Socioeconomic effects of area management and the potential for community-based co-management: A case study of the Atlantic sea scallop fishery

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SOCIOECONOMIC EFFECTS OF AREA MANAGEMENT AND THE POTENTIAL
FOR COMMUNITY-BASED CO-MANAGEMENT: A CASE STUDY OF THE
ATLANTIC SEA SCALLOP FISHERY

A Dissertation
Presented to
The Faculty of the School of Marine Science
The College of William and Mary in Virginia

In Partial Fulfillment
Of the Requirements for the Degree of
Doctor of Philosophy

by

Winifred L. Ryan 2003
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the requirements for the degree of

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Abstract

Community concerns regarding natural resource management may be addressed in several forms. The community may participate as part of the public in the management process; community concerns may be included in social impact assessment; and communities may directly participate as managers of resources whether on their own or in conjunction with higher levels of government. In fisheries, typically community concerns are addressed through social impact assessment which is perceived to be lacking in social theory, history, and often effect (Boggs 1994, Little and Krannich 1989). More recent activity and newer regulations show success with co-management, a management regime of shared responsibilities that is perceived to be based in social theory (McCay and Acheson 1987, Berkes et al 2001). Co-management requires specific situations to be in place for its institution, however (McCay 2002).

This dissertation was undertaken to find a mechanism to assist communities in providing their concerns on management issues of area management and possible buybacks while meeting requirements of social theory and law. In the attempt, a social impact assessment based upon community-based co-management theory, an assessment of the potential of community-based co-management are generated.
SOCIOECONOMIC EFFECTS OF AREA MANAGEMENT AND THE POTENTIAL FOR COMMUNITY-BASED CO-MANAGEMENT: A CASE STUDY OF THE ATLANTIC SEA SCALLOP FISHERY
Chapter 1. Introduction

In the 1990s, world and U. S. fisheries were determined to be in a crisis (McGoodwin 1994, Crean and Symes 1996). Catches were declining, and so were incomes of fishermen. These issues were of concern to the fishermen and their families, fishery scientists, fishery decision-makers, environmentalists, economists, anthropologists and sociologists, and to the communities in which fishermen lived and worked (H. John Heinz III Center for Science, Economics and the Environment 2000). New management strategies were developed to rebuild fishery resources, but social and economic effects of the conservation of the resources were viewed by management agencies and Congress to be less urgent.

Strategies for management included closing portions of fishing grounds or denial of access to specific groups of fishermen. This strategy has been generally successful for attaining biological goals of increased stocks; for example, the Atlantic sea scallop fishery is considered rebuilt, and the National Marine Fisheries Service (2003) finds that many other fishery resources are rebuilding. An additional mechanism for coping with stock declines is the reduction of capacity through buybacks. Buybacks remove vessels and/or permits from a fishery in crisis with at least some compensation to vessel owners. This is preferable to having owners declare bankruptcy. However, there must be some
restrictions on re-entry to the fishery for successful capacity reduction. Thus far, the biological and some economic concerns for fisheries have been, and continue to be, addressed, but at what socio-economic costs and to whom? In addition, how can those individuals and communities who have been affected adapt to management, or how can they mitigate negative effects of regulatory change by participation in the rule making process?

History

The situation of the 1990s was not generated de novo. A long history of management of fishery resources existed prior to that time period. Historic records show that regulation of fisheries in the United States began in the colonial era. One example of these regulations was restrictions on use of various types of fish. Fish were both a source of manure for agriculture and food during the early colonial era. In 1639, however, striped bass were prohibited from being used for manure by Massachusetts to prevent waste of a food resource (Karas 1993). Later regulation prohibited seasons of taking fish (Goode 1884), and prohibited nonresidents from harvesting (McCay 1998). Of note, these regulations set standards for allowed behavior in state waters. Beyond the state waters, access was open and fisheries within those waters were considered an open access common property resource until the 1970s.

In 1976, regulations were implemented designating the waters of the United States and fishing activities allowed and proscribed therein. The Fishery Conservation and Management Act (FCMA) authorized these regulations; the FCMA was subsequently renamed the Magnuson Fishery Conservation and Management Act (MFCMA) in 1980 and the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) in
1996 (U. S. Commission on Ocean Policy 2003). The FCMA established an exclusive economic zone (EEZ) in waters between three miles and 200 miles from shore. Foreign vessels were prohibited from fishing within the area without appropriate permits. In addition, the FCMA established mechanisms to conserve fishery resources and set a framework for management of those resources. Under the FCMA, the management of Federal waters was delegated to eight regional councils through the development of fishery management plans (FMPs), and seven standards for the FMPs were designated. MFCMA was amended in 1996 to become the Sustainable Fisheries Act (SFA), which included a ban on the creation of additional Individual Transferable Quotas (ITQs); set requirements for buybacks; and required the National Marine Fisheries Service (NMFS) to produce annual reports on the status of fisheries. In addition, the SFA expanded upon the existing national standards by adding three new standards. Of the three new national standards, one addresses the issue of bycatch reduction, and the remaining address two human dimensions of fishing including maintaining fishing communities and safety at sea. All national standards are shown in Appendix 1.

Although there are eight regional councils, these councils are seen by some individuals as being too centralized. There are currently issues occurring in fishery management which pose questions as to the appropriateness of having such large areas designated as the focus for fishery management. These questions include the possible need for more localized management if ecosystem management is to be successful in the future (Ebbin 2002); the equity of treatment of fishermen and fishing communities in light of the use of closed areas; and the equity of the distribution of effects associated with other management mechanisms such as buy-backs (Ecotrust 2002).
Regulations

Fishing activities in the EEZ are, by definition, within federal waters, and thus, federal regulations apply. Within the government's toolbox of implementation measures, command and control strategies are the most frequently applied by federal authorities. For example, MSFCMA (and SFA), require the councils to set standards to prevent overfishing. The setting of the standard for overfishing alone creates a command-and-control performance standard. An additional command and control measure for fisheries is the use of gear restrictions, but this measure is a command and control measure based on technological feasibility.

There are ten other implementation measures that could be used by government (1) research and development, (2) social funds, (3) civil penalties, (4) liability, (5) planning, (6) economic incentives, (7) criminal sanctions, (8) information dissemination, (9) property rights, and (10) contracts (Mohn 1993). Of these ten, fisheries regulations predominantly take advantage of criminal sanctions, planning, and occasionally, property rights. At present there is substantial research interest in the option of devolving some measure of property rights. Devolution of property rights to individuals was prohibited in the SFA with the requirement for no further expansion of ITQs. However, delegation of property rights to communities is allowable, but thus far only used for limited situations of highly resource dependent communities in Alaska. Expansion of the delegation of rights to communities through community-based co-management is a strategy that is intermediate between allocating public resources to individuals (because communities are socially interactive groups of individuals) and the retention of the full suite of those rights by the federal government. A review of regulations requiring consideration of
communities follows. Taken as a whole, these regulations would lead one to infer that, indirectly, community-based co-management is becoming a preferred management strategy.

Requirements for Consideration of Communities in Fishery Management

The earliest requirement for the consideration of communities in any federal management is through the National Environmental Protection Act (NEPA), enacted in 1970. In general, NEPA requires the generation of an Environmental Impact Statement (EIS) as a disclosure document for "any major Federal Action significantly affecting the human environment" (Sec 102 (2) C). Subsequent clarification by the Council of Environmental Quality (CEQ) defines the human environment as "the natural and physical environment and the relationship of people with that environment" (40 CFR 1508.14). To comply with NEPA in inclusion of the relationship of people with the natural and physical environment, social impact assessments (SIAs) are required for those actions (legislation, federally sponsored rules, construction projects, or permitting) that are identified as having significant social effects in the scoping process, which defines the important factors for an EIS.

Within the statutes related to fishery management, the most direct requirement for the consideration of communities in fishery management is National Standard 8 of the SFA. This standard states the following:

"(c)onservation and management measures shall . . . take into account the importance of fishery resources to fishing communities in order to (A) provide for sustained participation of such communities, and (B) to the extent practicable minimize adverse economic impacts on such
communities.”

Further definition as to what constitutes a fishing community is also provided in the SFA. Section 102 (16) offers the following definition:

"The term 'fishing community' means a community which is substantially dependent on or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew and United States fish processors that are based in such community."

Other regulations also require the consideration of communities. These regulations stemmed from concern for states rights that was politically important in the 1980s, and to lessen the burdens of unfunded mandates from federal authorities which began in the 1980s and continued into the 1990s. There are three Executive Orders (EO) which require consideration of communities. The three Executive Orders are EO 12866, EO12898 and EO 13083.

EO 12866 (Regulatory Planning and Review) requires that effects of regulation on communities be considered in light of unfunded mandates and economic effects. EO 12898 (Environmental Justice) requires notification of persons to exposure to hazardous and toxic materials –especially in light of fish and wildlife use for subsistence activities. EO 13083 (Federalism) restricts federal regulations from taking authority from lower levels of government when not national or multi-state in scope in accordance with the Constitution of the United States. In addition, regulations that are not required by statute must have consultation with lower levels of government.

Legislative redress to the concerns of communities were also developed. These
laws include the Regulatory Flexibility Act (RFA, or PL 96-354) which requires that regulations should not be burdensome with regard to reporting, accounting, consulting or legal costs or on small entities which are small businesses, small organizations (non-profit organizations), and small governmental jurisdictions (communities of under 50,000 people unless otherwise defined). In addition to the RFA, the Paperwork Reduction Act of 1995 was implemented to reduce paperwork burdens upon a number of entities including local and tribal governments and small businesses and that the information used by the federal government should be available for use by state, local and tribal governments.

**Current Issues**

With regard to fisheries, there are new issues to be considered. Among these are the concerns that communities may be affected differently by regulations. This has become particularly apparent with the development of area closures and concerns that communities are differently affected by the closures, even if there are subsequent re-openings. Additionally, concomitant with the development of closures and re-openings, there is the potential for developing boom and bust scenarios for landings, which have potential negative effects including the exacerbation of a loss of fishing infrastructure such as docking facilities and processing and additional stress on fishermen's families. Boom and bust may become more severe because vessels may move port to port to take advantage of scallops available in the re-opened areas.

