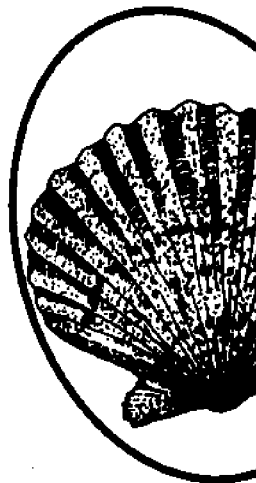
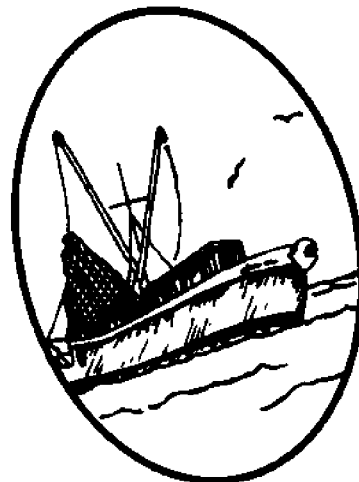
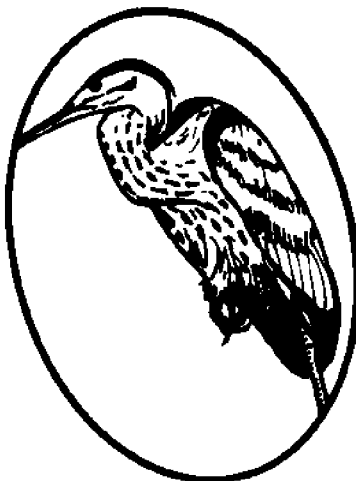
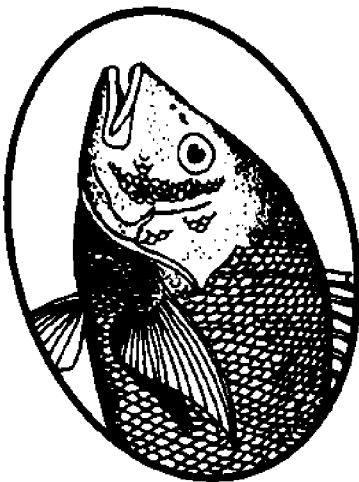
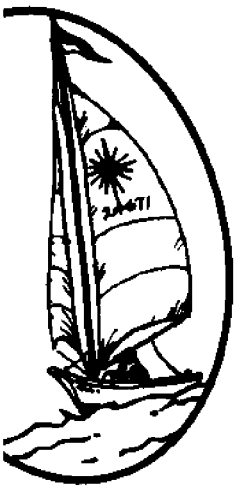


Working Paper 81-12

Socioeconomic Aspects Of the Bay Scallop Fishery In Carteret County, North Carolina

Peter H. Fricke



NATIONAL SEA GRANT DEPOSITORY
PELL LIBRARY BUILDING
URI, NARRAGANSETT BAY CAMPUS
NARRAGANSETT, RI 02882

UNC Sea Grant College Program
105 1911 Building
North Carolina State University
Raleigh, NC 27650

**SOCIOECONOMIC ASPECTS OF THE BAY SCALLOP FISHERY
IN CARTERET COUNTY, N.C.**

by

Peter H. Fricke

**Institute for Coastal and Marine Resources
East Carolina University**

This work was sponsored by the Office of Sea Grant, NOAA, U.S. Department of Commerce, under Grant No. 04-8-M01-66 and the North Carolina Department of Administration. The U.S. Government is authorized to produce and distribute reprints for governmental purposes notwithstanding any copyright that may appear hereon.

UNC Sea Grant College Publication UNC-SG-WP-81-12

December 1981

Price: \$1.25

**NATIONAL SEA GRANT DEPOSITORY
PELL LIBRARY BUILDING
URI, NARRAGANSETT BAY CAMPUS
NARRAGANSETT, RI 02882**

LIST OF TABLES

		<u>Page</u>
Table 1	Bay Scallop Landings in North Carolina (1977).	2
Table 2	Population Size of Coastal Townships and Municipalities, Carteret County, 1970.	3
Table 3	Boats Licensed to Fish in the Communities Studied.	4
Table 4	Key Informants Interviewed by Community and Occupation	6
Table 5	Fish Processing and Wholesale Establishments and Employment (1977).	7
Table 6	Licensed Fishing Boats in Carteret County (1978)	8
Table 7	Licensed Fishing Boats by Species Sought in Carteret County (1978)	10
Table 8	Licensed Fishing Boats by Length in Carteret County (1978).	11
Table 9	Employment of Persons Sixteen Years Old and Over by Industry in Carteret County in 1970	12
Table 10	Occupational Classes of Persons Sixteen Years Old and Over in Carteret County in 1970.	13
Table 11	Estimates of Fishing Effort for all Species of Part-Time and Full-Time Scallop Fishermen by Community, 1978.	15
Table 12	Fishing Seasons in Carteret County, N.C.	16
Table 13	Estimates of the Number of Fishermen by Community in 1978.	17
Table 14	Estimates of the Number of Full- and Part-Time Scallop Fishermen by Community in 1978	19
Table 15	Estimate of Net Income of Bay Scallop Fishermen by Community	20
Table 16	Estimates of Kin Relationships of Bay Scallop Fishermen by Community (%)	22

	<u>Page</u>
Table 17 Estimates of Age Distribution of Bay Scallop Fishermen by Community (%).	25
Table 18 Estimates of Length of Residence of Fisherman in his Community by %	26

SUMMARY REPORT

SOCIOECONOMIC ASPECTS OF THE BAY SCALLOP FISHERY IN CARTERET COUNTY, N.C.

