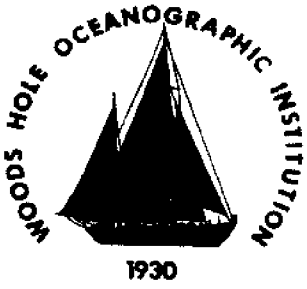
Woods Hole Oceanographic Institution



SMALL-SCALE COMMERCIAL FISHING IN SOUTHERN NEW ENGLAND

by

Susan Peterson
and
Leah J. Smith

August 1981

TECHNICAL REPORT

Prepared for the Pew Memorial Trust, for the Department of Commerce, NOAA, Office of Sea Grant, under Grants 04-8-M01-149, NA 79AA-D-00102, and for the Woods Hole Oceanographic Institution's Marine Policy and Ocean Management Program.

WOODS HOLE, MASSACHUSETTS 02543

WHOI-81-72

SMALL-SCALE COMMERCIAL FISHING IN SOUTHERN NEW ENGLAND

by

Susan Peterson
and
Leah J. Smith

WOODS HOLE OCEANOGRAPHIC INSTITUTION
Woods Hole, Massachusetts 02543

August 1981

TECHNICAL REPORT

Prepared for the Pew Memorial Trust, for the Department of Commerce, NOAA, Office of Sea Grant, under Grants 04-8-M01-149, also NA 79AA-D-00102, and for Woods Hole Oceanographic Institution's Marine Policy and Ocean Management Program.

Approved for Distribution: David A. Ross

David A. Ross, Director
Marine Policy and Ocean Management

Abstract

This description of the small-scale sector of the Southern New England (Massachusetts, Rhode Island and Connecticut) fishery includes information on the fishermen (their ages, education, experience, occupational training, family involvement and reasons for fishing) and the physical characteristics of the fleet (the boats and gear). Fishing patterns are analyzed by species, geographical areas and seasons. The economic structure of small-scale fishing is described in terms of investment, net and gross earnings, fuel costs, crew payments systems and marketing arrangements. Management implications of this information and analyses are included.

Table of Contents

Tables and Figures

INTRODUCTION

Small commercial fishing boats generally have been ignored in the context of managing the New England fishing fleet. This report, based on a study conducted from 1979 to 1981, describes the small-scale sector of the Southern New England (Massachusetts, Rhode Island and Connecticut) fleet. The physical characteristics of the fleet, distributions of fishing patterns by species, geographical areas and seasons, social and occupational characteristics of small-scale fishermen, the economic structure of small-scale fishing, and management implications of this information and analysis are included here.

The image of the commercial fisherman in New England is a man in foul weather gear braving the elements on a large offshore trawler - the "Gloucester fisherman" - or perhaps a lobsterman hauling pots along a rocky shore. One rarely imagines a man trailering a 17 ft fiberglass skiff to a spot 30 miles from home at 3:30 in the morning in order to catch and sell a few hundred pounds of bass, blues or cod before going to his "real" work as a carpenter, fireman or teacher. These part-time fishermen are one of two identifiable types of small-scale fishermen. The part-timers depend upon the fishery to supplement their incomes and to provide recreational and social benefits. Other fishermen work full-time in the coastal waters, fishing on boats less than 60 ft out of hundreds of ports in New England, but they too lack the glamour associated with large boats on the open sea. A number of fishermen's organizations, such as the Massachusetts Inshore Draggermen's Association, represent small-scale fishermen, but the fishing efforts of this group have remained unrecorded, and officially unrepresented in fishery management planning.

The New England Fishery Management Council, charged with managing fisheries while considering the complex interaction between natural and social systems in this region, has used data collected by the states and the National Marine Fisheries Service (NMFS). Detailed statistics on catch and earnings, such as those collected for the offshore fleet, have never been systematically collected for the small-scale fleet. Better information, collected by the States and NMFS as well as ad hoc research efforts, is needed to assess whether management measures affect all commercial fishermen in Southern New England. This information is also important to ensure equitable distribution of fishing rights among fishermen and equitable support through government services.

Research Design

This report is based on interviews with 236 small-scale fishermen in Southern New England in the summers of 1979 and 1980. Small-scale finfish fishermen were defined either by the size of their vessel, or for fishermen who fished from piers and jetties, by the volume of their landings. The small boat fleet was initially defined as all boats less than 50 ft long or 40 gross tons using inboard or outboard motors. This grouping includes boats under 5 tons, which are almost completely ignored in government data collection. After the research began, 60 ft emerged as a more useful division between small and large boats, and we adjusted the definition to include boats up to 60 ft. Small-scale fishing is also generally synonomous with "nearshore," that is, fishing most of the time within 20 miles of shore. References to fishermen throughout this report differentiate between the large-scale, offshore component of the industry and the small-scale, nearshore group.

Several men in each of these ports have no boats, but catch and sell a considerable volume of fish in some seasons by fishing from jetties, bridges and breakwaters. They are included in this report as small-scale commercial fishermen even though they lack fishing boats and may consider themselves recreational fishermen. We established two criteria to define the group of small-scale fishermen : (1) those who call themselves commercial fishermen and (2) those who sell at least 150 pounds of fish per week during some season. The criterion of 150 pounds caught and sold per week was set as a result of discussions with several fishermen who felt that this was a substantial commercial catch, particularly when it included species which sell for $2 or more per pound.

Fishermen were interviewed by Gloria Lee, a student at MIT; Katherine Wellman, a student at Brown University; Onno Husing, who had just completed his Master's Degree at the University of New Brunswick; and Margaret Linskey, Susan Peterson and Leah Smith of WHOI. In addition, George Epple, Department of Anthropology at Rhode Island College, did several interviews for us during his own field work. The computer analysis was carried out by Rosamund Ladner and Ann Martin of WHOI. This research was funded by the Department of Commerce, NOAA, Office of Sea Grant, under Grants 04-8-M01-149 and NA 79 AA-D-00102, the Pew Memorial Trust, and by the Woods Hole Oceanographic Institution's Marine Policy and Ocean Management Program.

We interviewed shellfish wardens and/or harbor masters from coastal towns and consulted with state fisheries personnel to determine which towns had significant small-scale fisheries representative of the entire area. Using this list of towns, we asked the states' fisheries agencies for the names of licensed fishermen from those towns. A 25% random sample was chosen from the lists of licensed fishermen.

For Massachusetts we obtained printouts on specific license classes from the Department of Marine Fisheries list of commercial license holders. Since Massachusetts does not issue licenses specifically for finfish, we had to eliminate the full-time lobstermen who fell into the sample since one of our original criteria was that the fishermen be involved in at least some finfishing. We used these lists for Westport, New Bedford, Fairhaven, Wareham, Bourne, Falmouth, Harwich, Barnstable, Orleans, Green Harbor, Marshfield, Plymouth, Marblehead, Gloucester, Newburyport, Nantucket, Yarmouth, Hyannis, Beverly, Chilmark, Edgartown, Tisbury and Cuttyhunk.

We also attempted to use Rhode Island's and Connecticut's registers of licensed fishermen to select a stratified random sample by town. The selected random sample created several problems. In both states almost all fishermen were licensed as "personal use lobster" fishermen even though many of them finfished; weeding out the full-time lobstermen presented an enormous task. In Rhode Island, interviews were conducted in Westerly, Point Judith, Block Island, Wickford, Warren, Bristol, Newport and Tiverton. In Connecticut we interviewed small-scale fishermen from Stonington, Groton, New London, Mystic, New Haven, Clinton/Westbrook, Stamford as well as Connecticut fishermen who fished out of Greenport and Montauk on Long Island.

Many of the small-scale fishermen selected in the random sample were not available for interviews for a number of reasons: some maintained a license, but had not fished for several years; some were fishing but did not want to be interviewed; some fished exclusively for shellfish; some of them had never been heard of in the town they listed on their license applications - they were not in the phone book, not in the town tax records, not known by the shellfish warden, the local police or firemen. In Massachusetts we were able to interview 67 men (15%) out of the sample of 459. We looked at vessel size (the only common variable in the Massachusetts file) to determine whether the group interviewed was representative of the entire sample; the average vessel length for our sample of all Massachusetts small-scale fishermen was 28.9 ft, while

the average size of the boats owned by the men interviewed was 28.7 ft. Thus we feel that our random sample is representative of the entire licensed fleet of vessels under 60 ft.

We also found that some groups of fishermen were not licensed. Some fish without a license because they consider themselves recreational (even though they sell their catch) or because they feel that licensing is an expensive intrusion into their income-supplementing activity. Therefore, we supplemented our interview list with names provided by shellfish wardens, harbor masters, fish buyers, bait store operators, boat yard operators and other fishermen. The unlicensed fishermen were different from the licensed group. They fished with either no boat or with boats considerably larger than the average boat in the sample of license holders. They earned incomes at the high and low ends of the range, rather than incomes near the average. In essence, they are highly visible and invisible - the "high-liners" of the small boat fleet and men fishing off bridges to supplement social security benefits. Data from this non-random sample of fishermen adds breadth to the analysis and, we feel, more accurately reflects the structure of small-scale commercial fishing than does our random sample drawn from lists of license holders.

We interviewed 16 fishermen (or 7% of the sample) from Connecticut, 155 from Massachusetts (67%) and 60 from Rhode Island (26%). Comparing this to the distribution of fish landed by commercial fishermen, we see that Connecticut accounts for only 1.4% of the Southern New England catch while Rhode Island accounts for 18.7% and Massachusetts nearly 80%. (There were 469 million pounds of fish landed by Southern New England fishermen in 1979.) Our sample has a greater proportion of fishermen from Connecticut and Rhode Island than the total catch statistics because Masschsetts has a larger proportion of large vessels than Rhode Island and Connecticut.

Recent History of New England Fishing

Commercial fishing in New England has been the focus of political and legal maneuvering since 1635 when the General Court of Massachusetts passed laws for its protection and encouragement. But for the next 350 years, the offshore and nearshore fisheries were subject to very few regulations. Broader protection of fishing grounds important to New Englanders, established by the U.S. Fishery Conservation Zone, was provided only after a long struggle with the advocates of international management of transboundary resources.

From 1958 through 1976 the fisheries were managed through ICNAF, the International Commission for the Northwest Atlantic Fisheries. This organization began as a scientific forum, designed for the exchange of information on population biology, physical oceanography, and research on the variety of fish stocks (Koers 1973). A number of accommodations to the U.S. and Canadian fishermen's demands for limiting foreign fishing effort were made under ICNAF. For example, member nations were required to report catch by species and area on an annual, then quarterly, and finally in 1975, monthly basis. But without substantial sanctions against the foreign fishermen, domestic fishermen felt the international framework was too weak to control fishing effort.