In addition to the fishery issues, the level of inclusion of community concerns in the development of FMPs and their amendments is also an issue. The process of generating an SIA is not seen by researchers to be an optimal strategy for research or for
inclusion of concerns in the rule making process (Boggs 1994, Little and Krannich 1989, and Lane et al. 1997). Boggs (1994) criticizes SIA for its lack of realization of its legal mandates for improved research on communities and effects of federal activities. Little and Krannich (1989) find that although SIA is supposed to be diachronic in that it projects effects into the future, in reality most SIAs are synchronic as they only describe a baseline set at a specific time and generally do not undertake longitudinal studies. Little and Krannich (1989) further criticize the SIA method as having no theoretical underpinnings in the social sciences. They have proposed using one of four different theories of communities for the basis of SIA. They suggest the use of the following:

1. Warren’s (1963) approach for studying community function,
2. Murdock’s (1979) human ecological principles of invasion, succession, competition and dominance,
3. Kaufman’s (1959) field theory which focuses on the shifting “field” of groups, organizations and clusters of residents which emerge and may change over the course of a project, and
4. network approaches of various researchers including (Bender 1978, Fischer 1982, and Wellman 1979).

These definitions and a discussion of them is presented in Appendix 2. More recently Pido et al (1997) offered an alternative to SIA, using a rapid assessment method for assessing community-based co-management for fisheries.

Despite the legal requirement to use SIA, there are some disadvantages to doing so, especially the methods recommended in the NMFS guidelines (NMFS 2001). First, reliance on the decennial census makes its difficult to show that changes are due
predominantly to changes in regulation. The ten year time period between censuses often involved many changes within the fisheries, their regulations, and fishing communities, making it difficult to link any particular demographic changes to the fishery management regulations being assessed. Further, the census data has been challenged of late with the debate in Congress and the media regarding statistical sampling over the actual count. One final factor regarding difficulty of the reliance upon decennial census data relates to the fact that typically only the most recent census is consulted. Using the census data as baseline may be more useful if several censuses are used to determine the general trend for the community, but the use of a single point of time makes the assumption that the situations at the time of the census will remain constant from the time of the census until the SIA is undertaken. Although this concept of minimal change is acceptable for a baseline set at or near the date of the census, the concept is inappropriate for baselines set more than one or two years from the date of the census. Finally SIA, although it could offer acceptable alternatives that the agency might not design without community input, is not often used for the development of plans or management despite the efforts recommended by Lane et al (1997) and Boggs (1997).

Particularly important in the discussion of SIA is the scale of the effects. For fishing communities, NMFS directs that the scale considered be the community. In addition, direction is offered that the community is a community of place, using census “place” level data1. However, there are rural villages that do not qualify as census

1 Census places are incorporated cities, and towns, and unincorporated villages which have a core of residences and businesses. (http://www.census.gov/geo/www/psapage.html#CDP)
designated places, which under the regulation would not be considered. In addition to the problematic definition of community, there are currently no standards for the terms “substantially engaged” or “substantially dependent” which are used in the NMFS requirement for selection of fishing communities. A fuller discussion of community definition, in addition to the definitions of dependency, used in this dissertation follows in Chapter 2.

The remaining mechanism for including community concerns in the fishery management process is through the public comments at the public hearings. Community representatives could speak during the public comment period of any of the meetings or submit written information. However, this requires that the community knows that it has a right to speak; that its representatives can travel to the meeting location; and that they know they can submit information. Individuals who participate in the process have expressed concerns that the public comment period is controlled by the council and that material presented may be disregarded (Wilson and McCay 1998).

In contrast to SIA and participation in public comment periods, Pido et al (1997) have advanced another approach to consideration of community concerns, using community-based co-management. Community-based co-management allows communities to participate in the management process more directly. Jentoft and McCay (1995) have described co-management as the middle of the range on a continuum with extremes of federal government-based management and user-based management. Sen and Nielsen (1996) have expanded upon and diagramed the types of management (Figure 1). Community-based co-management may recognize specific property rights in a fashion similar to that used for the community development quota, but this is not necessary.
Figure 1. The spectrum of co-management agreements of Sen and Nielsen (1996). The shaded area is seen as the actual range of agreements for community-based co-management. The unshaded area to the left is a central-government focused management strategy, while the unshaded area to the right is a community-base management strategy.
Responsibilities and rights assigned may be much more limited, falling within a range of encouraging local community participation in the central governments' process to allowing some measure of property rights under a command-and-control standard that provides a "level playing ground" between communities. A fuller discussion of community-based co-management follows.

**Community-based management and community-based co-management and the advantages to their use**

Over the last twenty years, interest in community-based management or co-management has evolved. Pinkerton (1989, 1994) studied the salmon fishery of the United States and British Columbia, and described native people's methods for protecting the resource which provided both food and employment for the people of the area. Several researchers also found that local solutions to common property resources existed, mainly through local social constraints on use and access (McCay and Acheson 1987). In *The Question of the Commons*, all authors described local controls on behaviors on participants in shared resources, and noted that despite Hardin's (1968) conceptualized "Tragedy of the Commons," seldom did that "tragedy" occur. When it did occur, the researchers contended that what had actually happened was that local observation and control over the resource had been severely limited, often by a higher level of government. More recently, several social science and fishery researchers have suggested increasing the study and development of community-based management and co-management (Crean 1999, Caddy 1999, Lane and Palsson 1996).

In the spectrum of management agreements, community-based management, in which the management is situated at the local level, is preferred by some individuals. There
are, however, distinct advantages and disadvantages of management occurring at the local level Pinkerton (1994). The advantages include increased potential for interaction among stakeholders in the locality; lessened travel costs to participate in management decisions; and the potential for participation by more stakeholders in the area. Disadvantages include the need to have someone locally to provide leadership; the potential for higher costs of management as there are multiple localities that may be involved; and varying management throughout the range of the species, which requires greater knowledge on the part of the fishermen who fish throughout the range. Management focused at the top, or Federal, level has disadvantages in trying to place a “cookie cutter” approach to the fishery throughout the range, and has costs for travel and participation, which are higher than is expected for management at the local level. Co-management with management activities shared between the local and Federal level (community-based co-management) is thought to include more of the concerns of the localities while maintaining some cohesiveness of management throughout the range of the fishery.

Successful examples of community based management and community-based co-management are found within the United States. Co-management between communities and states has a long history in Massachusetts and Maine for clams and in Maine for lobster (Acheson 1987). An example from the Federal level co-managing with a community is the limited fishery for Beluga Whales in the Cook Inlet fishery. Some authors have even considered the efforts undertaken by NMFS and the scallop fishermen to assess the status of stock for re-opening the closures that have already occurred as another example of community-based co-management if one considers the industry participants to be a community of interest (Bernstein and Judecello, 2000).
Case Study-Atlantic Sea Scallop Fishery

In this dissertation, the feasibility of community-based co-management of the Atlantic Sea Scallop (*Placopecten magellanicus*) is examined. The Atlantic Sea Scallop fishery was selected as a case study for several reasons. First, the sea scallop fishery is being managed by *ad hoc* area management and the Northeast Multispecies Fishery Management Plan (NMFMP). The Northeast Multispecies Fishery Management Plan had an emergency action undertaken in 1994 which designated three areas around Georges Bank that were closed to mobile fishing gears. The emergency action was made permanent under Framework 9 of the NMFMP in 1995. Amendment 10 to the Sea Scallop Fishery Management Plan (FMP) is being developed to formalize area management strategies, including allowing limited scalloping in the closed areas designated under the NMFMP. A past history of the use of area management strategies and its effects is useful in projecting both community adaptations and individual responses to the development of the management. Secondly, some participants in the sea scallop fishery have undertaken elements of community-based co-management in the past. When the fishery was largely focused in New Bedford in the 1960s, the local union set limits on time that fishing occurred, the length of trip, and on the number of crew per vessel. In the late 1990s, Fisheries Survival Fund, a association of scallop fishermen, undertook to determine the state of the stock within the closed areas with assistance from educational institutions to re-open the closed areas on Georges Bank. There is also a history of educational institutions, National Marine Fisheries Service, and fishermen undertaking scientific studies of sea scallops for a number of questions, including those of bycatch levels and gear modifications. This indicated that cooperative studies were accepted by
fishermen and the communities. Thirdly, there was a limited number of fishermen allowed under limited access permits. This means that there was a fairly small pool of participants, which suggested that there was the potential for recognition of fishermen and an ease of communication between them. Four communities provided the port facilities at which the great majority of the scallop landings occur. These communities were New Bedford, MA; Cape May, NJ; Hampton Roads, VA; and Seaford, VA. These communities were selected for study; their locations are presented in Figure 2. Finally, industry representatives recommended study of the effects of closures on communities. Prior *ad hoc* management was undertaken on an emergency basis, and there was a desire to show that effects were not limited to fishermen and their families with the development of Amendment 10.

These factors for consideration of community-based co-management overrode factors which might inhibit use of community-based co-management as a basis of study of the fishery. The factors inhibiting community-based co-management included the wide distribution of the resource, the lack of knowledge of the actual distribution of fishing from each of the ports, a lack of boundaries at sea, and a lack of recognition of community-based management within the Council.

**Expectations for this study**

As a case study, this dissertation could provide a model for greater inclusion of community concerns into management of fisheries that are prosecuted within Federal waters by blending community-based co-management and SIA. Community-based co-management of fisheries on the east coast of the United States has been dominated by
Figure 2. Location map of communities selected for study.
state and local government in co-management as opposed to a Federal and local
government co-management strategy. Note that although there is a growing emphasis on
decentralizing decision-making in the context of Executive Orders and statutes, there is
still a need for the oversight of a Federal agency to provide equity between communities,
and to assure some level of Federal management of the publicly-owned resource.

In addition, should the local governments not be prepared to undertake additional
efforts, there is a possibility that within the fishing community, established cooperatives or
other organizations may undertake efforts for local management of fisheries, which is done
in parts of Europe (Jentoft and Kristofferson 1989, Nielsen and Vedsmand 1999). In such
an instance, redefinition of the community level would be required, but at present the U. S.
has a paucity of cooperatives that could undertake management. In addition, experiences
in Atlantic Canada (Schrieber 2001) suggest that placing the emphasis on the fishing
industry may not be sufficient to address community concerns, so the co-management
process may be required to address a triumvirate of authorities, including the local
community, the cooperative or fisheries organization, and the Federal government.