Introduction

The principal areas of the fishery lie in Core and Bogue Sounds and, thus, in Carteret County (Table 1). Proposals for management of the resource include shortening the season, traditionally from December to April, and restricting access to the fishing grounds by either increasing license fees or closing scallop beds on a cyclical basis. While there is strong biological evidence that the resource is being over-fished, a management plan must also take into account its socioeconomic implications.

This report is of a study undertaken in 1978, with a follow-up in 1979, of the communities along Bogue and Core Sounds and their dependence upon the bay scallop fishery. The project, which involved some six weeks of field work, was based on a set of interviews with persons involved with both the fishery and the Bogue and Core Sounds' communities about the role that the bay scallop fishery played in their lives. The chosen method of research was the key informant interview because of the small size of the population of fishermen and the limited time available for the research. In consequence, the information presented herein is qualitative since open-ended interviews are not amenable to statistical treatment. To place this information in perspective, additional material has been collected from published sources and public records.

The townships and municipalities in which research took place were: Atlantic, Beaufort, Cape Carteret (Broad Creek), Davis, Emerald Isle (Salterpath), Marshallberg, Stacy and White Oak (Table 2). The choice of these communities was made on the basis of the number of boats fishing for scallops in each community based upon information available to the Division of Marine Fisheries in November, 1978. The range of boats was broad, from 27 to 283 per community, and communities were chosen to represent the full range of boats (Table 3). When interviewing began, it became apparent that boat licenses issued bore little relationship to the number of boats that were active in any one fishery. Licenses are issued on the basis of boat length, with an additional fee for shellfish (oysters and clams) permits. On the license application forms, fishermen indicate the categories of fish they intend capturing, but with the exception of shellfish, a single license covers all species. The level of activity depended upon the apparent productivity of the scallop beds; many fishermen went scalloping only if the fishing was good.

Some communities were omitted from the sampling frame for other reasons. Harkers Island was not studied because another study using key informants,

TABLE I. BAY SCALLOP LANDINGS IN NORTH CAROLINA (1977)

	<u>Weight (lbs)</u>	<u>% Wt.</u>	<u>Value (\$)</u>	<u>% Value</u>
North Carolina	257,048	100	509,255	100
Carteret County	257,048	100	509,255	100

Data derived from "Annual Summary of North Carolina Fishery Statistics, 1977," N.M.F.S.

TABLE 2. POPULATION SIZE OF COASTAL TOWNSHIPS AND
MUNICIPALITIES, CARTERET COUNTY, 1970

	<u>Population</u>
*Atlantic	814
Atlantic Beach	300
*Beaufort	3,368
*Cape Carteret	616
*Davis	456
*Emerald Isle (Salterpath)	422
Harkers Island	1,639
Indian Beach	245
*Marshallberg	525
Morehead	11,929
Pine Knoll Shores	62
Sealevel	347
Smyrna	517
*Stacy	257
Straits	1,166
*White Oak	2,496
Carteret County	31,603

Data derived from U.S. Census - Population Statistics,
1970.

*Communities studied.

TABLE 3. BOATS LICENSED TO FISH IN THE COMMUNITIES STUDIED

<u>Community</u>	<u>No. of Boats*</u>	<u>% of all Boats Licensed (N=2163)</u>
Atlantic	87	4.0
Beaufort	142	6.6
Cape Carteret (Broad Creek)	33	1.5
Davis	74	3.4
Emerald Isle (Salterpath)	102	4.7
Marshallberg	61	2.8
Stacy	36	1.7
White Oak	<u>78</u>	<u>3.6</u>
TOTALS	613	28.3

*Information obtained from key informants and N.C. Division of Marine Fisheries.

"The Sociocultural Organization of Fishing in a North Carolina Coastal Community" by Sabella and Hepburn (N.C. Sea Grant College Program), was in progress and it was felt that two socioeconomic studies of fisheries would be a burden upon local inhabitants. For a similar reason, Morehead City and North River were not included; the "Social and Economic Costs and Benefits of Ocean Outfalls" project (see "Ocean Outfall Wastewater Disposal Feasibility and Planning;" Coastal Plains Regional Commission, 1979) was in progress and questionnaire surveys of households and community leaders were planned.

Forty-five persons were selected as key informants (Table 4). Of these persons, ten indicated that they did not wish to cooperate in the study, and were not interviewed. The selection of persons to be interviewed was made following a series of discussions with members of the Law Enforcement Section of the N.C. Division of Marine Fisheries and with biologists familiar with the area. The criteria used in the selection process was that the person chosen was knowledgeable about the fishery and his community, and had taken an interest in the development of regulations for the scallop fishery. In all, seventeen fishermen, ten fish dealers or processors, and eight community leaders were interviewed. Of the latter groups, three were ministers, four owned non-fishing businesses and one owned a restaurant. All were assured that their replies would be kept confidential and, thus, none are named in this report, and information given herein is structured so that communities cannot readily be identified from this narrative.

Fisheries of Carteret County

In 1977, 257,048 pounds of scallop meats were landed in the fishing ports of North Carolina (Table 1). Of this catch, 100% of the scallops were landed in Carteret County. The value of the fishery was \$509,255 in both North Carolina and in Carteret County at the dockside. Approximately 28% of the catch was processed and sold as fresh scallops in Carteret County to restaurants or to dealers outside the County, and the balance was shipped to major markets. All the scallops were processed in the County before sale, giving an added value of approximately \$382,000 or an added ratio of 1:1.175. While this ratio is relatively small, processing allows dealers to ship scallop meats to distant markets as well as to control the supply to the market.