The New England fleet declined from World War II through the mid-1970s (Norton and Miller 1966; ICNAF 1965-75). In the early 1960s large numbers of foreign fishing vessels appeared on the fishing grounds formerly dominated by U.S. and Canadian boats. Attracted by apparently abundant and unexploited resources, the foreign fishing fleets, for the most part from eastern Europe, systematically harvested thousands of metric tons of fish previously ignored by most U.S. or Canadian fishermen (ICNAF 1965 - 1975).

The federal government, in particular NMFS in the Department of Commerce, offered alternatives to extended jurisdiction which were designed to improve the fishermen's situation (Husing 1980, Dewar 1981). Introduced in the 1960s and 1970s, these programs were intended to make the domestic industry competitive with the foreign fleets. The programs included construction of the Seafreeze Atlantic and the Seafreeze Pacific factory fishing boats, an experiment which failed miserably. Financial programs to supplement vessel construction costs, loan programs, marketing programs, industry development grants, small business grants, underutilized species development programs, support for gear research, representation on international fishery delegations, and many other activities were supported by agencies of the federal government.

The result of these efforts was that the domestic fleet remained more or less as it was. The economic structure of the New England industry remained based on strongly independent owner/operators. The markets continued to be directed toward the demand for fresh fish from New England consumers who expected cod, haddock, flounder or herring - not squid or silver hake. The fishing vessels were surprisingly similar to those built in the 1850s, although equipped with modern engines and electronic gear. The number of crew declined slightly, but only because catches dropped after the foreign invasion in the early 1960s and fewer people were needed to sort, gut and put the fish below.

Most of the New England fishermen who felt the effects of foreign fishing during the 1960s and 1970s owned and operated offshore fishing vessels greater than 60 ft in length, capable of fishing for cod, haddock and yellowtail flounder as well as herring, butterfish, squid, red fish, mackerel, and whiting. These were the men most influential in urging passage of legislation to protect fishing grounds off the New England coast. In 1976 President Ford signed the legislation establishing PL 94-265 - the 200 mile bill now known as the Magnuson Fishery Conservation and Management Act - which provided for domestic management of the fishery resources from 3 to 200 nautical miles from shore. The states maintain management responsibility for the zone from shore to 3 miles. The legislation established Regional Fishery Management Councils made up of representatives from the public, the fishing industry, state and federal governments. The New England Council has, since 1977, prepared fishery management plans for each of the species or groups of species in its region.

Two things have changed in the New England fishing fleet. First, the value of the catch increased in the 1960s and 1970s, partly because of foreign fishing (see Figure 1; note that value of commercial landings is in unadjusted dollars). Declining stocks led to decreased supply at the same time that demand was rising because of increasing population and awareness of the value of fresh fish in low-fat diets.[1] This combination led to higher prices. Higher prices encouraged the fishermen to intensify their efforts and to concentrate on those species whose value was exceptionally high. Many fishermen earned much larger incomes than they ever had before (Holmsen 1976, Dewar 1981). However, in the past four years fishermen have seen the value of their incomes eroded by inflation, higher fuel and operating costs, and a leveling off in the price of fish (Bockstael 1980).

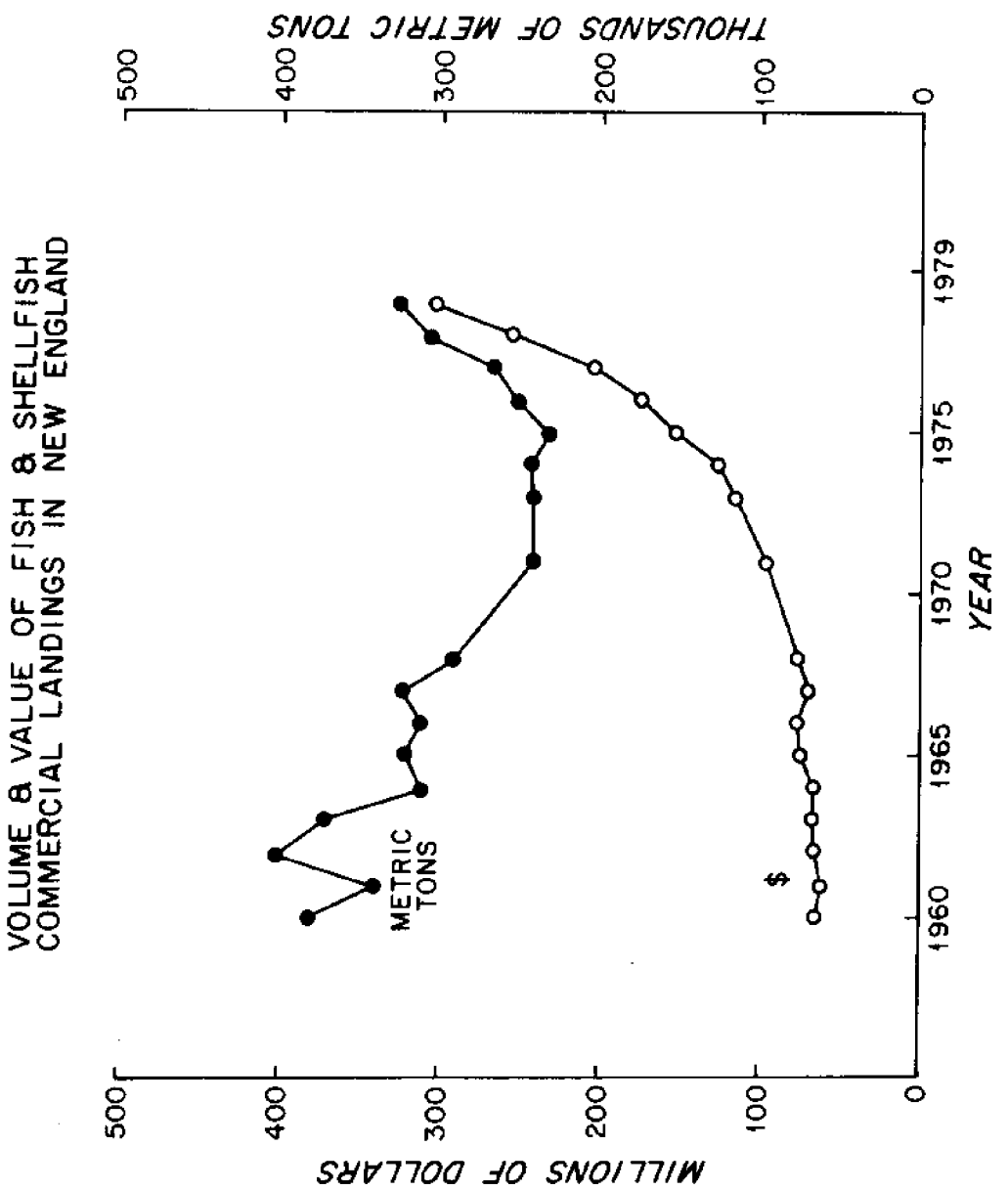

VOLUME & VALUE OF FISH & SHELLFISH
COMMERCIAL LANDINGS IN NEW ENGLAND
MILLIONS OF DOLLARS
THOUSANDS OF METRIC TONS
METRIC TONS
$
YEAR
0
100
200
300
400
500
1960
1965
1970
1975
1979

Figure: 1

While opportunities for higher income attracted more men to the fleet, many of them came from communities or jobs where they had learned to value their free time, home lives and shore-based activities. Thus many of the men who entered the fleet in the last five years have become "day" fishermen rather than "trip" fishermen. This desire to fish and lead a fairly normal shoreside life is reflected in the kinds of boats being built in New England. Of the new vessels that have joined the New England otter trawl fleet since 1975 (see Table 1), a 53% increase has occurred in the less than 30 gross registered tons (grt) class, 66% in the greater than 126 grt class, while smaller increases have occurred in the middle sized vessels. Fishermen are investing their money in smaller boats designed for day fishing or in the large, offshore vessels capable of extended fishing trips for large volume species.

Table 1
New England Otter Trawl Fleet 1975-1979

	Number of Vessels by Tonnage Class (gross reg. tons)					
	5-30 grt	31-60 grt	61-90 grt	91-125 grt	126+ grt	Total
1975	178	159	110	76	74	597
1976	195	159	98	75	72	599
1977	174	154	102	75	87	602
1978	208	163	106	88	87	652
1979	272	179	121	85	123	780
Percent increase	53%	13%	10%	12%	66%	31%

Source: National Marine Fisheries Service, Joseph Mueller, Gloucester

The following discussion on small-scale fishing in Southern New England begins by providing a description of the fishermen: their reasons for fishing, family involvement, extent of fishing participation, age, education and experience. This is followed by a description of the fleet, fishing patterns, and finally of the economic relationships within the fleet - income, marketing methods, ownership, financing sources.

CHARACTERISTICS OF FISHERMEN

Many of the small-scale fishermen we interviewed do not know one another, and wouldn't like one another if they did. There is long standing animosity between fixed and mobile gear fishermen, between commercial and sport fishermen and between fishermen in general and anyone who tries to tell them what they don't want to hear. Men from one port often denigrate the ability of men from another port, and the further from home, the more deprecating the comments become; Rhode Island fishermen can think of few good things about fishermen from Connecticut or Massachusetts. We speculate that fishermen stress their differences (either consciously or unconsciously) during interviews to maintain the myth of Yankee independence and the mystique of fishing. Nevertheless, the men we have grouped together as small-scale fishermen have responded to a wide range of questions. And, although most of them like their occupation, they also have complaints. A fair amount of time in each interview was spent listening to tirades about the markets, the government, the industry in general. One fisherman, when asked how he had become a fisherman, said, " A friend got me interested, and I'm still looking for the bum."

Some similarities among the captains of small fishing boats are important in identifying their roles in the commercial fishing effort from Southern New England. We begin by providing some of the basic information about them: their ages, years in fishing, family involvement, ethnic identity, education, alternative occupations and employment. Then we describe some of the more interesting details: their reasons for becoming and remaining fishermen.