In addition, for this dissertation, communities are discussed in scale and context.
This dissertation defines communities based on the factors of Warren (1963), but does not
restrict concern to a single level of community. A description of multiple levels of
communities is generated, and the effects of area management and buybacks on the
various levels of communities are also addressed. Although there is some literature on
fishing communities’ importance in context of the municipalities, there is still no consensus
as to measures of dependency. This dissertation provides indicators for dependency and
employment context for the fisheries sector in the local economies. If little else, these
indicators may prove useful for assuaging the need for numerical measures preferred by other scientists and decision-makers within the descriptive studies usually undertaken by sociologists and anthropologists in fisheries.

In addition, this dissertation illustrates an approach to showing the effects of area management on communities by taking advantage of geostatistical data that has not been available until recently. Data on sources of landings by port are plotted on a monthly basis and this shows areas with concentration of effort. Other researchers (NEFMC 2002, Rago 2000) have focused upon the range of the fleets from the various communities and the port areas contributing effort during re-openings. These studies have not used geostatistical data to study long-term fishing patterns, nor have they considered the effects of closures on fishing patterns for landings at the various ports.

Finally, this dissertation explores the feasibility of co-management and the development of procedures for fostering co-management in the scallop fishery. Attributes of the communities are assessed to determine the potential for community-based co-management at the various levels of community.

Research Questions for this Dissertation

This dissertation was developed to attempt to answer three questions. These questions include:

- what is the level of community support for area management?
- what is the level of support in the industry for buybacks?
- how can community and industry concerns be better included in fishery management?

Subsidiary to these questions are additional issues related to area management such as
what adjustments to area management would industry or community members see as beneficial to mitigate social and economic effects of the area management strategy, and how can the community and industry plan to adapt to area management. Relative to buybacks, subsidiary issues include determining the preferred method for funding a buyback, and determining which factors should be considered in developing a buyback strategy.
Chapter 2. Methods

Theoretical underpinnings for the selection of methods

This dissertation is centered upon discovering people’s support of area management and buybacks in addition to preferences of fishery participants and their respective communities to mitigate potential negative effects of the proposed area management strategy delineated in Amendment 10 of the Sea Scallop Fishery Management Plan (FMP). Qualitative research, particularly ethnographic methods, were selected because they are useful in efforts centered on discovery. As noted by Denzin and Lincoln (2000), “(q)ualitative research is inherently multi-method in focus.” Multiple methods are used to triangulate on information to determine what are major concerns of those studied, and to determine the preferences of those studied.

In deference to the legal requirements of consideration of communities, an approach was selected that was based on social impact assessment (SIA). However, to overcome the critique of SIA as atheoretical (Little and Krannich 1989), social theory of communities and community-based co-management has been selected for use to inform the selection of methods for this dissertation. In addition, a number of ethnographic methods for determining effects of proposed management under Amendment 10 of the Sea Scallop FMP were selected because if effects are to be addressed or mitigated through the SIA process, they must first be described. Community-based co-management theories,
in particular, are important because community-based co-management incorporates community and its concerns into the process of management and regulatory development. The community and its concerns are incorporated directly through consultation with the community, and/or the community develops priorities and preferred management strategies in consultation or review by central government.

With regard to buybacks, little is written regarding the social effects or factors for determining support for buyback strategies or factors upon which to base buyback strategies. Thus far, the sole document is a publication used to present community concerns for the proposed buyback of Pacific groundfish vessels, and it focuses on the disparate concentration of vessels in various ports (Ecotrust 2002). There is a limited body of literature on buybacks from the economic perspective. What is written suggests that buybacks are almost always disaster relief, whether the disaster is due to environmental changes or changes due to redefinition of resource availability through court decision. When the alternative is to go broke or to gain something, the industry participants prefer to gain something. In the case of buybacks, the greatest benefit falls to those who sell their vessels (Holland et al. 1999). Further, the authors recognize that the buyback program serves to redistribute income and access to the fishery. An observer could thus expect that if the political and/or economic power of those who benefit after the redistribution is sufficient, that there would be greater industry support. Holland et al. (1999) also discusses at length the questions of equity with regard to buybacks due to targeting of vessels for removal. Under the typical system of the low bidders being removed, usually the low bidder has some underlying reason for wanting to leave such as marginal success, and/or a desire to retire from fishing. Other factors that might increase participation are
the possibility that a license/permit that only allows part-time or occasional participation or that permit that is not used. If high capacity vessels are targeted, the greatest benefits accrue to the most active fishermen. Finally, some programs are targeted to those in specific demographic communities, so only certain people were allowed to participate and benefit.

Definitions

Communities defined

The levels of community studied are identified by the factors of Warren (1963). Warren (1963:9) defines community as

"that combination of social units and systems that perform the major social functions of locality relevance. In other words, by community we mean the organization of social activities to afford people daily local access to those broad areas of activity that are necessary in day-to-day living."

The functions with locality relevance are (1) production-distribution-consumption, (2) socialization, (3) social control, (4) social participation, and (5) mutual support. Warren further recognizes that these functions, although they have locality relevance, are not necessarily all undertaken at the locality level. To function, a community often must be connected outside the locality in modern systems. In this definition, function is at least as important as geographical location and the associated boundaries.

In particular, for the four geographic areas studied, there appear to be three levels of community that are important as determined from participant-observation. The first level is the county, based on the need for production-distribution-consumption for
everyday life. To attain the goods needed for day-to-day life, often fishery participants and other community members travel beyond the city or town boundaries, but the travel is not so extensive as to often pass the county boundaries. An example of these criteria are the preference for food and household shopping in Middle Township by residents of Lower Township in the Cape May area of New Jersey. Similar activities for New Bedford residents tend to occur in Fairhaven. In addition, when considering area of residence, many fishery participants reside within the county where the port is located, but substantially fewer reside in the municipality. The municipalities are important, however, because of the element of social control through land use regulation that they provide for the fishing participants and some of the municipalities also offer substantial support in the form of provision of wharf and dock space, the provision of low-interest business loans, and the provision of social services. Three of the municipalities, New Bedford, Fairhaven, and Newport News offer support for the fishing sector through provision of harbor facilities. New Bedford also provides a location for social participation and support through the Fishing Families Assistance Center. The final community is a community of interest based on employment that is centered in these areas, which I term the “fishing communities.” The fishing communities, which are made up of fishermen, processors, suppliers, boat owners and their families, are also relevant because they socialize participants into the subculture associated with fishing; are a locus for production; offer social control through informal methods of others within industry (control is often through gossip, shunning, and preferred selection of people for business arrangements); and finally, offer support in times of trouble at sea. An illustration of this context for community as compared to the regulatory definition is shown in Figures 3 and 4.
Figure 3. Models of overlapping communities as per Warren (1963) used for this dissertation.

Figure 4. Model of community as per regulatory definition.
Community-based co-management defined

Despite having received nearly twenty years of study, the term co-management still has a vague definition. In an overview of co-management, Hersoug and Rånes (1997) point out that while the term is used with frequency, the definition is not exact. They state (p:160) that “some authors seem to presume a legal framework that institutionalizes both autonomous and shared decision-making between the government and industry, others expand the concept also to less formal agreements that delegate some power to user groups or joint industry-government bodies.” More recently, there is a growing recognition of both concepts as being part of the same body. Even the less formal agreements are seen by researchers as either being, in fact, recognized by the government, or, at least, not fully inhibited by government (Acheson 2000). For this dissertation, I put forth a definition of community-based co-management that focuses on formal or informal arrangements between municipalities and the New England Fisheries Management Council to address community concerns.

Municipalities appear to be appropriate because it is expected that they have a stronger dependency upon the fishing sector than the county, and the municipalities have the potential for more day-to-day interaction with participants in the fishing sector either through land use controls or through the provision of public safety services. The fishing sector, in return, is a focus for employment, may provide revenue through taxes, and for those municipalities that provide direct services, the sector often pays fees associated with those services. In addition, at least two of the municipalities selected provide some fishery management at the city level. Both of the Massachusetts municipalities, New Bedford and Fairhaven, manage local clam resources. Another criteria for the selection of municipality
as the focus for “community-based co-management” is that municipalities are the closest level of legal organization equivalent to the community level designated by NMFS as “census places.” Finally, municipalities are long-term, legally constituted bodies upon whom rights and responsibilities may be assigned. They are incorporated under specific legal requirements and are difficult to dissolve, unlike fishing organizations.

Virginia, however, has a slightly different political framework. Counties are the lowest level of political organization, and are considered equivalent to the independent cities within the state. For this reason, York County, as opposed to Seaford was selected to be the level for consideration of community-based co-management for the Seaford area communities.

Factors for assessing the potential for community-based co-management

A number of studies over approximately the past twenty years have shown that there are specific requirements for the development of successful co-management. Successful co-management is defined as a co-management system that includes participants in making decisions and managing the resource, maintains long-term resource availability, is long lived, and benefits the participants. Authors who have been influential in determining factors for successful co-management include Wade (1987), Ostrom (1990), McCay (1980, 1989) and Berkes et al. (2001). Wade and Ostrom analyze existing systems of co-management and determine what factors are important in the development and maintenance of those systems. McCay and Pomeroy take a somewhat different approach in that they have attempted to apply the principles of co-management into current settings, and predict where co-management may be used in the future as well as contributing to the theory of co-management systems.
In Wade's (1987) publication, the greater possibility of successful co-management occurs if six factors are satisfied. The six factors are (1) small areas and clearly defined boundaries; (2) high costs for exclusion technology (if inexpensive, individuals can protect "their" space or resource); (3) the relationship between resources and the user group including an overlap of the resource area and the area of residence of the users, a vital demand for the resource for survival, and a knowledge of the resources' sustainable yields by the users; (4) characteristics of the user group itself including a small sized group, well recognized boundaries for the group, the relative power of subgroups (i.e., if subgroups with competing ideas are weak, then the major groups who proposes local management is more likely to succeed); (5) noticeability of activities to enhance detection of free riders or rule violators; and (6) a relationship between the users and the state such that the state tolerates locally-based authorities. In addition, within the groups there are interactive characteristics, such as a history of working out problems, a longer-term set of mutual obligations and shared values displayed through a setting where joint rules are made and punishments are adjudicated. In light of these factors, Wade perceived that marine fisheries were not amenable to community-based or co-management, largely because of a lack of long-term interaction between participants and problems of monitoring compliance. Although this may have been correct at the time of writing, more recent studies suggest that technological developments have occurred to enhance monitoring (Caddy and Cochrane 2000), and limited access has delineated a recognizable group of participants who have interacted for over a decade now, potentially overcoming Wade's perceived barriers to co-management of fisheries.