The processing and transportation sector is an important, but often overlooked, segment of the fishing industry (Table 5). Although the added value ratio referred to above is relatively small, the final market price of fish is approximately 2.75 to 3 times that of the value of dockside. A conservative estimate, and one used by the N.C. Division of Marine Fisheries, is that the value of the freshly-caught fish is multiplied by a factor of 2.5 by the time it reaches its final market place. Thus, the bay scallop fishery provides a revenue to processors, packers, transportation businesses, and marine repair and supply organizations of some \$1,273,000.

At the time of this study, there were 3,287 boats licensed to catch fish in Carteret County. Excluding charter and other pleasure boats, there were 2,519 commercial fishing boats, of which 1,235 (49%) were operated by full-time fishermen (Table 6). The diversity of fisheries of Carteret County can

TABLE 4. KEY INFORMANTS INTERVIEWED BY COMMUNITY AND OCCUPATION

<u>Community</u>	<u>Fishermen</u>	<u>Fish Dealers</u>	<u>Community Leaders</u>	<u>Total</u>
Atlantic	2	1	1	4
Beaufort	2	2	1	5
Cape Carteret (Broad Creek)	2	1	1	4
Davis	3	1	-	4
Emerald Isle (Salterpath)	2	1	1	4
Marshallberg	2	1	1	4
Stacy	2	2	1	5
White Oak	<u>2</u>	<u>1</u>	<u>2</u>	<u>5</u>
TOTALS	17	10	8	35

TABLE 5. FISH PROCESSING AND WHOLESALE ESTABLISHMENTS AND
EMPLOYMENT (1977)

	<u>North Carolina</u>	<u>Carteret County</u>
Processing plants	76	23*
Wholesale establishments	144	48*
Seasonal employment	2,528	816
Year-round employment	1,770	571

*Key informant estimate.
Data derived from "Fisheries Statistics of the U.S., 1978," N.M.F.S.,
and key informant responses.

TABLE 6. LICENSED FISHING BOATS IN CARTERET
COUNTY (1978)

<u>Characteristics</u>	<u>No. of Boats</u>	<u>%</u>
Commercial (full time)	1,235	37.6
Commercial (part time)	1,284	39.1
Pleasure	<u>768</u>	<u>23.3</u>
TOTALS	3,287	100.0

Data derived from N.C. Division of Marine Fisheries Boat
License Application Data Summaries (1979).

be seen in Table 7, in which the number of licenses issued to fishermen are shown for the six main categories of fish which fishermen intended to catch. These license sets, i.e., clam, crab, finfish, oyster, scallop and shrimp, reveal that the average commercial boat is utilized for five different forms of fishing. Thus, fishermen rely upon a variety of species and gears to provide their livelihood in any year.

The fisheries of Carteret County are small scale, and dominated by owner-operators of boats. Seventy-five percent of the boats used are under 21 feet in length, and approximately 92% are under 25 feet in length. Only 44 boats (1.3%) are over 51 feet in length (Table 8). The small size of boats is a function of the shoal waters of the sounds and inlets, and the richness of the fishery close to the fishermen's home port. It also indicates that the level of capital needed to participate in the fishery is low, and thus marginal and seasonal fishermen can participate.

The Economy of Carteret County

There are three major industries in Carteret County: tourism, fishing and defense. In addition, construction, agriculture, forest products and transportation add significantly to the economy of the County. Table 9 provides a breakdown of employment by industry and shows that 11,225 persons were gainfully employed in 1970. However, a further 1,280 persons or 11.4% were unemployed at the time of the census in 1970. This was in spite of an increase of nearly 3,000 jobs in the County in the previous decade. The three principal industrial categories shown by the census are the wholesale and retail trade (which includes fish houses) employing 2,605 persons; public administration (which includes the staff of the National Marine Fisheries Service, N.C. Division of Marine Fisheries, and the university laboratories) employing 2,068 persons; and manufacturing (including fish processing and boat building) with an employment of 1,615. In 1978 it is estimated that the number of jobs available had increased by 3,400 overall, but unemployment continued to average 7%, with a seasonal peak in January and February of 16.2%.

Breaking down the employment figures by occupational groups used by the N.C. Department of Social Security statistics, it appears that there were some 120 persons engaged in forestry, 225 in farming and 386 persons in full-time fishing in 1970. These figures appear suspect since the N.C. Division of Marine Fisheries data shows that there are some 1,235 commercial fishing boats operated year-round (Table 6) in Carteret County. An explanation for this may lie with the seasonal employment of fishermen and the nature of their occupation. For the present, it will suffice to suggest that the increase of approximately 2.8% of persons who worked for 26 weeks or less each year between the censuses of 1960 and 1970 were fishermen who were operating within a strictly cash economy. It is also suggested that a sizeable proportion of the uninsured unemployed, which represents in Carteret County some 11% of the male population below the age of 65, are also fishermen. Between these two groups of persons a total of about 1,100 unreported fishermen who obtained their principal earnings (i.e., more than 50% of total income) from this occupation is projected. Thus, it is believed that there are some 1,500 fishermen who fish full time in Carteret County.

TABLE 7. LICENSED FISHING BOATS BY SPECIES
SOUGHT IN CARTERET COUNTY (1978)

<u>Species</u>	<u>No. of Boats</u>	<u>% of Population (N=3,287)</u>
Clam	2,176	66.2
Crab	2,099	63.8
Finfish	2,700	82.1
Oyster	2,214	67.4
Scallop	2,131	64.8
Shrimp	2,444	74.4
Other	549	16.7

Data derived from N.C. Division of Marine Fisheries
Boat License Application Data Summaries (1979).