Table 2
Age Distribution of Captains in the Small Boat Fleet in Southern New England

Age	Percent of Captains
30 or younger	27%
31 - 40	30%
41 - 50	22%
51 - 60	15%
61 or older	6%
Total = 233	100%

Fishermen's Ages

The captains interviewed ranged in age from 18 to 78; the average age was 40 (Standard Deviation 12; see Table 2). Nearly 5% of the men were past the standard retirement age of 65. Several of the high school and college age fishermen fished only summers and holidays in order to earn enough money to support themselves during the academic year. These fishermen said they imagined they would continue to fish to supplement their incomes after college, but only two of them intended to become full-time commercial fishermen.

Experience in Fishing

Most of the fishermen appear to have extensive experience in the fishing industry, as shown in Table 3. But these average figures may be misleading because they reflect fishermen's estimates of years fished, expressed as "I've been fishing since I was 15; I'm 44 now, so I've been fishing nearly 30 years." Some of these men have fished since they were 15 for 4 weeks every summer while others have fished since they were 15 every month of the year. Comparing the gross stock (total revenues of a boat before any expenses are deducted) with the number of years of experience of full-time fishermen, we found no correlation between earnings and this imprecise measure of experience.

Table 3
Distribution of Years Fished by Small-Scale Fishermen
in Southern New England

Number of Years	Percent of Captains
Less than 5 years	8%
5 - 10 years	35%
11 - 15 years	14%
16 - 20 years	11%
21 - 30 years	17%
31 or more years	16%
Total = 228	101%

Family Involvement

We were interested in the level of family involvement in fishing, and asked whether or not relatives worked as fishermen. This is particularly important when considering the flow of information or innovation within the fishing

industry. Knowledge of good fishing spots, good markets, reliable repairmen or regulatory changes are more likely to be exchanged among men who know one another well, particularly among close relatives or people who have made financial or time investments in one another's businesses. Seventy-five percent of the 236 fishermen interviewed either did not give the information or had no family members in fishing, but for those who did respond, 20 of them (35%) had brothers, 19 (33%) had sons, 9 (16%) had fathers, and 8 (14%) had wives who work in the fishing industry. Forty-nine fishermen (21% of the sample) had fathers who had worked as fishermen and 14 of them (6%) had an uncle or grandfather who also fished for a living at some time in his life.

Family involvement in fishing is also important when considering the future of the industry - where are the new fishermen likely to come from, and what experience will they have had? One of the fishermen we interviewed whose grandfather and father were fishermen said that he had actively discouraged his children from involvement in the industry, and now he is glad he did. He was commenting on the fact that many of the groundfish regulations passed from 1977 through 1980 were "making criminals out of fishermen." He felt that fishing used to be great, but that "now the fishermen have to be afraid to bring in codfish." He goes on

> You don't know what it does to a man. I saw the writing on the wall. I discouraged all of my kids from becoming fishermen; they won't suffer my fate. I wish I could retire now, but I have one left to go [to college]. After that I'm getting out. I could easily sell the boat. A 60 footer is very popular and wanted size boat right now. But I'll be so glad when I finally hang it up. But what will I do? My health is great, I've got so much energy. How am I going to handle a shore job after this? It gets in your blood.

Ethnic Identity

We asked the small-scale fishermen what ethnic group they belonged to - that is, whether they considered themselves Italian, Portuguese, Yankee or whatever. One hundred ninety-two (84%) considered themselves to be Yankees, while 3 (2%) considered themselves of Norwegian background, 13 Portuguese (6%), 16 Italian (7%), while 12 (5%) did not claim to belong to any ethnic group. Most fishermen did not seem bothered by this question because ethnic identity has been important in some major ports, entering into financing other parts of the business. However, one fisherman reacted strongly: "Christ, why in the hell would you ask me that? What difference does that make? Would you

believe that I'm an American!" Despite this strong reaction, we continued to ask this question. The results show that the small boat fishermen are predominantly Yankee in contrast to the large boat fishermen, many of whom in ports such as Boston, Gloucester or New Bedford are Italian or Portuguese (see Poggie and Pollnac 1980; Peterson and Smith 1979; Miller 1980).

Education

The education levels of the fishermen do not seem to have much effect on the reasons for becoming a fisherman, the kinds of fishing they do, the money they earn nor the ways they fish. Education for those interviewed ranged from junior high school dropouts to M.D's and Ph.D.'s (Table 4). While many of the fishermen with higher education have had or currently have other jobs, the proportion of income earned from fishing is not significantly related to education level(correlation between education and income from fishing was insignificant).

Table 4
Education of Small-Scale Fishermen in Southern New England

State	Percent of Fishermen in State				
	Junior High School	High School or Technical	Fisheries Degree	Some College	Graduate School
Conn.	13	44	0	0	44
Mass.	13	45	2	7	32
R.I.	12	48	5	29	5
All States Total = 201	13% T=26	46% T=92	3% T=6	13% T=26	25% T=51

Occupational Choice

Many (47%) of the small-scale fishermen have training in other occupations. In the long run, the men with other job training would be less devastated by lack of fish or by extremely stringent regulations than would the 53% who have no other occupations (Table 5) because, in theory, they could look for jobs in the area of their other training. However, many of the small-scale fishermen fish part-time. That is, these men divide their work effort among two or more jobs. Many of the part-time fishermen depend upon their fishing income to make ends meet, and claim that they would not be part-time fishermen if their other

jobs provided adequate incomes. Some of the full-time fishermen - men who spend their working time working at fishing - had other occupations which they were not pursuing, including a number who had retired from other jobs.

Table 5
Alternate Occupations of Small-Scale Fishermen
in Southern New England

Alt.Occupation	Percent
None	53%
Marine oriented	9
Construction	9
Teacher	3
Public Service	3
Professional	2
Retired	6
Other	16
Total = 236	100%

Employment

The small boat fishing fleet in Southern New England provides employment for large numbers of men. Given the nature of our sampling problems (especially the presence of a substantial number of unlicensed captains), the 236 interviews represent only a small proportion of Southern New England small fishing boat captains - probably less than 5%. Some of the importance of the small boat fleet in this region can be measured by its role in augmenting the employment of men from coastal towns where seasonal employment from tourist-related activities is a major source of income to the year-round residents. If we assume that our 236 interviewed captains are 5% of those in the small boat

Table 6
Distribution of Crew Size Among Small-Scale Fishermen
In Southern New England

No. in Crew	Percent of Cases
1	37
2	33
3	16
4	10
5+	4
Total=207	100%

fleet, then there would be roughly 5,000 small-scale commercial captains in the region. With each captain employing an average of 2.1 individuals (including himself), small-scale commercial fishing would directly provide jobs for over 10,000 men (see Table 6). Of course, many of these fishermen fish only part-time. Only 54% of them were full-time, stating that they spent 100% of their working time fishing. Part-time fishing ranged from 2% to 90% of working time. (No one claimed to fish between 90 and 99% of the time.)

Reasons for Fishing

The reasons these fishermen gave for being in the fishing business varied considerably; however, by grouping the reasons in general categories (see Table 7), we were able to distinguish some interesting patterns. The majority of fishermen (64%) gave as their major reason for fishing a life-style oriented response (independence, fulfilled ambition, peace and quiet) rather than a money-oriented response such as investment, income supplement, limited options for employment. When they offered second reasons for fishing, the responses

Table 7
Reasons Given for Becoming Fishermen
Southern New England Small Boat Fleet

Reason	Percent of Responses First	Second
Peace & Quiet	10	12
Independence	27	31
Fulfilled ambition	27	16
Investment	4	5
Income Supplement	14	10
Limited options	8	8
No answer	10	18
Total = 236	100%	100%

were even less money oriented, with a larger proportion mentioning independence. This information indicates a strong attachment to fishing as a way of life, and a pronounced reluctance to leave the business. Most said they would leave only if there were no fish or if their health prevented them from fishing, although a few confessed that they would stop fishing if they suddenly became millionaires!

PHYSICAL DESCRIPTION OF THE FLEET

Most (91%) captains in the small boat fleet own their own fishing boats. Also, 58% of the captains owned an additional boat or boats (52% of owners with an additional boat owned one additional boat while 6% owned more than one additional boat.) There are advantages to being self-employed; an owner/operator can be more flexible in responding to changes in demand for certain species than a man who must seek approval from the boat owner. At the same time, owner/operators bear the risks associated with changing fuel costs, boat maintenance, insurance or prices.

We asked fishermen whether or not small-scale fishing is regarded as preparation for large-scale fishing. Most small-scale fishermen had no plans to become large-scale fishermen; furthermore, they felt that smaller boats were more efficient, caught better quality fish, were more economical, and with some notable exceptions, paid a higher rate of return to the investor. However, the fact that capital is not easily available may also deter entry into the large-scale fleet. Most of the small-scale fishermen sympathized with the large-scale, offshore draggers. For example, one fisherman said:

> Those poor guys who have those large boats with big payments. My boat, already paid for twice [mortgaged twice to put four kids through college] runs cheaper than 95% of the other boats in the fleet, and I'm just getting by. Think of it, you stock [gross receipts earned from a single fishing trip] $1400 - $1500, and your fuel bill alone is $900, without yet paying the crew, taxes, insurance, boat expenses, and that is without having a huge debt with the bank. You know those guys must be hurting. Everything being equal, you have to realize that about a third of what I make goes right back to the government, and what have I got in return? - shit prices, a shit load of boats piloted by untrained people. There should be a licensing law which makes sure that a captain has some competency. They do it in other maritime fields, why not fishing?

Fishing vessels under 60 ft include vessels with a wide range of fishing power and the potential for fishing a wide range of species. Age and length distributions for the vessels owned or operated by the men we interviewed are shown in Tables 8,9, and 10. While many (61%) of the vessels have been built since 1961, 24% were built before 1950, including one boat built in 1916. The fact that 21% of the small boat fleet sample (mostly boats less than 30 gross tons) was built after 1975 is consistent with statistics on the New England otter trawl fleet (Table 1), where there was a 53% increase in number of boats less than 30 gross tons between 1975 and 1979.

Table 8
Age Distribution of Small Fishing Vessels
In Southern New England

Year Vessel Built	Percent of Vessels
Before 1950	24%
1951-1960	16%
1961-1970	19%
1971-1975	21%
1976 and later	21%
Total = 200	100%

The boats in the smallest size group have some special characteristics. Many fishermen who fish boats less than 20 ft long trailer them from one fishing site to the next. This gives these fishermen flexibility to follow the stocks in which they have particular interest without having to consider steaming time and expense. It is less expensive to tow a trailer with a car or truck than to go by water - and few boats make 55 mph. Fishermen using smaller boats are strictly limited by weather conditions since they cannot withstand even a mild summer storm. Boats less than 30 ft are rarely used for anything other than day-long fishing trips since crew accomodations are inadequate.