Ostrom (1990) focuses on both economic and social institutions, which are
important for the success of co-management. She finds that communities can and do, under certain conditions, generate appropriate institutions for managing common pool resources, whether terrestrial or aquatic. Her factors for successful co-management are similar to those of Wade, except that she perceives that the size of the participant group and its proximity to the resource are less important. For resources that are parts of larger systems, she posits that nested enterprises with multiple layers of appropriation, provision, monitoring, enforcement, conflict resolution, and governance are needed for long-term maintenance of the management system. In addition, Ostrom focuses on some more processual features, including participation of resource users in rule making, the setting of graduated sanctions for violation of rules, and the presence of rapidly available, low cost conflict resolution mechanisms.

McCay (1980, 1989) describes a period when she participated in the attempt to generate a community-based management project for a clam spawner sanctuary in New Jersey. The crucial factor in instigating community-based management for this situation was the recognition of a problem, and the need to "do something." The attempt met with somewhat limited success, but even the less successful elements led to a better understanding of issues, which may either enhance or limit co-management. In this instance, it appeared that while the state authorities were supportive of co-management, there was little if any commitment toward undertaking the physical labor involved in replanting spawners to the sanctuary area by the fishery authority's employees. This caused a level of discouragement among the local participants who felt that they were stuck with the 'grunt work,' and eventually led toward the end of the project. This points out a need for a level of actual commitment (not just verbal) among both sides of the co-
management process which is further emphasized by other authors in subsequent efforts (Pomeroy and Berkes 1997, Jentoft 2000b), and that disappointments can occur, thus ending interactions, or, at a minimum, making parties less trusting.

Berkes et al. (2001) considers factors necessary for the development of co-management at three levels: the supracommunity level, the community level, and the household/individual level. These would equate to the federal level, the municipal level, and the fishing community levels previously defined.

At the supracommunity level are two factors which are important, the legal right to organize and the presence of external agents. The legal right to organize is necessary to confer authority to the community and is provided by the government through enabling legislation. External agents may be positive or negative toward the development of community-based/co-management strategies as NGOs, educational institutions, and others could assist in developing the problem definition, advising, providing expertise, aiding in conflict resolution, and advocating appropriate policies. However, external agents are also capable of disrupting the process. If the external groups' demands are distracting to coordination of the group as a whole by taking up time in litigation of decisions, or by offering too many options which could slow decision-making, the external agents could impede the co-management process.

At the community level there are thirteen factors which consider the physical and social environment. Of these, not all thirteen need to be present, but the more that are, the greater the likelihood of success. The thirteen factors are as follows:

- clearly defined boundaries,
- clearly defined membership,
- group cohesion (for example: high homogeneity of gear, kinship, religion, ethnicity, language),

- participation by those affected or inclusivity,

- cooperation and leadership at the community level,

- leadership (by action, example, and direction),

- empowerment (training and awareness of participants in taking on responsibilities),

- property rights over the resource that are defined (although collectively held),

- local organizations with defined membership, a right to exist, that are autonomous from the central government, and are representative of a majority of the resource users of the community,

- sufficient finances,

- partnerships and a sense of being a full partner,

- accountability and transparency in decision-making,

- a strong co-management institution for making decisions as well as for managing conflict.

At the individual level, there are two important factors for the success of co-management. These factors include an individual incentive structure that persuades people to participate, and credible rules with effective and equitable enforcement.

Although the factors considered by Berkes et al. (2001) are generally applicable to the development of community-based co-management, three additional factors should be considered for large-scale fisheries in the eastern United States. These factors include isolation of the fishing community; a high dependency upon the fishery for food, for social interaction, and/or for employment; and a precipitating event or situation which is
perceived as a "need to do something."

Isolation is implied, at least in some moderate degree by Berkes et al.'s characteristics of small-scale fisheries (Berkes et al. 2001:7). The characteristics include disposal of catch as organized local sale with significant consumption by operators, partial integration into the broader economy, and usually small management units. Isolation may be contributory to community cohesiveness as community members cannot escape one another and local concerns. Additionally, isolation may contribute to decreasing external agents’ negative activities due to lower visibility.

It also appears that communities associated with small-scale fisheries are at least moderately, if not highly, dependent upon fisheries for the provision of food and as a focus for social interactions and employment. The high level of dependency means that the activities of the fishery and social organization that stems from employment in the fishery pervades the local community. This pervasiveness, or embeddedness, allows the community to perceive that it has a need to provide local input into the management of the fishery because the health of the fishery is important to the health of the community.

Finally, there is a factor which comes from the processual description of Berkes et al. (2001). This factor has to do with timing and a precipitating event or situation from which the need for additional management is perceived by the community. This factor is found in the description of the process for community-centered fishery co-management that follows the discussion of factors affecting the success of community-based/co-management (Pomeroy 1998; and Berkes et al. 2001). The process consists of three phases, the pre-implementation phase, the implementation phase and the post-implementation phase. In the pre-implementation phase, the problem is recognized, there
is open discussion and consensus building within the community, and a plan of action is devised. The community then seeks assistance and opens discussions with the government, NGOs or donors as is appropriate, and the project planning begins and institutional linkages are developed. Therefore, again implicit, is the need for a problem that community members perceive as requiring action.

Social and Economic Conditions that May Lead to Industry Support of Buyback Programs

Although little has been written on social aspects of buybacks, substantially more has been written about economic conditions for buybacks. In the document prepared by Ecotrust for a recent meeting of the Pacific Fishery Management Council, which considered effects of buybacks for the Pacific groundfish fishery (Ecotrust 2002), there is a discussion of the inequality of buybacks between communities related to the concentration of fishing vessels and processing activities in certain ports, but little social theory is discussed. An overview document by Holland et al. (1999) provides description of some of the situations for satisfactory buyback programs, at least in an economic sense. Documents on buybacks as subsidies have been provided by the Congressional Research Service (Read and Buck 1997) and the World Wildlife Fund (1997). In addition, in 1999 the Federal Fisheries Investment Task Force provided a report to Congress, which discussed capacity, capitalization, subsidies, buyback programs, and other programs.

In review of the Ecotrust (2002) document, communities are described as being more than locations of economic activity. The authors suggest that the fisheries may provide important aspects of social cohesion in these coastal communities studied, but,
because of limited available information, economic impacts became the focus of study. Ecotrust found that economic impacts would be unevenly distributed by the proposed buyback strategy. This was done using geographic information systems analysis considering home ports and area fished. Ecotrust then compared income impacts before and after the closure of the shelf and displayed differential effects at different ports.

In review of the documents considering the economic attributes that enhance industry support/participation in buybacks, it appears that in all the documents listed above buybacks are offered predominantly as disaster relief, whether the disaster is due to environmental changes or changes due to redefinition of resource availability through court decision. When the alternative is to go broke or to gain something, the industry participants prefer to gain something. In the case of buybacks, the greatest benefit falls to those who sell their vessels (Holland et al. 1999). Further, the authors recognize that the buyback program serves to redistribute income and access to the fishery. An observer could thus expect that if the political and/or economic power of those who benefit after the redistribution is sufficient, that there would be greater industry support.

Finally, Holland et al. (1999) discusses at length the questions of equity with regard to buybacks due to targeting of vessels for removal. Under the typical system of the low bidders being removed, usually the low bidder has some underlying reason for wanting to leave such as marginal success, and/or a desire to retire from fishing. Holland et al. contend that if high capacity vessels are targeted, the greatest benefits accrue to the most active fishermen. Finally, some programs are targeted to those in specific demographic communities, so only certain people are allowed to participate and benefit. To apply equity concepts to the support of buybacks, as opposed to participation in
buybacks, if fishery participants perceive that the distribution is equitable and that they will benefit from either selling the vessel/permit or from the redistributive aspect of the buyback, then a greater potential exists for community support.

In the United States, buybacks must be voluntary according to provisions of the MSFCMA. Therefore, consideration of what may induce a person to sell back the vessel and/or permit may be used as a proxy for gaining community or industry support of buybacks. Holland et al. (1999) describes several situations which may induce a boat owner or permit holder to participate in a buyback. Under the typical system of low bidders being removed, usually the low bidder has some underlying reason for wanting to leave such as poor to marginal success as a fisherman, or a desire to retire from fishing. Another reason that may induce a person to participate is the possibility that a license/permit only allows very limited participation or for some reason the permit is not used. If that occurs, the permit holder may gain more income from the sale than through the use of the permit.

Methods selected

This dissertation uses the following methods for describing the affected communities by setting a baseline; reviewing the effects of past similar management through a longitudinal study; and assessing the potential for community-based co-management.

Baseline setting

The baseline data includes a description of the fishery and the communities. The fishery is described for 2002. The baseline for the description of the affected community
is a period of years from 2000 to 2002. The year 2000 was selected because census data was available for that year, but because fieldwork occurred in 2001 and 2002, the descriptions of activities were from that time period. It is expected that using 2000 census data is acceptable because the baseline period is not far separated in time.

To describe the communities, demographic data from the 2000 census is used to provide information on total population for the municipalities (zip code, in the case of Seaford), and the respective counties. In addition to the information available through the 2000 census, additional information on the communities was provided through literature review, particularly The Fishing Ports of the Mid-Atlantic (McCay and Cieri 2000), and New England's Fishing Communities (Hall-Arber et al. 2001). I undertook participant observation and informal interviews in New Bedford during January of 2001 and June of 2002, and in Cape May during February-March 2001 and August 2002. I reside in the area proximate to York County (Seaford, VA) and Hampton Roads, and thus, have had a longer opportunity to observe and participate in those communities. Additional sources of information used for describing the communities included local publications, including tourist information, local newspapers, and community web sites.

