are found primarily within the limits of New York State jurisdiction should be covered under a state and/or local license programs.

The other alternative is action at the state level. New York State Fish and Wildlife laws could be amended to include provisions for the establishment of fishing license programs covering both commercial and recreational fishermen. A principal problem with unilateral action by New York State is the possibility of the lack of uniformity in regulation and management activities conducted by adjacent states. If adjacent states also enact license requirements, reciprocities could be arranged where licensed residents of one state would have the right to fish in adjacent state waters.

7.3 Guidelines for Hard Clam Resource Management

The hard clam resources of Nassau and Suffolk Counties offer an opportunity for New York State to develop a management plan that could serve as a prototype for the development of plans for other important species. Unilateral management of this resource is possible; cooperation of adjacent states or foreign nations is not necessary. The Regional Marine Resources Council (MRC) of the Nassau-Suffolk Regional Planning Board has reviewed the status of hard clam management in the Nassau-

Suffolk region and has determined that many management problems are due to the lack of an adequate information base.[43] Indeed, the MRC found the information base to be only fair with respect to understanding of the following:

1. hard clam population dynamics, i.e., the natural rate of replacement, growth rates, and rates of removal by natural causes and man;
2. the effects of commercial and recreational harvesting on the capacity of the resource to renew itself;
3. the life cycle, reproduction, feeding, etc., of hard clams under controlled conditions;
4. the biology, chemistry and circulation of hard clam production areas; and
5. the quantitative contributions of pollution from various sources.

The MRC recognized the need for better scientific management of hard clam resources, and developed the following guidelines that identify in a general way, the studies required to assemble information upon which a hard clam resource management program should be based.

1. Conduct population studies on the hard clam standing crop, on rates of recruitment, growth, and mortality due to natural causes and harvesting in different natural environments for the purposes of obtaining maximum sustained yield estimates of the resource, and to determine the effects of harvesting on the resource.
2. Identify the point and non-point sources of coliform bacteria and other pollutants in the bays, and determine their relative significance.
3. Develop specific and practical methods for identifying human pathogens for which the hard clam could serve as a vector.

4. Study the potential and improvement of hatchery operations and mariculture methods in general to maintain or increase the production of hard clams. This would include study of the techniques of planting hatchery raised shellfish. These studies include the examination of the possible need for a state-operated hatchery to seed public grounds.
5. Study methods to control hard clam predators and other causes of clam mortality.
6. Study hard clam genetics and breeding to develop disease resistant strains, high meat yields, and other desirable characteristics.
7. Analyze the probable effects of proposed sewer projects on hard clam resources, both in terms of eliminating or reducing pollution, and altering bay freshwater budgets.
8. Prepare an accurate inventory of Long Island hard clam resources on maps of an appropriate scale for planning purposes.
9. Compile an historical record of the hard clam industry in the waters surrounding Long Island. Such a record would include analysis of changes in the trends of hard clam production and populations by area as functions of:
   a. changes in water salinity and temperature due to the opening and closing of inlets, channel dredging, the presence and removal of bars, and variations in freshwater inputs;
   b. changes in nutrient levels due to duck farming and increasing population;
   c. disease and predation; and
   d. changes in bacteria levels, phytoplankton, zooplanton and other marine biota.

Use the information generated above in the evaluation of proposed changes in the shellfish producing bays.

10. Collect adequate hydrographic data for use in mathematical modelling of the hydrography of Great South Bay, Shinnecock Bay and Peconic Bay.

11. Study the nutritional requirements of the hard clam during its various stages of development, and identify plankton species and other possible food sources supporting the hard clam population.

12. Determine the impact of the hard clam industry on the economy of Long Island, including the recreational value of hard clam resources. Ascertain the relative impact of corporations harvesting private lands and of shellfish farmers harvesting public lands.

13. Evaluate existing conservation laws as to their meaningful management of hard clam resources, and determine if such laws are being adequately enforced.

14. Analyze existing public health laws and standards to determine whether they are appropriate for consumer protection, from both the nutritional and public health points of view.

15. Determine how laws and regulations might be modified to improve the scientific and administrative management of hard clam resources and the industry itself.

16. Analyze the existing structure of the shellfish industry by determining the number and size of corporations harvesting private lands and the number of shellfish farmers working on public lands, and the extent of acreage so farmed. Compare effort and pro-

duction techniques/methods used by both groups.

17. Conduct a market analysis of the use of hard clams, including such items as seasonal demands, use of raw vs. processed clams, clam grading and pricing, etc., to determine the possibility of expanding markets.

18. Determine whether production surpluses and shortages can be smoothed by changes in operating and marketing procedures.

19. Analyze the practice of transplanting clams from uncertified waters to open waters as to goals and effects on available harvest.

FOOTNOTES

1. U. S. Department of Commerce. 1976. A Marine Fisheries Program for the Nation. U. S. Government Printing Office, Washington, D. C. p. 4.

2. Presentation by A. S. Taormina on Program Description of the Division of Marine and Coastal Resources, New York State Department of Environmental Conservation at the 15 November 1976 meeting of the Regional Marine Resources Council, Hauppauge, N. Y. (Minutes of referenced meeting, Attachment A).

3. maximum sustained yield - the maximum harvest that can be taken annually forever.

4. optimum yield - the amount of fish, based on an analysis of maximum sustained yield as modified by relevant economic, social and ecological factors, which will provide the greatest overall benefit to the Nation.

5. McHugh, J. L. 1972. Marine Fisheries of New York State. U. S. Department Commerce, Natl. Marine Fish. Serv., Fish. Bull. 70(3): 585.