Table 9
Length Distribution of Small Fishing Vessels
in Southern New England

Vessel Length	Percent of Vessels
12-20'	16
20-30'	21
31-40'	24
41-50'	17
51' or more	22
Total = 230	100%

Table 10 indicates that there is a significant correlation between the age and length of small boats. The fleet's older boats are on average longer than boats built in the first half of the 1970s, until 1976 when the average size jumped to 39 ft. This information could be interpreted in a number of

ways. It may be that fishermen chose smaller boats during the 1960s and 1970s. Or, it may be that smaller boats survived as commercial fishing boats while larger boats were put to other uses, sank or were abandoned. It may be important to consider whether the greater size of newer boats (1976+) is the beginning of a trend. If the pattern were to continue, capacity (measured by the amount of fish the boat could catch as well as hold on each trip) of the small boat fleet would increase even if the number of boats remained the same.

Table 10
Age/length Comparisons Among Small Fishing Vessels
in Southern New England

Year Built	Average Length	Number of Vessels
Before 1950	47 ft	39
1950 - 1960	43 ft	41
1961 - 1970	37 ft	37
1971 - 1975	33 ft	41
Since 1976	39 ft	42
		Total = 200

Missing: 36 cases
Significant .00001 Analysis of variance ETA

The horsepower of the vessels ranged from less than 50 horsepower to more than 300 horsepower (see Table 11). The fact that 42% of the boats had engines with more than 200 horsepower indicates the fleet's ability to operate over a range of fishing grounds, including offshore areas. Larger engines are needed to tow otter trawls or scallop dredges and are important during rough weather when the vessels need speed as well as power to return to port. The size of the engine is also related to fuel consumption; many of the fishermen opt for smaller engines in order to reduce their operating costs. However, some of the smaller engines use gasoline rather than diesel fuel which increases the operating costs.

Table 11
Distribution of Horsepower for Small Fishing Vessels
in Southern New England

Horsepower	Percent of Vessels
Less than 50 hsp	10%
51 - 100 hsp	9%
101 - 200 hsp	39%
201 - 300 hsp	29%
301 or more hsp	13%
Total = 222	100%

Gear

Fishermen who have small boats are not unsophisticated in their use of modern technology. Electronic gear was present on 78% of the small fishing vessels; 14% were limited to some kind of radio or CB, while 64% had additional electronics. Electronic gear includes Loran systems, fish finders or scopes, radar, sonar and several kinds of radios. The fishing gear used by these small-scale fishermen included many types, and many fishermen used more than one of them: otter trawl (39%), rod and reel (25%), sink gillnet (16%), lobster pot (5%), scallop dredge (4%), longline (3%), jig (2%), handline (2%). One percent or less used harpoon, haul seine, hoe, rake, weir, Scottish seine, eel pot, conch pot, fish trap, or trot lines. Forty-two percent of the fishermen used more than one gear type within a year. The adaptability of this group of fishermen in using several types of gear is a crucial factor in their fishing patterns and in their adjustment to changing costs of operation.

We grouped some of the data by gear types - handheld gear such as rod and reel, jigs, and handlines; fixed gear such as lobster pots, fish traps, longlines and gillnets; and mobile gear such as otter trawls and scallop dredges - to see if there were any correlations between the broad types of gear used and other characteristics of the fishermen. By comparing gear type to part- or full-time fishing (full-time fishing means 100% of work effort, not 100% of income earned), we found that claims by the otter trawl fishermen that men fishing handheld gear or fixed gear are not "serious" fishermen may have some validity (Table 12). Only 16% of the men using handheld gear fished full-time. But their claim did not hold for the men using fixed gear; 70% of them were full-time fishermen, and 78% of those using mobile gear were full-time.

An advantage of fixed gear over mobile gear is that it uses less fuel. But there is change within the fixed gear category too. The number of gillnets has increased rapidly in the past five years. In 1976 the fixed gear group would have been dominated by longliners. Starting in 1977 boats began converting from dragging and longlining to gillnetting. Fishermen from the smaller Rhode Island ports indicated that many had been full-time lobstermen until one of them, bored during the winter when it was not worthwhile trying to lobster, tried gillnetting to enliven his slow season. Now many of the fishermen gillnet because they see it as an inexpensive alternative to handlining and trap fishing, and an easy way to supplement lobster fishing without having to make adjustments to their boats.

In Chatham, Massachusetts most fishermen were initially against gillnetting because they thought the method would wipe out the fish and ruin the industry, but it has now become widely accepted. Problems with the technique do exist; as one fisherman from Chatham noted,

> One of the great problems with gillnetting is that it is so easy, it allows anybody to go out and catch fish. That's why we have so many boats now. People are out there without any experience and get into it for any old reason. Within the last year or two the number of boats changed from 20 serious fishermen to 50 to 60 to 70 boats landing four times as much fish.

This fisherman claims that these volumes are so great that they are driving the prices down everywhere - and especially in Chatham, once known for its high quality, individually handled, longline-caught fish.

Table 12
Proportion of Time Spent Fishing by Gear Type Used
Small-Scale Fishermen in Southern New England

	Percent of Fishermen		
	Full-Time	Part-Time	
Handheld Gear	16%	84%	58
Fixed Gear	70%	30%	54
Mobile Gear	78%	22%	54
Total = 166	T = 89	T = 77	

Another Chatham fisherman claims that the quality of the gillnet fish is no worse than the longline fish, "Lots of times the fish come aboard alive,

with longlining they often came up dead. It all boils down to how you take care of them, dress them right away, ice them down, keep them out of the sun, and attend your nets with some regularity."

Handheld gear was most commonly used by fishermen with alternative occupational training, while the other two gear types were used by a significant proportion of fishermen who had no other training (Table 13). Part of the reason for this is that initial investment required for mobile and fixed gear is higher than for handheld gear. Handheld gear can be used casually, without owning a boat, while the other two demand larger investments.

Table 13
Gear Type Used by Alternative Occupational Training
Small-Scale Fishermen in Southern New England

Gear Type	Percent of Fishermen		Total Number
	Another Occupation	No Other Occupation	
Handheld	99%	2%	68
Fixed	78%	23%	49
Mobile	77%	23%	31
Total = 148			

Handheld gear is common among part-timers who fish for recreational benefits as well as for income supplements. Fixed and mobile gear fishermen earned on average more than 85% of their incomes from fishing, while an average of only 34% of the incomes of handheld gear fishermen came from fishing (Table 14). In addition, the mobile gear fishermen had significantly older and larger boats than the men in the other two categories. There were no significant differences in the captain's ages, years fished or average number of species caught.

Table 14
Gear Type Used as Compared to Basic Characteristics
of the Small Boat Fishing Fleet In Southern New England

Gear Type	Average Age of Captain	Average % of Income	Average Boat Length	Average Years Fished	Average Year Boat Built	Average No. of Species
Handheld	42 yrs	34%	25 ft	17 yrs	1968	3.42
Fixed	38 yrs	85%	37 ft	17 yrs	1969	2.78
Mobile	40 yrs	92%	47 ft	20 yrs	1956	3.98

FISHING PATTERNS

Geographical Differences

We interviewed fishermen from more than 40 ports in Southern New England. Each fisherman was asked for his home port and the port(s) where he sold his catch. Not all of the fishermen claimed a home port, particularly the fishermen who trailered their boats to different fishing sites, and several full-time fishermen who claimed to "follow the fish." All had at least one sale port.

In order to simplify the discussion of fishing patterns as they vary along the coast, we have grouped ports in a number of ways. Home ports are categorized by geographical region: North Shore, South Shore, North Cape Cod, South Cape Cod, Buzzards Bay, and the Islands (Martha's Vineyard and Nantucket) are in Massachusetts. Because there were fewer interviews in Connecticut and Rhode Island, their ports are not subdivided. Sales ports are divided into two categories: major ports with two or more wholesale buyers of fish, and minor ports with only retail markets, truckers who periodically appeared to purchase fish, and/or a single wholesale buyer. Major sales ports are: Gloucester/ Rockport, New Bedford/ Fairhaven, Point Judith, Newport, New York City and Boston.

Table 15
Geographical Differences by Home Port in Characteristics of Small-Scale Fishing in Southern New England

State/area	Mean Age Captain-yrs (std. dev.)	Mean Boat Length-ft (std. dev.)	Mean Days Fished/year (std. dev.)	Part-time %	Part-time N	Full-time %	Full-time N
Conn	42 (8.3)	37.4 (11.7)	164 (57.6)	31	5	69	11
R.I.	38 (11.4)	41.9 (12.9)	223 (96.0)	44	14	56	18
Mass	40 (12.6)	35.8 (15.0)	141 (70.0)	49	60	51	63
N.Shore	41 (12.9)	44.2 (11.3)	161 (69.7)	28	7	72	18
S.Shore	41 (11.6)	43.6 (10.1)	163 (79.1)	29	4	71	10
N.Cape	40 (12.2)	48.0 (18.9)	145 (52.6)	29	2	71	5
S.Cape	39 (12.9)	30.6 (9.8)	146 (72.8)	64	21	36	12
Vin/Nant.	43 (13.5)	29.3 (12.0)	131 (69.2)	58	14	42	10
Buzzards B.	38 (13.2)	22.8 (8.6)	111 (62.8)	79	15	21	4

Comparisons of small-scale fishing in different states and areas are made in Table 15. Although average age of captains and average boat length do not differ radically from state to state, Massachusetts has a higher proportion of part-time fishermen and smaller number of days fished, especially in Buzzards Bay, the South Cape, Martha's Vineyard and Nantucket.