Longitudinal study

To counteract the criticism that SIA is ahistorical, I present a longitudinal study of the effects of prior area management on participants in the sea scallop fishery from the four ports. Data for the longitudinal study came from various sources. Fisheries data were provided by NMFS for scallop pounds landed, the scallop value landed, and the areas fished that provided landings to each of ports. Economic effects were determined through the use of county level annual data available through the Bureau of Economic
Analysis (http://www.bea.doc.gov/bea/regional/reis/default.cfm#s2). Community and fishery participant concerns regarding the effects of area management were gained through unstructured interviews, and participant-observation at fishery management meetings, local community meetings, and in the communities. Participant-observation at the fishery management meetings occurred intermittently over a two-year period from 2000 to 2002. Community meetings were mainly in New Bedford as it was the community most actively interested in fishery management. Finally to gain additional data on community concerns and industry concerns, fishing community forums on area management for sea scallops were held in New Bedford and Cape May.

Fisheries data available included information on landings by port, the value of landings, and the areas fished that provided landings to the port. The time period from 1990 to 2000 was used to display the effects since 1990 preceded the time of the institution of the first closures, and the new regulations became effective in the period between 1990 and 2000. Landings and values were graphed to show changes over time for each port. In addition, GIS analysis allowed for mapping of the areas fished for each port. The three digit statistical areas recognized by NMFS was used to plot the number of pounds per area landed in each of the four study communities for each month that data were available from 1990 to 2001. Seaford had a shorter period of available data, from 1994; therefore, the maps for this port were generated for the time period from 1994 to 2001.

Assessment of the potential for community-based co-management

Assessment of the potential for community-based co-management was undertaken
using the criteria of Berkes et al. (2001) plus three additional criteria. To reiterate, the three additional criteria are the dependency of the community on fishing, isolation, and a perceived "need to do something." As above, the same quantitative data were used, and qualitative data were gathered through participant observation in fishery management meetings, local community meetings, and in the communities, in addition to information gained through unstructured interviews and content analysis of local publications including tourist information, newspapers, and community web sites.

Specific indicators for the factors of Berkes et al. (2001)

Supracommunity Factors

The legal right to organize, or possibly more properly to have management authority recognized, is undertaken by the more central government's level, typically through enabling legislation. In the instance of the United States, the authority to manage fisheries is through the MSFCMA, which contains provisions for including community concerns with regard to sustained participation in fisheries and minimizing economic effects subservient to the concerns of sustainable fisheries. There are provisions, however, for highly dependent communities to be participants through community development quotas, particularly for Alaska fisheries. Other allocation of fishing regulatory authority is handled through the Councils, and the responsibility for the sea scallop fishery is held by the New England Fishery Management Council.

External agents dealing with the sea scallop fishery would include the academic and research institutions that study the various communities and may aid in provision of fishery data for determining stock levels. Also, there are a number of NGOs that are now participating in the fishery management process both as meeting participants and as
litigants in court cases these will be discussed by community as appropriate.

**Community level factors**

Clearly defined boundaries are determined by the description of area fished in interviews and through mapping of area fished from the period of 1990 to 2001. The mapping was done by community of landing with area fished being the three digit statistical area as noted in the vessel trip reports. Data were provided by NMFS. The first three years of data came from dealer weigh-out information; the remaining data from logbook data. Areas fished were mapped by three digit statistical areas to use areas commensurate with those described as important in preceding NEFMC framework documents.

Clearly defined membership is determined by descriptions of memberships of various organizations and by area of residence of fishery participants as determined from interviews. A further measure of clearly defined membership is any indicator that local people use to determine if someone is a local fisherman, and if the fishermen can be readily identified.

Group cohesion has several indicators. The first is a measure that has been emphasized in recent documents, the presence of a fisherman’s hangout. The fisherman’s hangout provides a locale for socializing and exchanging information that should enhance group cohesion. The location of the fisherman’s hangout is determined through interview and participant-observation. Less tangible measures of group cohesion include the discussion of factions in the fishery gained from interviews and participant-observation in meetings and in the communities. Finally, to assess group cohesion at the city or town level, content analysis of local publications and newspapers for the community was used to
determine if the community self-describes as a fishing community, and an inventory of services and structures provided for fisheries by the local government. Localities which provided services and/or infrastructure to the fishing were interpreted to be more cohesive than those that did not provide services or infrastructure.

Cooperation and leadership at the community level is indicated by the existence of local fisheries organizations, which in the past or present participate in fisheries assistance and management. The organizations can be either sponsored at the locality level or industry level.

Leadership indicators consist of recognition of a person or group within the community as a fishery leader or by participation and representation at the NEFMC meetings. Information comes from participant observation at meetings, interviews, and from NEFMC committee lists.

Empowerment indicators include participation in research, a positive view that users’ and communities’ voices are heard at Council meetings and through participation in legal actions related to fishery management. Data for these factors were gathered through interviews, participant-observation, review of relevant websites on fisheries news, and review of newspaper articles.

Property rights over the resource are determined by review of the fisheries management documents. Review of the existing documents provides guidance as to the level of property rights that may be present for the community. For the scallop fishery, no co-management agreement exists, therefore, communities have not been allocated rights.

Appropriate local organizations are indicated by the presence of local organizations that meet the qualifications of clearly defined membership, legal right to
exist, are autonomous from NMFS and NEFMC, and represent a large proportion of fishermen in the community. Data for this indicator comes from interviews and participant-observation. In addition to the existence of appropriate local organizations, they should have adequate funding. Adequate financial resources are indicated by membership or contributor funding as discovered through interviews.

Partnership and a partner sense of ownership of the co-management process is indicated by participation in the management process by various elements of the community and by a sense that industry and community concerns are listened to and perceived by the New England Fishery Management Council and its staff as having value. Information for this indicator was collected during participant-observation at local meetings and at council meetings, as well as in interviews.

Accountability and transparency indicators consist of meetings open to a large proportion of membership or contributors for the local organizations or city agencies related to fishing. Data for these indicators was gathered from unstructured interviews and a review of local management processes available in local documents.

Strong co-management organizations are indicated by defined mechanisms for conflict resolution for conflict between user groups, between user groups and the community, and between user groups and the government. Information from this indicator comes from a review of the existing co-management agreements.

**Individual level factors**

At the individual level, there are two important factors for the success of co-management. These factors include an individual incentive structure that persuades people to participate, and credible rules with effective and equitable enforcement.
Additional factors

Dependency

Dependency, for this dissertation, is defined as having two components. The first component is economic dependency, and the second is social dependency. Economic dependency is determined at the county level due to the availability of data from the Bureau of Economic Analysis county business patterns on an annual basis for 1990 to 2000. The county level was selected because it appears to encompass most of the day-to-day business interactions, and because more disaggregate levels of data often have more suppression to protect the privacy of the respondents. Employment data was selected because the communities appeared to be more interested in the retention of employment than in revenue in discussions with local leaders. In addition, most economic dependency indicators are expressed in terms of employment. The first measure of economic dependency is a Shannon-Weaver index of employment. The second measure of economic dependency is the location quotient of employment for the county as compared to the state. Finally, in addition to the quantitative values, a qualitative indicator of social dependency is determined by the presence of a fisherman’s monument, festivals and/or museum exhibits to celebrate or interpret local commercial fishing activities as well as local opinions and attitudes toward commercial fishing and fishermen.

Employment data were used to calculate indicators of the economic dependency of the communities on fishing through the use of the Shannon-Weaver index and the location quotient for employment by two digit SIC code for industry. The Shannon-Weaver index used was normalized to adequately indicate the economic dependency upon each industry since there were a consistent eleven categories for employment industries for all
The formula used to calculate the normalized Shannon-Weaver index was

$$ S = - \sum_i \left( \left( \text{county employment share} \right) \times \ln \left( \text{county employment share} \right) \right) / \text{maximum evenness for 11 industries}. $$

Where $S$ is the Shannon-Weaver index; $i$ indicates the $i$th industry for $i = 1, \ldots, 11$; the county employment share is the number of people in the county employed in the $i$th industry divided by the total employment in the county, and

the maximum evenness for 11 industries is $11 \times (1/11 \times \ln(1/11))$ or 2.397895

The location quotient for employment was calculated using the following formula:

$$ LQ = \frac{\text{county employment share}}{\text{state employment share}} $$

where $LQ$ is the location quotient; the county employment share is the number of people employed in the industry category in the county divided by the total employment in the county; and the state employment share is the number of people employed in the industry category in the state divided by the total employment in the state.

Social dependency was derived by consideration of a number of indicators, which included the presence of parks, museums, monuments and festivals focusing on fishing and a recognition of the importance of fishing in newspaper articles, discussion with local officials, or participant-observation. Further indicators of social dependence include local opinion of fishing and fishermen and the cohesiveness of the fishing community.

**Isolation**

Community isolation is indicated by distance from major cities, a lack of interstate highway connections, and a lack of railway connections. An additional indicator of a lack
of isolation is recognition of the city/town/county as part of a metropolitan statistical area by U. S. Bureau of Census. Census defines metropolitan areas on the basis of economic and social ties between communities, typically based central city and its associated suburban and rural areas. Characteristically, the central city serves as the focus of economic and social activities, and the surrounding suburban to rural areas provide residence for employees and, at least, some raw materials to the central city.

*Perceived “need to do something”*

Information on a perceived “need to do something” was collected from interviews and participant-observation at fishery and community meetings. Additional information on this factor was indicated by a level of municipal interest that included the development of fishing committees, discussion of the scallop fishery management plan by city staff, or participation in legal cases related to the sea scallop fishery.

**Assessment of support for a buyback and factors to be considered for developing a buyback**

Assessment of the support for a buyback and factors to be considered for developing a buyback was undertaken using qualitative data. This included information collected from unstructured interviews and from participant-observation at local and NEFMC meetings.
Chapter 3 Baseline setting - description of the fishery
and community descriptions

Baseline descriptions

The Atlantic sea scallop fishery

The sea scallop (*Placopecten magellanicus* Gmelin 1791) fishery is a valuable fishery for the United States. In 2002, 46,958,000 pounds of sea scallop meats, which had an ex-vessel value of $175,349,000 were landed (NMFS 2003). They comprised 4.1% of the U. S. total landings of shellfish in terms of pounds and 10.2% in terms of dollar value of shellfish. For all U. S. fisheries, scallops comprise 0.49% of pounds landed and 5.4% of the total ex-vessel value for all species based on 2002 data (NMFS 2003).