6. Ibid., 585-610.

   McHugh, J. L. and A. D. Williams. 1976. Historical Statistics of the Fisheries of the New York Bight Area. New York Sea Grant Institute, NYSSGP-RS-76-013. 73 p.

   McHugh, J. L. and Jay J. C. Ginter. Fisheries, MESA New York Bight Atlas Monograph 16, New York Sea Grant Institute, in press.

7. McHugh, J. L., Jay J. C. Ginter, W. H. Medeiros, W. E. Knapp and Anne D. Williams. 1974. Policy Formulation and Economic and Social Values of the Fisheries of New York State, New York Sea Grant Program - Year II Short Report, p. 1.

8. A. S. Taormina, NYSDEC, memorandum dated 23 August 1976 on relationship of commercial landing values to management strategies, included as Attachment A to the Minutes of the 13 September 1976 meeting of the Regional Marine Resources Council.

9. U. S. Department of Commerce. 1976. Fisheries of the United States, 1975, Current Fishery Statistics No. 6900. U. S. Government Print Off., Washington, D. C. p. 14

10. Mr. Richard Miller, Executive Secretary, Long Island Fishermen's Association personal communication, 12/17/76, meeting held at N. Y. S. Sea Grant Office, Stony Brook.

11. Mr. Emerson Hasbrouck, NMFS, personal communication, 2/9/77.

12. Mr. Charles Stiansen, C&N Fisheries, Hampton Bays, N. Y., personal communication, 3/9/77.

13. Callaghan, Dennis W. and Robert A. Comerford. 1976. Modified Regional Input - Output Analysis of Rhode Island's Commercial Fishing and Related Activities. College of Business Administration, Univ. of Rhode Island, Kingston. 14 p.

14. Morton, David W. 1976. An Intersection Study of Transactions in a Small Fishing, Farming and Summer Recreation Region. M. S. Thesis, Department of Agriculture, Cornell Univ., Ithaca, N. Y.

15. U. S. Department of Commerce. op. cit., p. 78.

16. A. S. Taormina, NYSDEC, memorandum dated 11 January 1977 on estimated capital investment for New York's commercial marine fisheries.

17. The discussion of the national impacts of extended fishery jurisdiction is based on information contained in A Marine Fisheries Program for the Nation. See footnote 1.

18. Gusey, William F. 1976. The Fish and Wildlife Resources of the Middle Atlantic Bight. Shell Oil Co., Houston. p. 305.

19. Coastal Resource Center. 1976. Fishing and Petroleum Interactions on Georges Bank, Volume II - Part A (draft). Graduate School of Oceanography, Univ. of Rhode Island, Kingston. p. 168.

20. Silbajoris, Robert A. 1975. Underutilized Marine Fishery Resources of New York State. Thesis presented to Graduate School, SUNY at Stony Brook, Marine Environmental Studies Program.

21. Mr. David Chase, Sea Grant Advisory Service, Riverhead, N.Y., personal communication, 3/23/77.

22. Mr. Richard Miller, Executive Secretary, Long Island Fishermen's Association, personal communication, 1/4/77 meeting held at N.Y.S. Sea Grant Office, Stony Brook.

23. Record of meeting held on 3/15/77 in Hauppauge, N.Y. between NSRPB staff and various baymen association representatives.

24. Mr. William Pell, Greenport, N.Y., personal communication, 1/25/77.

25. Lynch, Gerald L. 1976. Fishery Cooperatives in Theory and Practice. Thesis presented to Graduate School, SUNY at Stony Brook, Marine Environmental Studies Program. p. 4.

26. Mr. Harold Udell, Commissioner, Dept. of Conservation and Waterways provided NSRPB staff with information on commercial fishing activities in the Town of Hempstead.

27. The New York State Dept. of Environmental Conservation, Division of Marine & Coastal Resources and the New York Ocean Science Laboratory are planning a symposium on the status and potnetial of aquaculture in the Long Island marine environment to be held during the fall of 1977.

28. See Mohr, Peter T. 1976. Marine Sport Fisheries of New York State. Thesis presented to Graduate School, SUNY at Stony Brook, Marine Environmental Studies Program. 120 p., for an overview of marine recreational fishing in New York State.

29. Ibid.

Briggs, Philip T. 1973. "Salt Water Fishing on Long Island," Division of Marine & Coastal Resources, N.Y.S. Dept. of Environmental Conservation, 4 page manuscript.

Karas, Nicholas. 1976. "Recreational Fishing Activity," 7 p. and "Fishes of Long Island," 15 p. with 12 sets of maps showing the monthly distribution of major sportfish in Nassau-Suffolk marine waters. These reports were prepared for the Nassau-Suffolk Regional Planning Board. The sportfish distribution information is summarized on Nassau-Suffolk Regional Planning Board natural resource inventory maps.

30. U.S. Dept. of Commerce, op. cit., p. 26.

31. Mohr, op. cit., p. 37-45.

32. McHugh, J. L. 1976. "Recreational Use of Shellfishes: Issues and Conflicts," in Seminar on Coastal Recreational Resources in an Urbanizing Environment," Hyannis, Mass. (in press)

33. Coastal Resources Center, op. cit., p. 195.

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▶ 1 040 YSM ǂc YSM ¶

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▶ 6 245 02 A Marine fisheries subplan for Nassau and Suffolk counties / ǂc prepared by Nassau-Suffolk Regional Planning Board ; Lee E. Koppelman, project director. ¶

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