Table 16 shows the major ports where small-scale fishermen sell their fish in Southern New England. Choice of sales port depends upon several factors, including the species caught, proximity to home and the desire for competitive prices. Some ports are specialized, handling a rather limited range of species or volume of fish. Second, some ports, particularly those with cooperatives,

Table 16
Distribution of Small-Scale Fishermen by Major Port of Sale
in Southern New England

Major Sale Port	No. of Fishermen	Percent of Fishermen
Point Judith, RI	29	13.0%
Chatham, MA	19	8.5
Gloucester/Rockport, MA	18	8.1
Provincetown, MA	16	7.2
Newport, RI	16	7.2
Menemsha, MA	11	4.9
Little Compton/Sak. Pt., RI	10	4.5
Newburyport, MA	8	3.6
Hyannis/Barnstable, MA	8	3.6
Plymouth/Scituate, MA	7	3.1
Vineyard Haven, MA	6	2.7
Nantucket, MA	6	2.7
Stonington, CN	6	2.7
Harwich, MA	6	2.7
Total	166	74.5%

buy from their members or regular customers before buying from outsiders. Third, some ports are rather isolated and pay lower prices than major ports, leading some fishermen, in order to get a better price, to land their fish in a port some distance from where they live and/or moor the boat. Some fishermen land the fish in one port, perhaps their home port, and then truck it to a buyer in another place where they know they can get a good price. Many of the fishermen we interviewed felt that selling the fish was their most difficult

problem. They all knew how to catch it, but had trouble dealing with buyers ill-prepared to handle large volumes of fish on a seasonal basis, pay reasonable prices for popular species, buy unusual species, and treat the small-scale fishermen equitably. Thus, fishermen may not have the option of selling fish in any port.

The relationship of gear types to the size of the fishing port where the individual fisherman most often landed his fish was also analyzed (Table 17). While nearly half of the mobile gear fishermen chose to market their fish in major fishing ports, 74% of all small-scale fishermen interviewed consistently sold their fish in minor ports. Since most of the mobile gear fishermen were

Table 17
Gear Type Grouped by Ports of Sale
Small-Scale Fishing in Southern New England

Gear Type	Percent of Fishermen		Total No.
	Major Port	Minor Port	
Handheld	7%	93%	71
Fixed	17%	83%	60
Mobile	46%	55%	99
Total	T=60	T=170	230

catching species mixes of similar composition to the large-scale fishermen, it is not surprising that such a large proportion of them sold in the major ports' markets. A very high proportion of the small-scale fishermen using fixed (83%) and handheld (93%) sold their fish in the smaller ports where retail buyers carry a broader variety of fish than do the wholesale buyers in the larger ports, and where the fishermen can sell their catches without waiting for an auction or more formal sales method.

One of the most frequent complaints made by the fishermen was that port facilities were inadequate. Not only did many places lack space for tying up commercial boats, but commercial boats had to compete with recreational boats. Moreover, in some towns, dock space (or mooring space) was controlled by the town, and thus subject to political manipulation. In other places, most of the waterfront was privately owned, and the price charged for tying up could vary enormously.

Seasonal Differences

Table 18 summarizes the information fishermen provided on their annual fishing patterns. There is a marked increase in the proportion of men fishing in the warmer months, and, at the same time, fishing further from shore. Only some of the fishermen have the boats and personal fortitude to withstand the harsh winter weather and heavy seas in order to catch high priced, scarce species. The fishing patterns also reflect the choice made by many of them to seek other employment or vacation during the winter. Some fish in the summer with the intention of earning all of their income in part of the year, leaving winter free for travel or other activities.

Not all of the small-scale fishermen want to stay small-scale, partly because of the limitations on the amount of fish they can catch and times of year they can fish. One man, complaining that processors always pay lower prices in summer to compensate for the high prices they have to pay in winter, said, "If that's true, what good does that do for a small guy like me? During January and February when the prices are good, I'm at home watching TV! You're forced to kill yourself by working very hard during the six months of the year when you know you can get out." The lack of a large crew means he has to spend more of his own time and labor on maintenance than if he had a crew to share these tasks.

Table 18
Small-Scale Fishing Patterns
In Southern New England

Area Fished	Percent of Fishermen											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Ponds	2	2	1	1	1	1	1	2	2	3	3	3
Inshore	12	10	10	16	17	17	16	17	15	19	18	16
1-3 mi.	6	6	8	11	13	18	16	16	17	13	10	7
3-5 mi.	8	8	15	22	25	22	20	18	20	18	13	9
5-20 mi.	23	22	23	25	27	28	30	29	28	29	27	21
20+ mi.	3	4	6	10	11	12	12	14	12	7	6	6
Not Fishing	46%	47%	37%	16%	6%	3%	6%	6%	6%	12%	22%	39%
Total = 236												

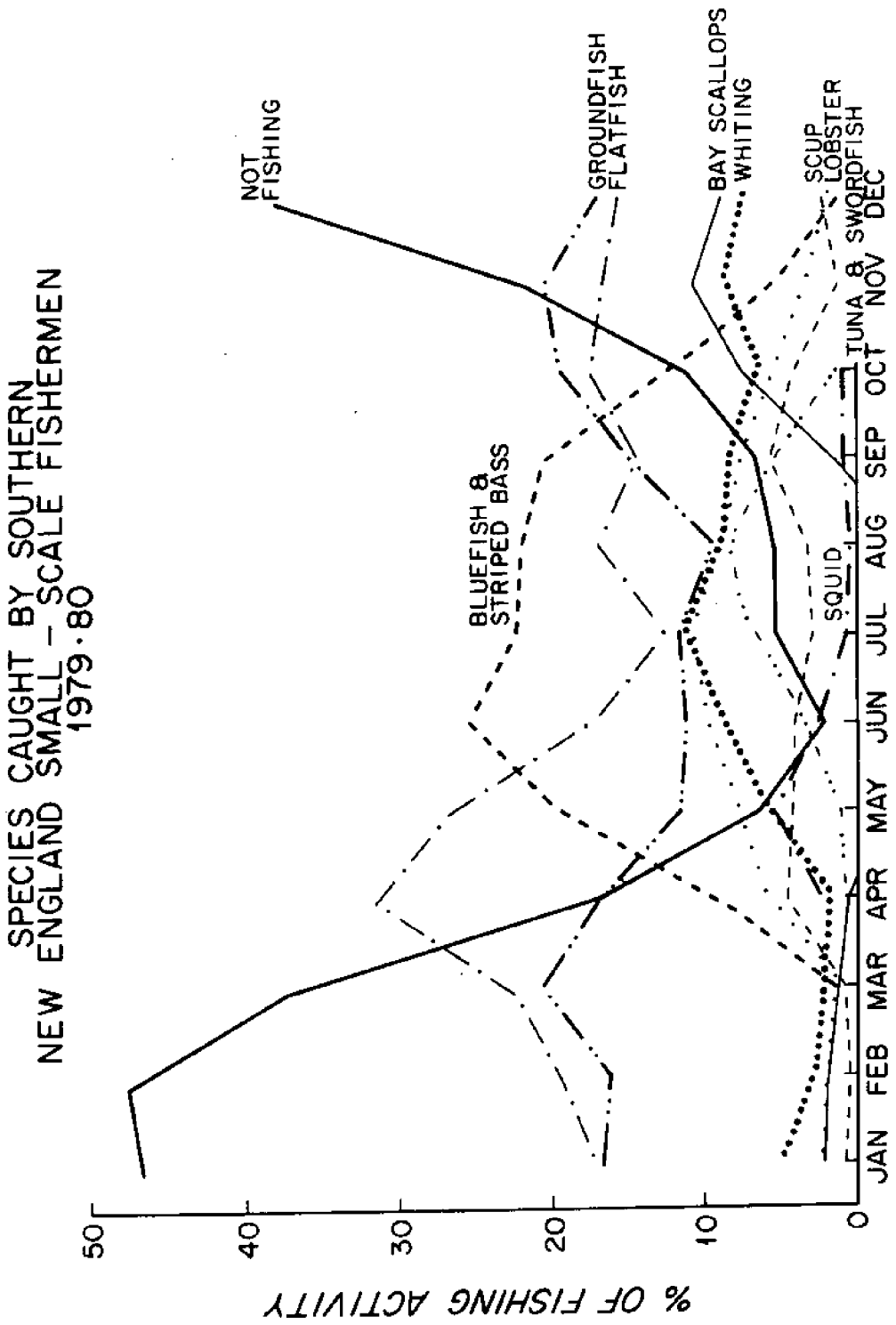

SPECIES CAUGHT BY SOUTHERN NEW ENGLAND SMALL-SCALE FISHERMEN 1979-80
% OF FISHING ACTIVITY
50
40
30
20
10
0
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
NOT FISHING
GROUNDFISH FLATFISH
BAY SCALLOPS WHITING
SCUP LOBSTER SWORDFISH
BLUEFISH & STRIPED BASS
SQUID
TUNA

Figure: 2

Species choice

The patterns of fishing are analyzed here by monthly reports of species sought by small-scale fishermen. Table 19 illustrates that most of these fishermen (90%) caught two or more species during the course of a year. The variety of species sought throughout the year is further illustrated in Figure 2 as is the importance of traditional groundfish (cod and haddock) and flatfish (yellowtail flounder, fluke, blackback). We have concluded that small-scale fishermen reduce the risks of fishing by diversifying their efforts across a number of species during the annual fishing cycle. Figure 2 and Table 19 help to substantiate this conclusion. Furthermore, many fishermen stated their intention of diversifying further if markets could be developed for many of the species now considered underutilized.

Table 19
Number of Species Caught
By Small-Scale Fishermen in Southern New England

Number of Species	Percent of Fishermen
1	10
2	15
3	27
4	24
5	13
6	7
7+	4

Total = 236

The choice of species is influenced by the ability of the fisherman to fish for it (i.e., his gear and its flexibility in varying weather conditions), the availablity of the species in the area he wants to fish, market prices, and finally, the market acceptability of some kinds of fish. Species sought are listed in Table 20, from those mentioned by the largest number of fishermen to those mentioned by the fewest.

The economic structure of the industry and ultimately the need for fishery management regulations are affected by a combination of factors including species fished and the volume caught. The availability of species changes in a predictable way: bass and bluefish become more abundant as the waters off New England become warm and these fish migrate north; other species such as

Table 20
Species Sought by Small-Scale Fishermen
in Southern New England and Average Price in 1978
(arranged from most to least frequently sought)

		Avg. price/lb			Avg. price/lb
1.	Cod	$ .25	15.	Haddock	$ .32
2.	Blackback	.44	16.	Pollock	.17
3.	Whiting	.15	17.	Swordfish	1.33
4.	Flounder	.60	18.	Tuna	.78
5.	Lobster	1.89	19.	Perch	
6.	Fluke	.63	20.	Bay Scallops	3.23
7.	Striped Bass	1.07	21.	Quahogs	2.30
8.	Scup	.25	22.	Tautog	
9.	Herring	.06	23.	Squeteague	
10.	Squid	.39	24.	Sea Clams	.53
11.	Sea Scallops	2.45	25.	Crabs	.37
12.	Bluefish	.14	26.	Grey Sole	.53
13.	Butterfish	.36	27.	Weakfish	.23
14.	Sand Dabs	.21	28.	Ling, conger, pout	
			29.	Sea Bass	.43

bay scallops have a season that is regulated by each town rather than by natural availability. Other species respond to unpredictable changes in the environment; in some years the swordfish and tuna are easily caught nearshore off Cape Cod, while in other years fishermen must travel farther offshore and to Maine or Canada to fish for them.