Sea scallop distribution

The sea scallop fishery occurs throughout the range of sea scallops (*Placopecten magellanicus*) within U. S. waters. Sea scallops are found on the continental shelf of the northwest Atlantic from the Gulf of Saint Lawrence in Canada to approximately Cape Hatteras, N. C.; their distribution in the United States Exclusive Economic Zone (EEZ), therefore, ranges from the Hague Line to Cape Hatteras. They are most abundant on
Georges Bank and the Middle Atlantic Bight, with somewhat lesser abundance in the Gulf of Maine, the Bay of Fundy, and the Gulf of Saint Lawrence. Generally, scallops can be found at depths ranging from 18 to 110m. Sea scallops live in marine conditions where salinities are over 16.5%, where there is water movement, and where temperatures are below 21 degrees Celsius (Packer et al 1999).

Of particular interest to area management are the aggregations of scallops called beds. Beds may be sporadic or essentially permanent. The permanent beds are found to correspond to areas where temperature, food availability, substrate are suitable, and where physical processes may serve to keep larvae in the vicinity of spawning populations or where they are recruited from other beds (Packer et al 1999). In general, it is thought that the Georges Bank region is self-sustaining with larvae retained in the Georges Bank Gyre, while the Mid-Atlantic region has recruitment due to larvae from other source areas (Packer et al. 1999). The beds make up major resource areas, and are more commonly occurring in the area of Georges Bank, the Hudson Canyon, and along the Virginia-North Carolina border. These areas are presently under area management under the current Sea Scallop Fishery Management Plan (FMP). With the development of Amendment 10 that is currently in process, area management will be further defined. It is expected that additional areas are likely to be proposed for closure and re-opening, and that specific criteria for scheduling closures and re-openings will be determined.

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2 The current area management was created by an emergency action to define areas to be closed to fishing to enhance recovery of groundfish by preserving habitat. The areas are re-opened to the scallop fishery through the framework process for scallop management. Formalization of area management includes setting criteria for areas and criteria for closure and re-opening through Amendment 10 to the Sea Scallop Fishery Management Plan.
Biological Factors Affecting the Fishery

In addition to consideration of locations of high density of scallops, spawning also affects the timing of areas selected for exploitation since recently spawned scallops have smaller meats when compared with shell size. Scallops spawn at varying times across their range, with a single spawn in the spring typical for the northern areas and two spawning periods more common for the southern areas. Of the two spawning periods in the Mid-Atlantic, the spring spawn is the more reliable (DuPaul et al. 1989). This is important because the scallop meats weigh less after spawning, and price is determined, at least somewhat, by the number of meats per pound.

An additional biological factor affecting preference for fishermen for various areas has to do with growth of scallops and their likelihood of availability. Recruitment and growth of the sea scallop to harvestable size varies due to the conditions of the various areas. The single most productive area in the past has been the Georges Bank area as discussed above in the description of scallop beds. The source areas for the Mid-Atlantic may be from New York Bight, with possible augmentation from the Georges Bank area (Packer et al. 1999), but this has not yet been conclusively determined. At the time of the writing of the Essential Fish Habitat (EFH) Source document, it was thought, but not proven, that locally produced larvae are swept away from the Mid-Atlantic area, and thus, this area is not self sustaining. For the Gulf of Maine and the beds of the Maine coast, it is not known if the beds are self-sustaining. In addition to larval sources, recruitment also depends on the larvae finding suitable settlement substrate. Spat, the small scallops which settle out of the water column, have better survival rates if settlement occurs on hard surfaces or sedentary branching plants and animals as opposed to shifting sands.
Although a limited number of stakeholders have discussed prey management to aid in gaining an increase of scallop yield, interest in controlling predation is limited to controlling starfish which has been proposed by an individual from New England. Predation on scallops depends upon the stage of scallop development. Larval scallops are planktonic, and are, thus, expected to be preyed upon by planktonic carnivores and filter feeders. Juvenile scallops are preyed upon by several species of fish, including cod, wolffish, ocean pout, eel pout, American plaice, yellowtail flounder, winter flounder and sculpins, as well as shellfish such as crabs and lobsters. Other species also consume juvenile scallops and spat, most especially starfish.

An Overview of the History of Scallop Stock

Sea scallop stocks have varied over the years. Landings peaked in 1978 at something over 26,500,000 metric tons of meats, then declined to approximately 10,000 metric tons in 1984. There was a rebound in 1991 to almost 23,000 metric tons, and a decline to a bit over 7,000 metric tons in 1993, which held stable until 1995. For the Georges Bank area, there was a large decline in catch (nearly 90%) between 1990 and 1994. Both declining stock availability and larger stocks to the south, which drew off effort, were seen as reasons for the decline in landings from Georges Bank during that time period. In the Gulf of Maine, variable landings were reported, but all seemed to be in the 500 to 800 metric ton range from 1991 to 1996. Landings for the Mid-Atlantic Bight averaged 6,000 metric tons in 1994 and 1995, and were about twice the landings for 1993. This was related to the strength of the 1990 and 1991 year classes. In 1996, a 23% decline in catch was noted as well as a decline in the relative abundance indices. Overall, however, the Atlantic sea scallop was determined to be in an overfished condition in 1997.
In 2000, landings exceeded 32.5 million pounds (14,816.8 metric tons), which was more than double the 1997 landings (NMFS 2002b). More recent data (NMFS 2002a) shows strong increases in the northern stocks and while somewhat less strong increases in the Mid-Atlantic stocks were observed, the fishery was listed as recovered in 2001.

The Current Status of the Fishery

The fishery is managed currently under a combination of limited access, effort controls, and area management. While area management is becoming more defined, the expectation is that both the limited access nature of the fishery and effort controls will be maintained. In particular, effort controls relate to the type of gear that may be used, the number of days at sea allocated by permit type, the number of fishermen allowed per vessel, and a cap or limit on increases in vessel size or engine horsepower that may be undertaken at one time on a permitted vessel.

Under the limited access management that is currently in place for scallops, 290 active permits are listed in the NMFS 2002 database for limited access fishing (Table 1); and there were 2,170 permits for the general category access fishing in 2002. The limited access permit numbers are consistent with the data in the 2000 Stock Assessment and Fishery Evaluation (SAFE) Report of 1999 data (NEFMC 2000). To be duly noted, however, in the 2000 SAFE report, 301 vessels landed 400 or less pounds of scallops (the definition for allowable of general category landings), while the total number of general category permits was not stated. Under the limited access permit category, there are three classifications that determine the allocation of number of days at sea - full time, part time and occasional, as well as definition by gear type as dredge, small dredge, or trawl.

Dredge vessels are allowed to use two dredges with a total length for the two dredges of
31 feet, and they are allowed a crew size of seven people. Small dredge vessels are allowed to use one 10.5 foot dredge, and has an allowed crew of five people. Trawl vessels use a trawls rather than dredges, and are allowed no more than seven crew members. Full time vessels are allocated 120 days per year, while part time vessels are allocated 45 days per year, and finally occasional vessels are allocated 10 days per year.\textsuperscript{3}

Table 1 displays the number of permits by limited access category for the fishery as a whole.

Table 2 lists permits by limited access category. For the four port communities selected, there were a total of 107 permits in New Bedford, 38 in Cape May, 19 in Seaford and 47 in Hampton Roads. These permits are listed by “home port” which fails to include vessels that actually tie up at the locations if the permit is mailed to an address in another municipality.

In general, the dredge vessels can be found throughout the range, but the scallop trawl vessels are more frequent in the Mid-Atlantic area. Another difference between the fleets at the harbors is the vessel size (Table 3). New Bedford vessels are larger in size, both in terms of length and gross tonnage, while Cape May has the smallest average size for vessels. New Bedford also has the largest range of size of vessels, from 45 to 110 ft.

The price structure for the scallop products is based on the location of harvest, the size class of scallop, time of year, and the abundance of the size class at any one time. Typically, scallops from Georges Bank and the Great South Channel are preferred, as they

\textsuperscript{3} The days allocated are days-at-sea, not directly days fishing; i.e., a vessel that is in transit may take a full day, or even several days, to get to an area to fish. The transit time, referred to as “steaming time” is taken into account as one or more of the allocated days-at-sea.
<table>
<thead>
<tr>
<th>Permit category</th>
<th>Number of active permits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full time dredge</td>
<td>222</td>
</tr>
<tr>
<td>Part time dredge</td>
<td>14</td>
</tr>
<tr>
<td>Occasional dredge</td>
<td>5</td>
</tr>
<tr>
<td>Full time small dredge</td>
<td>17</td>
</tr>
<tr>
<td>Part time small dredge</td>
<td>6</td>
</tr>
<tr>
<td>Full time net</td>
<td>16</td>
</tr>
<tr>
<td>Part time net</td>
<td>13</td>
</tr>
<tr>
<td>Occasional net</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>306</strong></td>
</tr>
</tbody>
</table>

Table 1. Limited access permits by category for the Northwest Atlantic sea scallop fishery from NMFS April 8, 2002 permit database (http://www.nefsc.noaa.gov/ro/doc/vesdata1.htm).

<table>
<thead>
<tr>
<th>Permit Category</th>
<th>New Bedford</th>
<th>Cape May</th>
<th>Seaford</th>
<th>Hampton Roads</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full time dredge</td>
<td>101</td>
<td>21</td>
<td>19</td>
<td>36</td>
</tr>
<tr>
<td>Part time dredge</td>
<td>1</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Occasional dredge</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Full time small dredge</td>
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<td>3</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
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<td>0</td>
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<tr>
<td>Full time net</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>7</td>
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<tr>
<td>Part time net</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Occasional net</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>107</strong></td>
<td><strong>38</strong></td>
<td><strong>19</strong></td>
<td><strong>47</strong></td>
</tr>
</tbody>
</table>

Table 2. Sea scallop permits by category for the study communities from the NMFS April 8, 2002 permit database (http://www.nefsc.noaa.gov/ro/doc/vesdata1.htm).