TABLE 8. LICENSED FISHING BOATS BY LENGTH
IN CARTERET COUNTY (1978)

<u>Length</u>	<u>No. of Boats</u>	<u>%</u>
Under 21'	2,480	75.4
21 - 25'	534	16.2
26 - 50'	229	7.0
Over 51'	<u>44</u>	<u>1.3</u>
TOTALS	3,287	100.0

Data derived from N.C. Division of Marine Fisheries
Boat License Application Data Summaries (1979).

TABLE 9. EMPLOYMENT OF PERSONS SIXTEEN YEARS OLD AND OVER
BY INDUSTRY IN CARTERET COUNTY IN 1970

<u>Industry</u>	<u>No. of Persons</u>	<u>% of Persons</u>
Agriculture, forestry, fishing & mining	731	6.5
Construction	773	6.9
Manufacturing	1,615	14.4
Transportation, utilities, communications & sanitary services	563	5.0
Wholesale & retail trade	2,605	23.2
Banking, insurance, real estate, business & repair services	566	5.0
Services	821	7.3
Health, education, welfare & kindred services	1,270	11.3
Legal, engineering & misc. professional services	213	1.9
Public administration	<u>2,068</u>	<u>18.4</u>
TOTALS	11,225	100.0

Derived from U.S. Census Population Statistics, 1970: Table 190.

TABLE 10. OCCUPATIONAL CLASSES OF PERSONS SIXTEEN YEARS OLD
AND OVER IN CARTERET COUNTY IN 1970

<u>Occupation</u>	<u>No. of Persons</u>	<u>% of Persons</u>
Professional, technical and kindred	1,250	11.1
Managers and administrators (non-farm)	1,128	10.0
Sales worker	719	6.4
Clerical & kindred workers	1,359	12.1
Craftsmen, foremen & kindred workers	2,367	21.1
Operatives (non-transport)	1,365	12.2
Transport equipment operatives	364	3.2
Laborers (non-farm)	877	7.8
Farmers, farm managers, farm laborers & farm foremen	225	2.0
Service workers, including private household	<u>1,571</u>	<u>14.0</u>
TOTALS	11,225	100.0

Derived from U.S. Census Population Statistics, 1970: Table 191.

The seasonal nature of the tourist trade, construction industry and agriculture both enhances the employment/unemployment cycle and permits local residents to engage in part-time fishing (Table 11). The proportion of persons who worked for less than a full year in 1970, but more than 26 weeks, was 21% or 2,357 persons in Carteret County according to the U.S. Census Bureau. It should be noted here that the tourist trade employs many seasonal immigrant workers and students as does agriculture, and, thus, the rise in seasonal employment during the summer months does not necessarily help the unemployed of Carteret County. In consequence, it is reasonable to suggest that some 3,500 persons earn their living, in whole or in part, through fishing in Carteret County.

The Employment of Fishermen

In the preceding sections, the information used was largely derived from secondary-source material. In this and subsequent sections, the information used is that which was obtained from the key informant interviews.

The fishing communities along Core and Bogue Sound reflect the cycle of the fishing season and the availability of alternative jobs in the employment of fishermen. The fishing cycle is shown in Table 12, and it can be summarized by stating that the hard-shell crab, clam and finfish fisheries are year-round; oysters and scallops are winter fisheries; shrimp is caught in the summer and fall, and the fishery for menhaden falls in the summer, with a short season in the late fall. Employment is thus possible year round, but the most lucrative fisheries are those for shrimp, scallops, oysters and clams.

The availability of alternative employment is a function of the location of the community. Atlantic, Davis and Stacy offer little employment other than fishing and fishing-related activities (Table 13). Marshallberg lies within the employment hinterland of Beaufort-Morehead City and that of the Marine Corps Air Base at Cherry Point in Craven County. Beaufort, Broad Creek, Salterpath, and White Oak fishermen have employment alternatives in the tourist industry of Bogue Sound, Morehead City industries, and the Marine Corps bases at Bogue, Cherry Point (Craven County) and Camp Lejeune (Onslow County). In consequence, there is a greater proportion of community income in Atlantic, Davis and Stacy derived from fishing than in the other ports. Salterpath, because of its location on Bogue Banks, offers an intermediate case.

Population changes in Carteret County have also had differing impacts upon the communities. The 'down-east' ports of Atlantic, Davis, Stacy and Marshallberg have not grown in population during the past four decades. The other communities share in the population growth of Carteret County from 18,284 people in 1940 to 36,400 in 1976. The major portion of this twofold increase in population is to be found in the settlements on Bogue Banks and in Cape Carteret, Morehead City and Newport townships. The in-migration is associated with the development of Marine Corps bases in the area and the increasing popularity of the Bogue Sound area among older persons seeking retirement homes. Neither of these patterns of migration has affected the way in which the fishermen carry on their occupation directly, but indirectly

TABLE 11. ESTIMATES OF FISHING EFFORT FOR ALL SPECIES OF PART-TIME
AND FULL-TIME SCALLOP FISHERMEN BY COMMUNITY, 1978*

<u>Community</u>	<u>Days Fished/Month</u>	
	<u>Part-Time Fishermen</u>	<u>Full-Time Fishermen</u>
Atlantic	12	20
Beaufort	6	18
Cape Carteret (Broad Creek)	8	19
Davis	8	19
Emerald Isle (Salterpath)	12	22
Marshallberg	7	19
Stacy	8	19
White Oak	6	18

*Information provided by key informants; the estimate assumed good weather.