We compared fishermen seeking predominantly high-value, specialty market species (Group I), those seeking traditional commercial finfish with generally lower prices (Group II), and those seeking other shellfish and nontraditional species (Group III). Table 21 lists the species in each group. Along the Massachusetts coast, we found that geographical distribution of fishermen differed significantly for Groups I and II, while Group III species were sought by similar percentages of fishermen in all areas. Fifty-three percent of fishermen from Cape Cod, Martha's Vineyard and Buzzards Bay fished for Group I, while only 11% of fishermen from the North and South Shore did. In contrast, 68% of North and South Shore fishermen sought Group II species, while only 26% of those from Cape Cod and the Islands (31% from Buzzards Bay) did so. The significant differences between geographical location of fishermen seeking Group I and Group II species can be explained by a combination of local availability of the stocks of fish and the relative importance of specialized

markets (especially restaurants) in the two areas. The importance of summer tourism in southeastern Massachusetts establishes seasonal markets for the luxury species; such markets also exist along the North and South Shores.

Table 21
Species Sought by Southern New England Small-Scale Fishermen Grouped by Market Characteristics

Group I	Group II	Group III
Bay Scallops	Cod	Conch
Sea Scallops	Flatfish (misc)	Squid
Lobster	Flounders	Cusk
Striped Bass	Fluke	Dogfish
Swordfish	Haddock	Eels
Tuna	Halibut	Mussels
Quahog	Hake	Butterfish
	Herring	Weakfish
	Mackerel	Sea Clams
	Pelagic Species	Squeteague
	Perch	Tautog
	Pollack	Ling
	Redfish	Conger eel
	Scup	Ocean pout
	Sole	
	Whiting	
	Bluefish	
	Crab	

The full-time/part-time distinction among fishermen was useful when examining species selection. Most full-time fishermen (54% of all interviewed) seek the traditional, widely marketed species in Group II. These species are available during most of the year, in contrast to those in Groups I and III. A person who fishes only part time is more likely to be a sport fisherman who sells some of his catch (such as those who fish for striped bass and blue fish) or a person seeking a convenient boost to his income during the slow seasons (such as many of those who fish for bay scallops and lobsters). Swordfish and tunas are likely to be sought either by full-time fishermen using larger boats (and who fish for Group II species during part of the year) or by part-time fishermen with very expensive boats who fish these species for recreation but condescend to sell the catch. Furthermore, fishermen seeking Group I species used significantly smaller boats than those seeking Group II species: 76% of Group I fishermen had boats 30 ft or less in length, while only 44% of Group II and 56% of Group III had boats that small.

ECONOMIC RELATIONSHIPS

The characteristics of the fishermen define the labor force; the boats and gear are the major capital investments; the fishing patterns reflect the ways the fish are exploited. These components define the economic relationships and shape the production levels of the small-scale segment of the fishing industry. Most small-scale fishermen fish for a variety of reasons, and many of them do not mention economic returns as the most important consideration. Why do people invest their time and money in this business? Table 22 describes the distribution of reasons given by full- and part-time fishermen for choosing fishing as an occupation. As we mentioned earlier, lifestyle reasons are given twice to three times as frequently as economic reasons. Lifestyle reasons include responses of independence, combining freedom of action with an enjoyable activity, fulfilling a life-long desire to fish. Economic reasons include the monetary rewards of fishing, obtaining a good return on

Table 22
Reasons for Fishing and Time Spent Fishing:
Small-Scale Fishermen in Southern New England

	1st Reason		2nd Reason	
	Lifestyle	Economic	Lifestyle	Economic
Full-time	74% (T = 84)	26%	64% (T = 71)	35%
Part-time	68% (T = 69)	32%	56% (T = 64)	44%

investment and an absence of other job opportunities. Fishermen frequently gave long, rambling discourses about why they enjoyed fishing so much, how many advantages fishing had over any other occupation they could think of, how unwilling they would be to work at another job, and so forth. The expressed importance of non-pecuniary rewards of fishing to these fishermen helps to explain their willingness to settle for modest incomes from fishing; however, many of them earn very good livings from the fishery and are proud of the economic and social standing that results from being "high-liners" (the industry's term for high money-earners).

There is a joke told among fishermen that illustrates their commitment to the industry. It goes something like this:

> Once there was a millionaire who knew that he was dying. He went around looking for someone who was worthy of being his heir. First he talked to an artist and the artist told him that he would only drink away the money in bars, and thus was not worthy to receive it. Then the rich man went to an insurance man and asked him what he would do if he were to inherit. The insurance man said that he wasn't worthy of the money because he was a compulsive gambler and would lose the money at the track. After talking with many people, the millionaire finally found himself down on the docks talking to a fisherman. When asked what he would do with the money, the fisherman replied, "Oh, I'd probably keep right on fishing until it was gone."

Income from Fishing

We differentiated part-time fishermen from full-time fishermen on the basis of the proportion of work time the fishermen spent fishing. But being a full-time fisherman does not mean that all of an individual's income is earned from fishing. A retired person may fish as his only work time activity, yet have only a modest dependence on any income received from fishing. Another person may be a full-time fisherman, receive no other income and have no alternative occupation. These differences in dependence upon fishing are important when considering the effects of management measures on the individual fishermen. A management measure which restricts fishing for varying periods would be more severe for the men dependent upon fishing for most of their income. When asked what proportion of their income came from fishing 171 responded (72% of those interviewed), and their answers ranged from 28 (16%) earning less than 10% of their income to 97 (41%) earning all of their income from small-scale fishing (Table 23).

Table 23
Percent of Income from Fishing
For Small-scale Fishermen in Southern New England

Percent of Income from Fishing	Percent of Fishermen
10% or less	16%
11 - 50%	16%
51 - 80%	6%
81 - 99%	5%
100%	57%
Total = 171	

Despite the possible divergence between time spent fishing (i.e. a retired person who spends 100% of his time fishing) and income earned from fishing (as opposed to money earned from Social Security, investments, retirement),for most fishermen the two went together. Proportion of time spent fishing and proportion of income from fishing were highly correlated (r=.94, significant at the .001 level, based on 153 cases). Of those who were full-time fishermen, 68% had alternate occupations, but most of these people live in small coastal towns where job opportunities are limited even for those with some non-fishing work experience.

Distribution of net income (from 90 respondents) is shown in Table 24. Net income represents a fisherman's personal earnings, comparable to annual income for salaried workers. Most fishermen are unwilling to discuss how much money they make from fishing. The group of fishermen who did respond are representative of the sample: there is no significant difference in boat length, reason for fishing (economic vs. life style), or captain's education for those who replied compared with those who did not reply. Thus we assume these responses are typical for the entire group. Although 22% made less than $10,000 per year, 37% made over $20,000. Thus small-scale fishing provides a

Table 24
Net Income Reported by Small-scale Fishermen
In Southern New England

Net Income	Percent of Fishermen
$10,000 or less	22%
$10,100 - $20,000	40%
$20,100 - $30,000	24%
$30,100 or more	13%
Total = 90	

reasonable amount of income for many people in the fishing business, although the majority choose the profession for life-style rather than for strictly economic reasons. Particularly among the full-time fishermen, where net income averaged $23,380 (based on 44 replies), the pecuniary rewards are respectable. Part-time fishermen (43 responses) averaged $16,349 net income per year.[2]

We obtained information on gross stock - total revenues earned by a fishing boat in a year - for only 50 boats, or 22% of the sample (Table 25).

Again, the average boat length, captain's education and reason for fishing of the fishermen who answered this question were not significantly different from those who did not. However, 70% of those who answered were full-time. For those who provided information on earnings, the mean gross stock was $55,456 per year (median = $30,017), but keep in mind that the gross stock average is based primarily on full-time fishermen.

Table 25
Gross Stock Reported by
Small-Scale Fishermen in Southern New England

Gross Stock	Percent of Fishermen
$11,000 or less	22%
$11,100 - $35,000	36%
$35,100 - $100,000	18%
$100,100 or more	24%

Total = 50

Gross stock averages were substantially different in the various geographical groups of sale ports (Table 26). The higher average for the North Shore is associated with larger boat size and the fact that 89% of these fishermen are full-time. For the Cape and Islands, 80% of the respondants to the gross stock question worked full-time at fishing, had the smallest average size boats in the region, and high average gross stock. This reflects choice of high-priced species in seasonal abundance.

Table 26
Gross Stock by Area of Major Sale Port
For Small-Scale Fishermen in Southern New England

Area	Number of Fishermen	Mean Gross Stock	Av. Boat Length	% Who Fish Full Time
North Shore	9	$110,000	49	89%
South Shore	3	$ 53,333	44	67%
Cape, Vineyard, Nantucket	5	$ 82,800	34	80%
Connecticut	12	$ 54,258	38	75%
Rhode Island	23	$ 26,557	36	57%

Capital Investment

The capital cost of investing in a small-scale fishing business is modest compared to large-scale fishing, although the fishermen's estimated resale values of boats and gear varied considerably. The values averaged $73,000, but ranged from $600 to $330,000 for the 114 fishermen who responded to this question. Commercial fishermen who depreciate the value of their boats for tax reasons are likely to know the value of their boats, but they may be unwilling to provide the information if they suspect that information is to be related to income tax statements. The estimates of value gathered in this survey correspond with prices advertised for similar vessels in fishermen's newsletters, the National Fisherman and regional newspapers.

Fishermen with less expensive boats (as reflected by resale value) could generally finance their boats from personal savings. On average, their boats were small (32 ft) and they were more likely to be part-time fishermen (Table 27). Outside sources of capital were sought by full-time fishermen who wanted larger boats. Among the 32 fishermen who provided information on both gross stock and sources of financing (Table 28), average gross stock was highest for those who used government programs or loans from friends and relatives as a major capital source; these boats also had the highest average resale value. This reflects the ability of a successful fisherman to attract capital by his demonstrated ability to earn revenues from fishing as well as the greater amount of money required for a large vessel.