<table>
<thead>
<tr>
<th>Ave. length (ft)</th>
<th>New Bedford</th>
<th>Cape May</th>
<th>Seaford</th>
<th>Hampton Roads</th>
</tr>
</thead>
<tbody>
<tr>
<td>85.5</td>
<td>101</td>
<td>21</td>
<td>19</td>
<td>36</td>
</tr>
<tr>
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<td>0</td>
</tr>
<tr>
<td>78.5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>83.2</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>1</td>
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<tr>
<td>78.7</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>74.2</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>74.2</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>74.2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 3. Vessel size by port from the NMFS April 8, 2002 permit database (http://www.nefsc.noaa.gov/ro/doc/vesdata1.htm).
are larger and more “muscular” than the scallops from the Mid-Atlantic. Normally, the price differential for scallops is on the order of $.25 per pound for U10s (fewer than 10 meats per pound) from the Georges Bank area versus those of the Mid-Atlantic. A recent article in National Fisherman (Van Zile 2002) shows a table of prices from the New Bedford Seafood Auction with the price differential dropping by area of harvest with the smaller scallops for April of 2002. The U12 class of scallop from the Great South Channel was at the time averaging $6.71 per pound, while those from Georges Bank and the Mid-Atlantic were averaging $6.20 and $5.14 per pound respectively. The 20-30 meat per pound class was consistent for all areas harvested. Price by area, when compounded with shipping costs and fuel usage to steam to the area are often factors considered for selection of specific areas harvested. Scallops that are landed during higher demand periods, typically in June and July, tend to be more valuable than those landed in the winter.

Although scallops may be landed anywhere that there is a harbor with a dealer holding the appropriate permit, only a limited number of ports have substantial reported landings of scallops. Ports with substantial quantities of landings include New Bedford, MA; Cape May, NJ; Hampton Roads, Virginia (actually two adjacent cities, Hampton and Newport News); and Seaford, VA which is an unincorporated village within York County, VA.

Community Descriptions

New Bedford Area Communities

_The New Bedford Fishing Community_
The fishing community of New Bedford is locally recognized to be made up of fishermen, their families, boat owners, processors, gear suppliers and other support services, which are located in New Bedford and Fairhaven. Among the additional support welders and boat repair people who work on the wharves, boat cleaners, and suppliers of services are the two ship yards, three settlement houses\(^4\), one independent ice house, water, fuel and groceries.\(^5\) For the scallop industry, other fishery participants are also considered by some to be important to the fishing community; these include the groundfish participants because they share harbor space and fishing areas, and to some extent the local lobstermen who make up a small segment of the community but also share the harbor and some overlap of fishing area. All the fishery participants are seen as necessary because their presence helps keep the congregation of services conveniently located in New Bedford and Fairhaven. Furthermore, participants who may dock on either side of the water consider themselves, in essence, one fishing community.

Distinctive in the fishing community of New Bedford Harbor is the position of women with regard to the fishery. More women were observed in fishing-related occupations than at other ports. Actual participation of women on the vessels at sea is virtually non-existent. It is much more common for women to be employed in on-shore services. Women have important positions in the New Bedford fishing economy as vessel owners and owners and employees of ship supply stores and settlement houses. One woman owns a fleet of five vessels in addition to having other business interests. Another

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\(^4\) Settlement houses, in this instance, are businesses that handle the accounts and disbursement of funds for fishing vessels and employees that work on them.

\(^5\) Groceries are often referred to as “grub” in the fishing communities.
woman owns a vessel with her husband. However, at public meetings women often self-identify as something else, for example a fisherman’s wife. Women also hold less prestigious positions, such as “grubbers” and cleaners of the boats. A final group of women associated with the scallop fishery, as spouses of fishermen, have retained the more traditional role of homemaker.

New Bedford is a large fishing community when compared to the remaining three communities in this study. New Bedford is listed as the principal port for 234 vessels according to the data available from NMFS, and approximately half of these (95) have limited access scallop permits. All the scallop permits for New Bedford are for scallop dredge vessels. Despite the apparently large size of the community, it is still sufficiently small so that many of the fishermen recognize one another. One way that scallopers distinguish themselves from other fishermen is through the wearing of a shackle earring. This local accessory is a reasonably recent fashion. The original design was created by a captain and his wife in conjunction with a local jeweler.

The New Bedford fishing community, however, is not strictly composed of people who reside in New Bedford and Fairhaven. A settlement house owner reported that she prepares approximately 500 to 600 settlements a year. Nearly everyone for whom she prepares settlements resides in an area “shown on the back of the (New Bedford) phone book. The guys (fishermen) mainly live in New Bedford, Dartmouth, Fairhaven, Westport and Mattapoisett.” Upon noting that several cars with Maine license plates were observed on the wharves, she remembered that some of the people for whom she provides settlements “come out of Rockland, Maine.” When I questioned a boat owner and fisheries consultant in Rockland, I was informed that approximately 50 individuals fish out
of New Bedford. Other informants suggested that more of the New Bedford scallop fishermen reside at greater distance from the harbor. A fisherman’s wife informed me that two of the men on her husband’s boat “live in Rhode Island to avoid some of the taxes.” She also knew of a captain who “comes in to port here, gets a rental car and heads home to North Carolina.” In addition, one of the fleet owners told me he has fishermen who come in from as far away as Seattle and Florida. This suggest that, while New Bedford has a core of fishermen who reside in an area near to New Bedford, there is also a small core of New Bedford fishers who reside in Rockland, Maine, and there is a very dispersed population of people with employment ties to New Bedford throughout the country.

New Bedford has active fisheries organizations. They include Fisheries Survival Fund, Trawlers Survival Fund, Shore Support, and the Scallop Group. In addition to these active groups, there are other groups that are not quite as active. Beyond the independent associations, the city and state cooperate in funding parts of the Fishing Families Assistance center which provides a location for communication, education, and meetings.

The Fisheries Survival Fund (FSF) is perhaps the most active for the scallop fishery. FSF has undertaken to gain reopenings on Georges Bank and in the Nantucket Lightship closed area. The FSF employs three consultants with strengths in politics, law, and science. This organization has undertaken to create a “strawman” for Amendment 10, or, as their director, suggests “our scientist wrote Amendment 10.” FSF is funded by donations taken from the catch value, and has a core group who reviews regulations and directs the consultants.

Two additional organizations are recognized as associated with the scallop fishermen of New Bedford. Shore Support has a focus that is more on the family and
helping to keep family together through good times economically (when Dad’s at sea), and through tougher times (when the family gains less income). The Scallop Group meets periodically and is made up mainly of boat owners. The interest of the Scallop Group was described by a local observer as being more interested in ITQ (individual transferable quotas) and consolidation than in area management.

The New Bedford fishing community banded together recently for a Fisherman’s Rally in June of 2002 in response to a court decision to limit days-at-sea for groundfish. Despite this cooperative effort, there are distinct factions recognized by local fishing community members. Some of the differentiation is based on fishery — groundfish vs. scallop vs. lobster vs. gillnet. Despite these groupings, there is general acceptance that the fisheries are interconnected, sometimes more directly and some more indirectly. More direct connections include gillnet vessels to lobster vessels. One of the local lobstermen told me “the gillnet restrictions have affected us, now it’s much harder to get bait.” Perhaps more indirectly, the presence of all the fishery participants comprises a critical mass of clients for the various services.

A more contentious grouping is between people who advocate ITQs, consolidation, and efficiency, and people who prefer to maximize the number of boats and jobs. Typically those who advocate ITQ as a method of management are scallop fleet owners who presumably were those identified by Doering, Moss and Terkla (1986) as vessels owners who have a strong business perspective as opposed to those for whom the fishing is perceived as more of a family oriented operation. The group that prefers more boats and more jobs tends to be characterized by owner-operators, crews, women, and

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6The legal case was CLF v Evans
strong participants of FSF and Trawler Survival Fund.

The New Bedford fishing community is ethnically diverse, as is the city of New Bedford. A high proportion of the groundfish fleet is owned and crewed by people of Portuguese ancestry, while the scallop vessels have a somewhat different ethnic representation. Scallop vessels tend to be owned by Norwegians and Yankees, crews may include these two groups plus eastern Europeans (Poles), Philippinos, and/or Cambodians. Processors hire workers who have green cards, mainly of the group locally considered “Mayans” (people from southern Mexico and Central America) on a week-by-week or day-by-day basis. Other processing employees observed from people going to work in the south terminal area included Asian and Mexican people who reside nearby, several of whom bicycled or walked to work, and Yankees.

**Port - New Bedford Harbor**

New Bedford Harbor has a strong presence of maritime activities. In addition to the commercial fishery vessels which utilize the harbor, passenger travel and cargo service also is found within the harbor. Passenger service consists of both cruise ship landings and ferry services. New Bedford has two ferry services -- one to the island of Cuttyhunk and another to Martha’s Vineyard. Both ferry services were observed to carry some limited amount of cargo as well as passengers. Cargo service has a specialized segment of importers of products from Cape Verde and Portugal, and the city is attempting to convince the local ferry authority that service to Nantucket and Martha’s Vineyard would be beneficial to both New Bedford and the islands.

New Bedford harbor serves two municipalities, the City of New Bedford on the
Figure 5. Aerial photo of the New Bedford Harbor area. Photo from USGS Terraserver
west side and the Town of Fairhaven on the east side. Fishing related activities occur on both sides of the harbor with offloading and processing dominantly occurring on the New Bedford side, and large scale ship repair on the Fairhaven side. Both localities provide docks for tying up vessels and wharves for ancillary activity. The docks do not provide individual slips, and therefore, the vessels raft together. Repairs that do not require hauling the vessel also occur at the docks, often with small scale metal fabrications done on trucks on the wharves or directly on the vessels.

New Bedford has an industrial waterfront, partially due to historic uses from whaling and textile manufacturing, and partially due to requirements of modern fisheries activities. The waterfront is separated from downtown by Route 18, also known as the J. F. Kennedy Highway. To the southernmost end of the city, residential uses predominate outside of the hurricane barrier. Along the harbor nearing the center of the New Bedford side, former textile mills, which have been converted to other uses or are abandoned, buffer the active working waterfront. New Bedford’s harbor area is a designated port area as defined by the Massachusetts Office of Coastal Zone Management under Chapter 91 of the General Rules of the Commonwealth of Massachusetts. The uses in the harbor area are generally restricted to those that benefit water dependent activities. The harbor is under use restrictions delineated by the Harbor Development Commission with substantial public input from citizens of both New Bedford and Fairhaven. The planning document for further development of the harbor is also under the aegis of the Harbor Development Commission, and a new Harbor Development Plan was issued in 2002.