TABLE 12. FISHING SEASONS IN CARTERET COUNTY, N.C.

<u>Month</u>	<u>Clams</u>	<u>Crabs</u>		<u>Species</u>			<u>Oysters</u>	<u>Scallops</u>	<u>Shrimp</u>
		<u>(hard shell)</u>	<u>(soft shell)</u>	<u>Crabs</u>	<u>Finfish</u>	<u>Menhaden</u>			
January	x	x			x		x	x	
February	x	x			x		x	x	
March	x	x			x		x	x	
April	x	x		x	x			x	x
May	x	x		x	x	x			x
June	x	x			x	x			x
July	x	x			x	x			x
August	x	x			x	x			x
September	x	x			x	x			x
October	x	x			x	x	x		x
November	x	x			x	x	x		x
December	x	x			x	x	x	x	

TABLE 13. ESTIMATES OF THE NUMBER OF FISHERMEN
BY COMMUNITY IN 1978

<u>Community</u>	<u>No. of Fishermen (A)</u>	<u>No. of Scallop Fishermen (B)</u>	<u>(B) as a % of (A)</u>
Atlantic	141	115	81.5
Beaufort	250*	80*	32.0
Cape Carteret (Broad Creek)	62	51	82.2
Davis	98	78	79.6
Emerald Isle (Salterpath)	93	86	92.5
Marshallberg	83	65	78.3
Stacy	57	42	73.7
White Oak	117	80	68.4

*The key informants were unable to name all the fishermen operating from Beaufort. Their estimates of the number of fishermen ranged from 180 to 320.

it has opened up alternative employment opportunities. The growth of the County has also increased the use of the sounds for recreation, and inflated the value of waterfront property with residential development occurring in areas previously used by fishermen. This competition for space on shore and in the fishing grounds was referred to by several informants as being a factor in the decline of fishing in the western half of the County.

A marked change in the fishery is in the number of part-time fishermen (Table 14). The increasing employment opportunities ashore and the rising capital costs of equipping boats have combined to create a situation in which some fishermen have shifted to part-time fishing. Since the majority of the fishermen are owner-operators of their boats, a job ashore can provide a "cushion" against fluctuations in the fishery (Table 15). However, the part-time fisherman concentrates on those species which are the most profitable and can be fished for a relatively short season, at night, or for up to five hours per day. If there is a short season, annual vacations can be timed to coincide with the activity in the fishery. Fishing at night, e.g., for shrimp or flounder, allows the part-time fisherman to work at a regular day-time job ashore. The use of pots for fishing for crabs or eels permits the fisherman, for these species, to tend his gear before or after work ashore. Clamming, oystering and scalloping fit themselves to this last mode as well as the first. Moreover, since the shellfish seasons are confined largely to the winter and early spring when tourism and construction industries are laying off employees, many part-time fishermen have an involuntary vacation from work ashore at this time and are free to fish.

The Structure of the Bay Scallop Industry

The fishery infrastructure in North Carolina is based upon the exploitation of many species, and fishermen engage in the scallop fishery as only one part of the fishing cycle. In consequence, the bay scallop fishery is conducted with vessels which also are used for other fishing activities. Processing, marketing and transportation of scallops and scallop meats also utilizes an infrastructure designed to handle many species.

Scallop fishing is normally carried out with vessels of less than 20' in length towing two dredges. These boats and the gear used are designed for shoal waters. Often they are manned solely by the owner, although a crew member, usually a kinsman, is frequently carried. Payment of crew is normally on a share basis, but this differs from boat to boat and community to community. One frequently mentioned division gives one-third of the gross to the boat to cover operating expenses and depreciation, one-third to the owner, and if a kinsman, one-third to the crew member. Shares are also apportioned in fifths, particularly where there are part owners.

Ownership of boats is illustrative of the complexity of the structure of the fishery. If a young fisherman is able to amass sufficient capital, he will buy an older, second-hand boat, and will demonstrate his skills in that craft. Alternatively, he will be given the use of a boat by his family or friends on a share basis. Young men also frequently begin their fishing career as captains by operating a boat for a fisherman or dealer. As the

TABLE 14. ESTIMATES OF THE NUMBER OF FULL- AND PART-TIME
SCALLOP FISHERMEN* BY COMMUNITY IN 1978

<u>Community</u>	<u>Commercial Fishermen</u>		<u>% of Part-Time Scallop Fishermen</u>
	<u>Full-Time (A)</u>	<u>Part-Time (B)</u>	
Atlantic	97	18	15.7
Beaufort	53	27	33.8
Cape Carteret (Broad Creek)	32	19	37.3
Davis	66	12	15.4
Emerald Isle (Salterpath)	71	15	17.4
Marshallberg	42	23	35.4
Stacy	33	9	21.4
White Oak	47	33	41.3

*"Part-time fisherman" was defined as someone who had regular employment elsewhere. Information was provided by key informants.