Table 27
Primary Financing Sources for Small Fishing Boats
In Southern New England

Financing Source	No. of Cases (%)	Avg. Boat Length	Percent Part-Time	Percent Full-Time
Bank Loan	23 (10)	37 ft	35	65
Personal Savings	13 (6)	32 ft	54	46
Loan from Relatives/Friends	5 (2)	42 ft	40	60
Government Program	5 (2)	43 ft	0	100
No Response	190 (81)			

Government programs have made money available for financing fishing boats by guaranteeing vessel loans made by commercial banks, allowing fishermen to

establish tax-sheltered capital construction funds, and making direct loans through the Small Business Administration Loan Program. Only a few of the fishermen interviewed took advantage of government programs: six used the Farm Credit Bureau, three the SBA Loan Program and only one the NMFS Loan Guarantee. The negligible contribution of the latter program is due to an administrative focus on funding larger vessels (mostly over 100 ft) with this program in New England.

Table 28
Gross Stock by Financing Source
For Small-Scale Fishermen in Southern New England

Major Financing Source	Average Gross Stock (No. Cases)	Avg. Resale Value (No. Cases)
Bank Loan	$ 40,936 (14)	$51,023 (23)
Personal Savings	$ 10,122 (9)	$24,623 (13)
Government Program	$105,000 (5)	$58,600 (5)
Loans - Friends and Relatives	$ 42,750 (4)	$40,600 (5)
Total	32	46

Few of the small-scale fishermen we interviewed had major problems with the amount of investment required in their businesses. Several had gradually traded their way up from small skiffs to more powerful boats in the 40-50 ft class. Others had eventually needed to go to the bank to finance new gear or a new or rebuilt boat. Gear by itself was evaluated at between $100 and $60,000 (mean $3900 for the 116 fishermen who responded), but for 84% of them gear was worth less than $5000. Even some of those with relatively expensive boats and gear could manage their finances from personal sources (including relatives and friends). Generally, capital costs do not constitute a serious barrier to entry into small-scale fishing. An active market in second-hand boats provides conditions for easy exit as well.

Crew Payment Systems

Share or lay systems are one method for dividing among crew and boat owner(s) the money earned from selling fish. Details on the systems used in New England are given in Holmsen (1976) and Smith and Peterson (1976). Only 65 of the fishermen interviewed (27% of the sample) were paid through some

form of a share system. The most common systems were the 50/50 (reported by 22% of the group who used some lay system), 55/45 (used by 22%) and 60/40 (used by 29%). In each case, the first number refers to the percentage of gross revenues divided among the fishermen and the second to the percentage going to the boat. However, various costs are subtracted either before the gross revenues are divided between the crew and the boat or before the crew share is divided. A number of other systems were also in use. Some captains paid their crew a flat rate per day, with a bonus if the catch was large.

Marketing Arrangements

Although many small-scale fishermen sell primarily to wholesalers or co-operatives (64%), about 36% sold to other buyers - fish markets, restaurants, local families, whoever is at the dock (Table 29). In contrast, virtually all the larger boats in New England sell direct to wholesaler/processors either through an auction or coop or by prior arrangement with an individual processor (see Peterson and Smith 1979). The fisherman's customary or most frequent buyer is considered the primary buyer.

Table 29
Buyers of Fish Caught by Small-Scale Fishermen in Southern New England

Primary Buyer Type	Percent of Fishermen
Wholesaler & coops	64%
Other	11%
Fish Market	9%
Restaurant	7%
Anybody	5%
Family	2%
No Response	2%
Total = 124	

The diversity of selling arrangements indicates some of the differentiation in markets for fish: the combined requirements of species, quality, timing and volume create many niches in which exchanges take place with substantial buffering of competitive market forces. This differentiation in the marketing of fish is partly explained by the absence of processors in the smaller ports frequented by small-scale fishermen. Of 223 fishermen who responded, 42% sold

their fish in a port without a processor. The product flow to the ultimate consumer is quite different in these smaller ports. From the wholesaler's point of view, some minimum volume of fish is a necessary condition to setting up business in a particular port. The preference for larger catches to be sold in traditional wholesale markets is also reflected in the relationships between average boat length and sales methods, such as auction (55 ft), coop (45 ft), contract (42 ft). In contrast, the smaller volume requirements of non-wholesale buyers show up in the smaller average boat size of those who sell primarily to them: limited number of buyers (35 ft) or other buyers (27 ft).

Table 30
Categories of Fish Buyers for Various Characteristics
of Small-Scale Fishing in Southern New England

Characteristic	Percent of Fishermen by Fish Buyer Type					
	Family	Restaurant	Fish Market	Wholesaler	Other	Total
Handheld	13%	13%	13%	33%	27%	15
Fixed Gear	4%	4%	12%	60%	20%	25
Mobile Gear	0	6%	8%	81%	5%	79
Total = 119						
Conn.	0	20%	40%	27%	13%	15
Mass.	2%	0	7%	67%	23%	43
R.I.	2%	10%	4%	67%	17%	58
Total = 116						
Full-time	0	12%	17%	52%	19%	42
Part-time	11%	21%	21%	26%	21%	19
Total = 61						

If we examine the data without looking at gear type, 43% or 101 fishermen sell their fish regularly to a single, independent buyer. Eighteen percent (42 men) sell through a cooperative and 26% (62 men) sell to a small or limited number of buyers. Table 30 illustrates how type of sales method varies by gear type, state and proportion of time spent fishing. Our question about market alternatives and gear type was answered by 119 fishermen, while a smaller number responded to the questions about residency and porportion of time spent fishing. The mobile and fixed gear fishermen sold most of their fish to wholesalers, while the men using handheld gear sold to a much wider

variety of markets. Hidden in the category "other" is the alternative of selling fish at the dock. Several of the men sold fish as they came into port and made no effort to establish regular sales relationships with wholesalers, restaurants or fish markets.

Many of the fishermen interviewed complained bitterly about the prices they receive for their fish. Their primary complaint was that there is no differentiation based on the quality of fish - all fish is weighed and sold by the pound rather than being considered as high, medium or poor quality. This is particularly important because small-scale fishermen produce a high quality, fresh product - especially when compared to fish from the offshore boats which spend 4 to 8 days at sea. In addition, the average price for all fish is lower in the summer when most small-scale fishermen catch their largest volumes. Finally, they feel that the New England buyers will never reform (i.e. pay good prices for high quality fish) as long as they can get cheap fish from Canada to even out the supply of fresh fish distributed from New England. A Provincetown fisherman stated the general problem: "One of our biggest problems is that fish coming in from Canada; we will never get our processing industry to take us seriously if they can always rely on that stuff. Why should we fishermen have to pay for the Canadians to be put to work?" Somewhat inconsistently, the small-scale fishermen also felt that their future in the industry was going to be assured because of their ability to catch high quality fish for lower costs than the larger boats - regardless of where those boats were from.

Fuel Costs

Rising fuel costs have recently become an issue in the fishing industry, particularly for the Gulf of Mexico shrimp fleet and the New England groundfish fleet. We asked small-scale fishermen in the summer of 1980 what percentage of their costs were fuel costs. The responses ranged from 5% to 80%, but on the average fuel accounted for 27% of their operating costs. Fuel consumption depends primarily on gear type, distance of fishing area from home port, engine and vessel size; fuel cost itself will help determine decisions about these aspects of an individual fishing operation. Fishermen complained of increasing fuel costs, but most felt it was a less serious problem for smaller vessels (with engines less than 250 hp) which fish nearshore with fixed gear. There is already evidence that fuel costs have influenced many fishermen to switch from mobile to fixed gear.

CONCLUSIONS

The New England Fishery Management Council must make major policy decisions regarding regulation of fishing effort. This report provides some of the data needed by fisheries managers for considering the special problems of regulating small-scale fishing, particularly as it differs from the large-scale offshore segment of the New England fishing industry. Currently, the larger offshore boats are regulated, and their effort is monitored by the Coast Guard and the NMFS. Although many small-scale commercial and recreational fishermen fish in the Fishery Conservation Zone (see Table 18), they are essentially outside the bounds of the current regulatory system as administered by the Fishery Management Council. The New England states have not had a strong regulatory system, with the exception of locally-controlled shellfish management systems, and thus the inshore finfish fishermen fish with few government restraints. This is in contrast to some states, such as California, which have a history of managing commercial fisheries within state jurisdiction. Many small boat fishermen feel that their fishing activities should not be subject to strict regulation. For example, small-scale fishermen feel that quotas should not apply to them since they are not able to fish safely year round and must fish intensively during good weather.

However, when we consider the large number of small-scale commercial fishermen (total 1979 estimate for the U.S. is 184,000) and recreational fishermen (1,058,000 estimated in 1979 from Connecticut to Maine) and their effect on the total quantity of fish removed from the fishery, then the need to understand them better, and perhaps to regulate them, becomes clearer. Much of that "recreational" catch is sold by those who are discussed here as small-scale commercial fishermen. Clearly they catch substantial volumes of fish; in waters off the Northeast coast of the U.S., recreational fishermen catch approximately as much cod as do commercial fishermen (NMFS 1981).

Information about the small-scale fishermen can be used in fishery management plans and in management decisions. Most regulations have been based on a style of operation typical of larger, offshore boats in the New England fleet. Regulations which try to spread a limited amount of a single species over as many boats as possible (e.g. trip limits) keep incomes relatively uniform for boats specializing in that species. For example, if a fisherman has usually

sought cod for only a small portion of the year, a regulation limiting him to X amount on a given trip may induce him to remain in the cod fishery secure in the knowledge that this rate of catch can be maintained and will not be exceeded by others. This decision may replace a strategy of seeking larger amounts of alternative species for which he would have no limitation. This may be reasonable economically in terms of his individual operation, but it has other implications for the industry. It helps ensure that many fishermen will continue to participate in an already popular fishery, when fewer could harvest the same total amount. It may also subtly discourage fishing for less popular species. Although individual fishermen may not feel this is an inefficient situation, discouraging flexibility is an unfortunate side effect, as is the excessive number of boats harvesting fish. For some of the more specialized larger boats, such regulations may create substantial inefficiencies.