TABLE 15. ESTIMATE OF NET INCOME OF BAY SCALLOP FISHERMEN BY COMMUNITY*

Community	Income from all Fishing (A)		Income from Scalloping (B)		(B) as a % Age of (A)	
	Full Time	Part Time	Full Time	Part Time	Full Time	Part Time
Atlantic	10,670	6,100	1,250	1,250	11.7	20.4
Beaufort	11,000	5,750	1,310	1,310	11.9	22.8
Broad Creek	10,425	6,225	1,450	1,450	13.9	23.9
Davis	10,500	4,150	1,250	1,250	11.9	30.1
Salterpath	11,575	6,362	1,625	1,625	14.0	25.5
Marshallberg	10,700	5,500	1,250	1,250	11.7	22.7
Stacy	11,000	5,750	1,000	1,000	9.1	17.4
White Oak	10,250	5,125	950	950	9.3	18.5

*Key informants were asked to estimate the annual income of typical full-time and part-time fishermen after all boat expenses had been met. These estimates were combined and a mean taken for each port. It should be noted that, if landings data on dockside values is correct, there may be a uniform tendency of the key informants to underestimate net income of fishermen by one-third.

young captain gains experience and prestige, he will buy a newer boat from his own funds or jointly with another fisherman. More frequently the purchase will be jointly with a fish dealer. This arrangement has advantages and drawbacks for the fisherman. The advantages are that the dealer is knowledgeable about the fishery and is able to provide credit at lean times of the year. Also, the fisherman is assured supplies, gear and dockage for the boat. The drawbacks are that the activities of the boat are tied to those of the dealer, and overhead associated with the loan or partnership of the fish dealer tend to be more onerous than if the relationship did not exist. In particular, an unscrupulous dealer may, through a process of underpricing catches and overpricing stores and equipment, ensure that a boat, or a fisherman, is associated with his fish house for a considerable period. Even though market conditions may be much more favorable elsewhere, this pattern of tied vessels ensures that communities have a steady flow of fish, and hence employment, through the marketing and processing sectors of the industry.

In Carteret County the fish dealers are, in the main, independent operators. Large corporate systems are associated only with the menhaden industry. The fish houses are part of each community and provide a large measure of community employment. Table 5 shows that 571 full-time jobs were available in the 71 fish houses or plants in the County in 1977, and a further 816 persons were employed part time. As with the employment of fishermen, there is a considerable gray area here. Employees reported in the official statistics are those for whom employment records are kept. The key informants believed that many fish houses employed workers on a cash basis only whenever they needed them. This served to meet the needs of the fishing seasons, simplified record keeping, and conformed to local norms or ideas of appropriate behavior. The estimates of fishermen-key-informants were that thrice as many people worked in the fish houses as were reported for part-time employees. Thus, some 2,400 persons were estimated to have part-time or seasonal employment in fish houses by fishermen-key-informants. The estimates of fish-dealer-key-informants placed the total number of part-time employees at approximately 1,200. For full-time employees, it was agreed by all respondents that the official statistics probably underestimated employment by 100 persons or 17.5%, and that these unreported full-time employees were kinsmen of the fish dealers.

The scallop fishery does not utilize all aspects of the fish processing and marketing infrastructure, but it does provide considerable extra employment on a seasonal basis. Shucking is done by hand or by machines, but sorting and packing meat is carried out by hand. The key informants estimated that approximately half of all those employed in seasonal work (fishermen's estimate: 1,200; dealers estimate: 600) worked in scallop processing, and some two-thirds of the full-time employees, 450 persons, were involved in some phase or another of the scallop fishery. The fishery thus provides employment opportunities of some magnitude to local communities.

To summarize, the web of relationships between fishermen, fish dealers and employees in the processing and market sector is a complex one bounded by community relationships. The majority of the participants are kinsmen and neighbors (Table 16), and this linkage is carried over into the fishermen's opportunities to fish and own a boat, and into his relationship with the fish dealer. The fisherman and dealer need one another in order to

TABLE 16. ESTIMATES OF KIN RELATIONSHIPS OF BAY SCALLOP FISHERMEN BY COMMUNITY (%)*

<u>Community</u>	<u>Father</u>	<u>Brother(s)</u>	<u>Kin Who Are/Were Fishermen</u>			<u>Cousin(s)</u>	<u>N</u>
			<u>Grandfather(s)</u>	<u>Uncle(s)</u>			
Atlantic	82	84	78	71	92	108	
Beaufort	69	70	58	67	85	62	
Cape Carteret (Broad Creek)	72	74	63	72	90	48	
Davis	80	86	81	78	94	73	
Emerald Isle (Salterpath)	74	74	68	76	90	73	
Marshallberg	72	70	69	76	87	59	
Stacy	79	72	66	77	89	42	
White Oak	61	63	51	67	74	70	

*Information from key informants.

survive in the current economic order. The dealer needs fish as cheaply and in as large a quantity as possible in order to develop his market in and out of the region. A fisherman needs a steady relationship with a dealer in order to cope with fluctuations in market prices, sizes of catch and the costs of vessel operations.

Investment in the Bay Scallop Industry

Scalloping is a primitive fishery in that the modernization of gear found in the clam and shrimp fishery has not occurred. N.C. Fisheries Regulations for Coastal Waters (1978) prohibit the use of dredges weighing more than 50 lbs. or equipped with teeth (Section .1003, p. 25). In consequence, this is a small boat fishery and the investment of a typical fisherman in boat, gear, and operating costs, excluding fuel, is on the order of \$500 to \$800 per scallop season which is approximately three months. This estimate depends upon the size and age of the boat and year-round utilization of the boat. For part-time fishermen, the relative cost of entry into the fishery is higher than for full-time fishermen.

Fuel costs vary between boats and engines, but the fishermen informants estimate that some 10 to 20 gallons of fuel will be used per day. Commercial fishing for scallops is not permitted on Saturdays or Sundays, and the number of days on which fishing is normally permitted by N.C. Division of Marine Fisheries is two per week. However, seasonal adjustments of up to five days per week fishing are sometimes made later in the season. Thus, fuel consumption varied between 20 and 40 gallons per week per boat, for boats working grounds near their home port. In cases in which boats are used at a distance from their home port (e.g., Salterpath boats used in upper Core Sound), the fuel used rises rapidly to a range of 40 to 60 gallons per week.

Costs of processing vary considerably between fish houses. Those using shucking machines report a start up cost at the beginning of each season of between \$3,500 and \$8,000. This start up cost includes maintenance and repair of the machinery, the buildings housing it, and the preparation necessary to obtain a sanitary certificate. Estimates of the cost of the machines vary widely since some are largely homemade and others are purchased or built under license. Currently, the cost of new machines varies between \$15,000 and \$32,000, and the installation and housing of this equipment is estimated to cost between \$2,500 and \$7,500. In the long run, this investment in equipment pays for itself in terms of higher output, faster processing and, thus, reduced spoilage rates and reduced labor costs.

Manual shucking of scallops is expensive in relation to machine shucking. It is estimated by the fish-dealer-informants that it costs some 40¢ to shuck each pound of meat. However, unlike machine shucking, manual shucking has no overhead or capital charges, but it does have import for local communities. In particular, the decrease of seasonal female employment in the eastern Carteret County communities (Atlantic, Davis, Marshallberg and Stacy) has reportedly strained community relationships with fish house operators. It has also contributed to an out-migration of younger women who seek work elsewhere in the County.

Other forms of investment in the fishery are limited. Trucks used for fish transport need not be especially adapted for the transport of scallops, and gear used in the fishery is often used in clamming and oystering as well. The principal costs then are in boats, fuel, machine shucking and processing, and the cost of labor.

Demographic Characteristics of Fishermen

Fishermen of Carteret County are engaged in a traditional occupation of the area, training for which is done on the job. In consequence, the age profiles of scallop fishermen do not correspond to the age profile of the population as a whole (Table 17). It is estimated that 60% of fishermen are older than 39 years of age compared to 44% for the County's population. Similarly, educational attainment among fishermen is lower because fishing communities and families value skill attainment in the fishery rather than formal qualification. Thus, less than one-third of the fishermen were estimated to have completed high school and only 2% had completed college.

The most striking demographic aspect of the fishermen were their kinship linkages (Table 16). In Atlantic, only 7 of 115 fishermen whom the informants knew did not have kin who were fishermen. In a community of 840, this would imply an intense interlinkage of families and groups of occupations. Within this context the employment statistics are meaningless to a large extent since family obligations and needs give rise to reciprocal exchanges of goods, services and cash which are appropriate to a traditional fishing community but not necessarily to a wider, industrialized society.

While income levels of fishermen are relatively low vis-a-vis the national average (Table 17), this does not take into account the benefits to be derived from membership in a traditional fishing community (Table 18). The reciprocal exchanges referred to above, the use of garden plots and local materials as well as the consumption of fish, help to insulate these communities from the worst of inflation except where fuel is concerned. The majority of fishermen in the communities were married by age 25, and family size was estimated by the key informants to be between 4 and 5 persons (parents and 2 or 3 children). All informants noted that the size of families had declined in recent decades and that younger family members were tending to move out of the community and to other occupations.

Attitudes Towards Management of the Fishery

The N.C. Division of Marine Fisheries regulates scallop fishing through the use of restrictions on gear referred to earlier, and the regulations of the length of season. In the past, scalloping has been carried on from the beginning of December to March. Scalloping has normally been limited to two days per week by the N.C. Division of Marine Fisheries, and in the 1978 season, these days were Mondays and Wednesdays. The purpose of this measure was to provide stocks throughout the season, and thus, avoid an influx of scallop meat on the market which would depress market prices. By regulating the fishery in this way, the fishery managers were able to ensure that benefits

TABLE 17. ESTIMATES OF AGE DISTRIBUTION OF BAY SCALLOP FISHERMEN BY COMMUNITY (%)*

<u>Community</u>	<u>19 or less</u>	<u>20-29</u>	<u>Age in Years</u>		<u>50-59</u>	<u>60 or more</u>	<u>Totals</u>	
			<u>30-39</u>	<u>40-49</u>			<u>%</u>	<u>N</u>
Atlantic	8	17	15	21	24	15	100	107
Beaufort	4	23	16	19	28	10	100	64
Cape Carteret	2	20	26	20	24	8	100	50
Davis	3	16	19	23	23	16	100	71
Emerald Isle	3	11	19	29	24	14	100	74
Marshallberg	6	18	16	22	25	13	100	62
Stacy	5	19	17	21	23	15	100	41
White Oak	7	21	19	19	24	10	100	73

*Estimated by respondents.

TABLE 18. ESTIMATES OF LENGTH OF RESIDENCE OF FISHERMAN
IN HIS COMMUNITY BY %*

<u>Community</u>	<u>0-10 Yrs.</u>	<u>11-25 Yrs.</u>	<u>26-40 Yrs.</u>	<u>More than 41 Yrs.</u>
Atlantic	3	15	56	36
Beaufort	19	28	31	22
Cape Carteret	8	14	49	29
Davis	2	12	46	40
Emerald Isle	2	16	51	31
Marshallberg	1	19	47	33
Stacy	2	10	53	35
White Oak	7	23	34	36

*Estimated by key informants.

to the fishermen and the industry, in general, were maximized. Increases in the number of fishing days permitted in the week, usually towards the end of the season when the resource is scarce, also benefited the fishermen.