The general pattern of economic relationships for the small-scale segment of the fleet is complex and diversified. Individual fishermen appear to have adjusted their fishing strategies to a combination of factors including relative abundance of species, relative prices of species, weather and ocean conditions, catching efficiency of various gear types and personal experience. Their investments in boat and gear are modest in comparison to the requirements for larger boats, and consequently they are not so bound to a known method of fishing and a traditional species by the requirements of large monthly mortgage payments. Most small-scale fishermen can afford the time and learning required to try a new gear or species, whereas most large-scale fishermen find such experimentation too expensive a risk. The flexibility in fishing styles is not the only distinguishing characteristic of the economics of small-scale fishermen's operations. Their marketing patterns are also variable and individualized, often relying on sales directly to restaurants, retailers or consumers rather than the standard channels of selling to wholesalers or processors.

Although most of the small-scale fishermen rely on fishing for the greater proportion of their income, they are attracted to fishing by non-monetary rewards. They feel a strong comittment to fishing because of its "life-style" characteristics and would be unwilling to leave the occupation unless forced. Even though some of these fishermen have skills or experience in alternate occupations, returns from fishing would have to decline to a very low level before they would leave.

The geographic dispersion of these fishermen creates further diversity. Rather than being concentrated in a few major ports as are the large-scale fishermen, they are scattered all along the coast in many communities. Their importance is both economic and symbolic - some are part of traditional fishing families, others are "outsiders" who began fishing as a recreational diversion and ultimately adopted commercial fishing as a life style and occupation. Because a growing number of retired persons in coastal towns supplement fixed incomes with fishing, information about these fishermen may be useful in social welfare system development plans for these towns.

Fishing is proportionally of greater economic importance to many small coastal towns than to the large ports, despite the image of such cities as Gloucester and New Bedford as fishing centers. In these large ports there are alternate ways to make a living; in small ports the fishing industry may be vital to the economic fabric of the town. Our findings reflect the diversity of roles fulfilled by fishing in the lives of small-scale fishermen. For some it is a way of supplementing income and food during the slow winter season; for others it is a release from tensions built up during periods spent on other jobs; for many it is a full-time way of living which combines personal satisfaction and independence with an adequate income and time spent with family. In these fishermen's home ports, their interests are consulted when decisions are made about harbor improvements or marina construction. In most of the small New England harbors, there is usually a degree of conflict between commercial and recreational fishing interests. This appears when marine facilities are improved, when dredging is discussed or when limits on moorings are considered. Some accomodation is usually possible for the commercial fishing interests even if a recreational boating marina is built.

Small-scale fishermen feel they are affected by both state and regional fisheries management. Even if they are not personally bound by quotas, closed seasons, or closed areas, they have seen an invasion of "their" inshore grounds by the large trawlers. This competition sometimes has a severe effect on their own fishing success. Many of the small-scale fishermen question the wisdom of the past and current regulations on the New England fish stocks. A number of them have specific criticisms of the lack of cooperation between the fishermen and the managers. One fellow stated his opinion succinctly:

> For every law or regulation the fishermen are going to find some way around them. The government should try to enlist some of the fishermen's

support through careful explanations of their programs rather than try to cram regulations down their throats. For example, the logbooks. Did they ask anybody about the books, not only the general idea, but the way that they were designed? They obviously didn't because any fisherman would have told them that it was a physical impossibility to do it.

Better knowledge of how small-scale fishermen operate is particularly valuable now because of the pressing question of allocation faced by fishery managers: the large boats' fishing effort is being restricted; should the small boats have their effort regulated? Their style of operation is important to assessments of the effect of future fishing effort by part-time or small-scale fishermen on underutilizied species. The small-scale fishermen in the New England fishery are more flexible than the large-scale fishermen, switching gear and species sought in response to market changes with a flexibility which improves their economic return. These small-scale fishermen should not have their flexibility of operation restricted by complex management techniques, nor should they be ignored in future development of fishery management plans in the region. Their style of fishing adds diversity to the New England industry which may be necessary for the survival of a strong fishing fleet providing a range of fishery products to American and foreign consumers.

Footnotes

[1] The decline in demand caused by the Pope's rescinding the requirement for no meat on Friday caused a noticeable but temporary drop in demand (Bell, 1968).

[2] The part-timers devoted 40% (26.6 std. dev.) of their working time to fishing on average, but some individuals worked at fishing 90% of the time while others spent only a few days a year fishing. The mode for the part-time group was 25%, median 34%. Totals for a single item are not always the same in a cross tabulation; in this case, 90 fishermen gave net income data, but only 87 of the 90 provided information on the proportion of time spent fishing.

Bibliography

Bell, Frederick, 1968. "The Pope and the Price of Fish." American Economic Review 51, pp. 1346-1350.

Bockstael, Nancy, 1980. "The Crisis in the Fishing Industry." Maritimes, August 1980, pp. 1-3.

Dewar, Margaret, Forthcoming. Industry in Trouble: Economics and Politics of the New England Fisheries. Cambridge: MIT Press.

Holmsen, Andreas A., 1976. Economics of Small Groundfish Trawlers in Iceland, Norway and Southern New England. URI Marine Tech. Report No. 53.

Husing, Onno, 1980. Fisheries, Bureaucracy and the 200 Mile Limit: An Anthropological Study of the Effects of Increased Government Regulations in One New England Fishing Community. Unpublished Masters Thesis, University of New Brunswick.

ICNAF, 1965-1975. Statistical Bulletins of the International Commission for the Northwest Atlantic Fisheries. Dartmouth, NS.

Koers, Albert, 1973. International Regulation of Marine Fisheries. London: Fishing News (Books) Ltd.

Miller, M., and Van Maanen, 1979. Boats Don't Fish, People Do: Some Ethnographic Notes on the Federal Management of Fisheries in Gloucester. Human Organization, Vol. 38, No.4.

National Marine Fisheries Service, 1981 Fisheries of the United States, 1980. Washington,D.C.: U.S. Department of Commerce, NOAA.

Norton, Virgil J. and Morton M. Miller, 1966. An Economic Study of the Boston Large-Trawler Labor Force. Dept. of Interior; BCF Circular #248.

Peterson, Susan B. and Leah J. Smith, 1979. New England Fishing, Processing and Distribution. WHOI Technical Report No. 79-52.

Poggie, John J. and Carl Gersuny, 1974. Fishermen of Galilee: the Human Ecology of a New England Coastal Community. Kingston: URI Marine Bulletin Series #17.

Smith, Leah J. and Susan B. Peterson, 1977. The New England Fishing Industry: A Basis for Management. WHOI Technical Report No. 77-57.

Appendix I: Fisherman Information

1. Personal
   - name — phone no. — address
   - sex — age — ethnic group
   - other occupation(s)
   - years in fishing
   - no. of crew and info about them
   - family involvement in fishing
   - reasons for entry into and exit from fishing
   - education and or training
   - income from fishing - gross and net
   - % of income from fishing
   - % of time spent fishing

2. Boat and Gear
   - boat name
   - year built
   - length
   - tonnage
   - type of construction
   - horsepower
   - value
   - future boat changes/purchases
   - owned by:
   - gear type(s) and size; where purchased, where repaired
   - experience with other gear - where and when
   - future gear changes

3. Fisheries
   - species sought
   - caught
   - how
   - where
   - what season (by month)
   - amount sold
   - days fished per year and month
   - length of trip
   - port of registry
   - port where greatest % of fish is landed
   - alternate ports where fish is landed
   - type of buyer

4. Perceptions
   a) effect of the 200-mile limit on fishing activities
   b) effect of foreign fishing
   c) examples of specific management measures(state or council) that have affected fishing
   d) perception of small scale fishing in southern New England
   e) perception of large-scale fishing in southern New England
   f) alternative occupations/activities if life could be lived over

Appendix II
Description of Interview Procedure

Interviews with fishermen were informal, carried out as conversations interspersed with questions rather than as a formal question/response exchange. We interviewed in a variety of settings: at the boat, at a fish buyer's market, by the fisherman's truck, over the telephone. In addition to the data included in Appendix I, we made notes on issues of particular interest to the fisherman being interviewed (anger with scientists who assess the fishery resource, ignorance of all regulations, importance of family participation, connections between fishing and non-fishing activites). We also noted any information about the fisherman from other fishermen or dealers, the setting of the interview, and so forth. Interviews with fish buyers were almost always conducted at the buyer's building - in the office, in the fish-cutting area, or at the unloading dock. Depending on the buyer's attitude, notes were taken during the interview or written down later.

May 1980

DISTRIBUTION FOR SEA GRANT REPORTS

No. of Copies	Address
3	National Sea Grant Depository Pell Marine Science Library University of Rhode Island Kingston, RI 02881
5	Office of Sea Grant 6010 Executive Blvd. Rockville, MD 20852
25	NOAA Library & Information Serv. Div. OA/D825 6009 Executive Blvd. Rockville, MD 20852
1	Sea Grant Today Editor, Food Science and Technology VPI & SU Blacksburg, VA 24061

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. WHOI-81-72	2.	3. Recipient's Accession No.

4. Title and Subtitle

SMALL-SCALE COMMERCIAL FISHING IN SOUTHERN NEW ENGLAND

5. Report Date: August 1981

6.

7. Author(s): Susan Peterson and Leah J. Smith

8. Performing Organization Rept. No.

9. Performing Organization Name and Address

Woods Hole Oceanographic Institution
Woods Hole, MA 02543

10. Project/Task/Work Unit No.

11. Contract(C) or Grant(G) No.

(C) 04-8-M01-149 **
(G) NA 79AA-D-00102 **

12. Sponsoring Organization Name and Address

Department of Commerce, NOAA, Office of Sea Grant **
and
Pew Memorial Trust

13. Type of Report & Period Covered

Technical

14.

15. Supplementary Notes

This report should be cited as: Woods Hole Oceanog. Inst. Tech. Rept. WHOI-81-72

16. Abstract (Limit: 200 words)

This description of the small-scale sector of the Southern New England (Massachusetts, Rhode Island and Connecticut) fishery includes information on the fishermen (their ages, education, experience, occupational training, family involvement and reasons for fishing) and the physical characteristics of the fleet (the boats and gear). Fishing patterns are analyzed by species, geographical areas and seasons. The economic structure of small-scale fishing is described in terms of investment, net and gross earnings, fuel costs, crew payments systems and marketing arrangements. Management implications of this information and analyses are included.

17. Document Analysis a. Descriptors

1. New England
2. Fishing industry
3. Coastal fishing

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) Unclassified 20. Security Class (This Page)	21. No. of Pages 44 22. Price

(See ANSI-Z39.18)

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)