Presently, the Division of Marine Fisheries is considering moving the opening of the season to mid-January because of the poor meat-to-shell ratio of scallops immediately after spawning in the fall. There was some concern about this issue among key informants in 1978, but that season was so poor that the informants all agreed that further management measures were necessary. The existing measures, gear regulation and limitation of fishing days, were continued in the 1979 season, but the opening of the fishery was delayed until mid-January. Key informants noted that the few complaints made about this move came from part-time fishermen who had relied upon Christmas and New Year vacation fishing to provide additional income. The clam season was prolonged into December, 1978, to provide an alternative shellfish fishery for fishermen. Since the full-time fishermen of Bogue and Core Sounds were engaged in multi-species fishing activities, the changes in season were not a source of major economic concern to them. Among processors, the poor scallop catches were of concern since the meats are a high value commodity and the shucking machinery, where installed, was not being used sufficiently to meet its costs. For fish house workers, the lack of scallops was said by informants to have resulted in a considerable loss of income.

The management of the scallop fishery was seen by the informants as being appropriate and effective when the fishing was good. However, according to key informants, the recent poor seasons, particularly in 1973, have led a number of the scallop fishermen to speculate about the advisability of alternative management strategies. Alternatives most often cited by key informants were vigorous enforcement of existing regulations by the Division of Marine Fisheries, changes in license fees, and allocation of fishing grounds and catch quotas. These issues will be discussed in turn in the rest of this section.

Many informants commented on the lack of enforcement of fishery regulations. Their criticism of the Division of Marine Fisheries was not of the quality of enforcement but rather of quantity. Few Enforcement Officers were available to police the fisheries in the sounds and, in consequence, some fishermen were alleged to be using illegal size dredges and were fishing on days when the fishery was closed. Community reaction towards persons suspected of breaking regulations was one of censure, but the closely knit villages, described earlier, are not ones in which offenders would normally be reported to the authorities. Increased patrol activity by Fisheries Enforcement Officers was seen by the informants as being a useful management tool in that it would curb illegal fishing.

License fees for fishing vessels are currently low in relationship to those levied in neighboring states, and make no distinction between full-time and part-time fishermen. A number of the informants believed that commercial fishing license fees should be raised to a level which would discriminate between "serious" fishermen and those who fished only occasionally. Alternatively, licenses should be limited in number and issued to those full-time fishermen who wished to participate in the fishery, with any licenses remaining being issued to part-time fishermen. The idea of these changes was

to limit access to the fishery to full-time fishermen, and reflects an apparently widespread feeling that the part-timers, with an alternative occupation, were benefiting unduly from the present management arrangements.

Three of the informants proposed that the existing management strategies be continued but that certain scallop beds close to each port be reserved for fishermen of that port until the last weeks of the season. Many of the informants spoke of the scalloping practices of fishermen from western Bogue Sound who were reputed to fish until every scallop in Carteret County had been captured. The proposal of the three key informants would reduce the pressure by "outsiders" on the scallop beds close to a community and would ensure that the fishermen and processing workers living there obtained the maximum economic benefit from the resource. A variant of this proposal suggested by a key informant who was a fish dealer would be to set landing quotas for each port proportional to the number of boats fishing on a full-time basis from that port. By this means, a flow of fish through each community would be equitably achieved.

In the discussion of management practices, all the fishermen-key-informants agreed that the opening of the scallop season, or any other fishing season, should occur on the same day throughout the state. They were agreed that this would be a better practice than opening beds, or areas, to fishing when scallops had achieved any specific shell-meat ratio. The universal opening of the fishing season was seen as an important method of reducing overt conflict between fishermen from different ports since all would be able to fish their local beds at the same time.

The relationship between fishermen, processors and fishery managers is a complex one. As we have noted earlier, some management practices are explicitly linked to the economic benefit of the industry, e.g., opening scallop beds for only two days a week in order to maintain market prices and avoid a glut. Other management regulations are related to stock maturation and the biological evidence for their necessity is often disputed by fishermen, e.g., the concept of achieving minimum shell-meat ratios before opening the scallop fishery. In all cases the key informants, when critical of one or another action of the fishery managers, would temper their comments with reference to the need for some form of management. The working relationship between these groups will never be a smooth one, but efforts at communicating information and ideas could usefully be increased. In particular, communications related to biological aspects of management, which are in layman's language, would be appreciated by the key informants. A frequent comment was that fishermen cannot read Latin and many of the public reports were not comprehensible by those who were the most interested.

In day-to-day interaction between the Division of Marine Fisheries and fishermen and fish houses, the Law Enforcement Branch was seen by the key informants as the main point of contact. Tales of regulation evasion, of "putting one over on the Bureaucrats," were grist to the mill in the interviews, but there was also a strong thread of respect for the activities of the Enforcement Officers. Since the majority of the officers come from and live in the fishing communities, their relationships with fishermen in particular are part of the social network and, in consequence, regulation enforcement can often be accomplished without recourse to formal procedures.

This is both a strength and a weakness in the administration of rules concerning the scallop fishery; a strength because action is community based and, thus, part of the fabric of daily life, and a weakness because, to those not familiar with fishing communities, it would appear that little enforcement is carried out, if the criteria of arrests, etc., are applied.

Conclusion

The bay scallop industry is an important one to the local economy of communities along Bogue and Core Sounds. In good years, it provides seasonal employment for between 3,000 and 5,000 persons and contributes as much as a tenth of the income of a full-time fisherman. The current management techniques of regulation of gear, length of season and number of fishing days, are seen as appropriate by the key informants interviewed for this study for normal fishing years. In poor seasons, further regulation, including a delayed start to fishing, was acceptable to the majority of those interviewed.

Since the fisheries in the sounds rely on many species during the year, economic hardship to fishermen in a poor scallop season can be avoided to a certain extent by the judicious extension of the periods during which other species, e.g., clams, may be fished. Those who suffer the greatest loss of income during a poor season are workers employed as shuckers and packers in fish houses for whom little alternative employment is available.