New Bedford’s harbor area is recognized to have three basic areas – the South Terminal, the central wharf area, and the North Terminal. An aerial photo of the harbor is
included as Figure 5. In Figure 5, note that the port development is largely to the north of the hurricane barrier and south of Rt. 195 in New Bedford and between the hurricane barrier and Rt. 6 in Fairhaven. The newest extension of the South Terminal, locally known as Standard-Times Field, is a reclaimed brownfield or area of prior industrial activity that was part of an EPA sponsored clean-up project undertaken in conjunction with the city. The property in the South Terminal Extension is offered for sale to fishing industry uses; however, other property in the South Terminal and central wharf area is owned by the city and made available on a long-term lease basis. Some of the property in the North Terminal area is under private ownership.

The South Terminal area is the main area where fish is offloaded. In addition, to the offloading of fish, several other fishing-related activities are also found in the South Terminal area. These include processors, wholesalers and retailers of fish, box manufacturers for packing fish, fuel and gear suppliers, a diesel engine repair facility, and a settlement house. Other businesses, which serve the fishing community, that are located at the South Terminal include a foul weather clothing manufacturer, and a restaurant which serves as the south end fisherman’s hangout.

The central wharf area has docks, wharves, a major ice house and a major fuel company for the fishing vessels. Some limited offloading and shipment of fish also occur in the central wharf area. The wharves are the location where vessels are tied up and a center for small scale vessel and gear repair, and the location where independent suppliers cater to vessels by providing grub, water, and cleaning services. The State Pier is also situated in the central wharf area, and is the location where cargo is offloaded, including products from Cape Verde and Portugal (Hall-Arber, 2001). Other activities in the central
wharf area are tourist activities including dock walks, a visitor center, a ferry service to Cuttyhunk, a harbor tour vessel, the schooner Ernestina (a vessel for educational services), and within the last year the State Pier area has become the center for cruise ships landings. Inland of the wharf area, between Route 18 and the downtown, is a number of fishery related businesses including marine lawyers, a settlement house, gear providers, and ship supply businesses.

The North Terminal area, which is located north of Route 6, has processors with bulkheads for offloading vessels. Also in the area are gear providers on Fisherman’s and Pope’s Islands, while on the mainland there is also a location for washing out trucks that haul fish, a diesel repair, a well-recognized fisherman’s hangout, and cold storage facilities.

On the Fairhaven side of the harbor, fishing related businesses include two shipyards with the capacity to haul large vessels for hull repair, a ship supply store, a marine lawyer, a settlement house, a scalloper’s bar that is the fisherman’s hangout, a propellor shop, and two gear suppliers. Vessel activity takes place mainly now at the Union Wharf area and somewhat north. The area just south of Union Wharf, which had dock space, an ice house, and a winch manufacturer, has been purchased by a local ferry operator for maintenance of ferry vessels. The conversion of this property is not yet complete. Union Wharf is owned and maintained by the town. At Union Wharf most of the larger vessels tied up are scallop vessels, but some smaller lobster vessels also dock here.
**Infrastructure**

The New Bedford waterfront area provides substantial services for the fishery industries. These services include several ship suppliers, the major gear supplier for the scallop fishery for the region, fuel providers, ice house, docks, settlement houses, insurance and legal services, divers, a water provisioner, lumpers, and individuals who clean and grub the vessels.

The fuel providers, gear and ship suppliers, ice house, legal and insurance services, divers, water provisioner, and people who clean and grub the vessels are all private companies for which services are paid dependent upon arrangements between the business and usually the boat owner. Lumpers are paid by the captain and crew, and while the boat owner may use the “grubbers,” payment for food is taken out before the crew share is paid.

In addition to business infrastructure provided by private industry, the City of New Bedford provides some elements of physical, economic and social infrastructure. First and foremost, the city provides the wharf and dock facilities for docking. The fees are kept low—$350 per year. In addition, the city manages the dredging needed for vessels to use the harbor. In addition to the docks and bridges which need to be maintained, the city also has coordinated and provided the needed matching funding for the Hurricane Barrier and

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7Lumpers are people who are employed to off-load fishing vessels.

8 Scallopers are paid on the “lay system.” Captains and crews are paid a percentage of the catch value minus fuel, food, and other expenses, which usually includes a bonus or percentage of the gross paid to the captain. The portion of the catch value paid to the crew is referred to as the “crew share,” and the percentage that is paid to the vessel owner is referred to as the “boat share.”
Rt. 18 (JFK Highway). The Hurricane Barrier separates the harbor area from Buzzards Bay for the purpose of maintaining a safe harbor area. Route 18 connects the waterfront seafood industrial area to Interstate 195.

Social infrastructure is provided by the Fishing Families Assistance Center, a city and state sponsored activity, which provides access for fishermen and their families to educational opportunities, computer access, a repository for regulations and also serves as a location for meetings. Economic infrastructure provided by the city includes specific loans through the New Bedford Economic Development Council, which provide gap funding of $5,000 to $50,000. Gap funds are those funds not covered by loans from banks that are necessary to undertake vessel upkeep, repair, or conversion.

Fairhaven also provides substantial infrastructure for the port through private industry and town owned Union Wharf. Local private firms that provide service for the fisheries include a ship’s store, a gear provider, a propellor shop, the two shipyards, a settlement house, and a once well populated, now lesser so, bar which still serves as a fisherman’s hangout. In addition, fuel and lubricants are provided by truck or barge from New Bedford. Until 2001 ice had been provided at the Hathaway dock, but now ice is provided across the harbor in New Bedford.

_Municipality-New Bedford_

_Overview_

New Bedford is consistently among the top fishing communities in the nation. In 2001, it became number one in the nation for landings by value. The fishermen of New Bedford landed 106.9 million pounds of seafood, at a value of $150.5 million in 2001
RESULTS). In 2001, scallops accounted for a large portion of these landings at approximately 21.3 million lbs. and nearly $82.0 million (NMFS 2002). Other fish landed in the port include groundfish, monkfish, and lobster. Recently an article in the local paper has also stated one of the cold storage facilities would also begin handling herring (Nicodemus 2002).

New Bedford is the largest city in Bristol County (Figure 6). The city is located on the south shore of Massachusetts, between Cape Cod and the Rhode Island border. New Bedford harbor is located at the mouth of the Acushnet River along the shore area of Buzzards Bay, and falls within New Bedford and Fairhaven (Figure 7).

As a city, New Bedford has had a shifting economic base over the course of its history. In its earliest days, from 1700s to the mid 1800s, fishing was the dominant activity of New Bedford, which was then the worldwide center for whaling. Both transportation of whale products and the manufacturing of raw whale products persisted from the early 1700s through the early 20th Century. In addition to providing employment for New England Yankees, the whale fishery also drew participants from around the world. New Bedford was recognized as one of the most cosmopolitan places worldwide because of the diversity of people who came to the city to participate in whaling. From approximately the time of the Civil War until roughly the 1930s, cotton fabric manufacturing came to dominate New Bedford. With the mills came a population to work in the mills from rural New England and Quebec. More recently, and for approximately the last 70 years, fishing has again become a dominant economic sector in New Bedford.
<table>
<thead>
<tr>
<th>Geography</th>
<th>Map/aerial photo</th>
<th>Bristol County</th>
<th>New Bedford</th>
<th>Fairhaven</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance to Major Cities</td>
<td>Providence, RI abuts Boston 30 mi</td>
<td>Providence, RI 33 mi Boston 55 mi</td>
<td>Providence, RI 35 mi Boston 55 mi</td>
<td></td>
</tr>
<tr>
<td>Metropolitan Statistical Area</td>
<td>Boston-Worcester-Lawrence, New Bedford, Brockton, Providence-Fall River-Warwick</td>
<td>New Bedford</td>
<td>New Bedford</td>
<td></td>
</tr>
<tr>
<td>Governance</td>
<td>Chairman and two commissioners</td>
<td>Mayor-Council</td>
<td>Board of Selectmen</td>
<td></td>
</tr>
<tr>
<td>Services</td>
<td>sheriff's office, registry of deeds, probate office, vital records</td>
<td>water and sewer, public housing, policing, parks and recreation, harbor development (including appeal for the Display Auction), economic development, docks, job placement, Fishing Family Assistance Center</td>
<td>water and sewer services, parks and recreation, clam fishing, docks</td>
<td></td>
</tr>
<tr>
<td>Transportation</td>
<td>Interstate 1 195</td>
<td>1 195</td>
<td>1 195</td>
<td></td>
</tr>
<tr>
<td>Air</td>
<td>limited passenger</td>
<td>limited passenger</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Rail</td>
<td>No passenger service</td>
<td>No passenger service</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Maritime</td>
<td>Ferry, cruise and cargo in New Bedford, Ferry and cruise Fall River</td>
<td>Ferry, cruise and cargo</td>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Selected community characteristics for Bristol County, New Bedford, and Fairhaven
<table>
<thead>
<tr>
<th></th>
<th>Bristol County</th>
<th>New Bedford</th>
<th>Fairhaven</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Population</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% male</td>
<td>48.0</td>
<td>47.1</td>
<td>47.2</td>
</tr>
<tr>
<td>% female</td>
<td>52.0</td>
<td>52.9</td>
<td>52.8</td>
</tr>
<tr>
<td><strong>Racial and Ethnic Composition(%)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>one race</td>
<td>97.7</td>
<td>94.1</td>
<td>98.8</td>
</tr>
<tr>
<td>white</td>
<td>91.0</td>
<td>78.9</td>
<td>96.3</td>
</tr>
<tr>
<td>black/African American</td>
<td>2.0</td>
<td>4.4</td>
<td>0.6</td>
</tr>
<tr>
<td>American Indian and Alaska Native</td>
<td>0.2</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Asian</td>
<td>1.3</td>
<td>0.7</td>
<td>0.4</td>
</tr>
<tr>
<td>Native Hawaiian and Other Pacific Islander</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>some other race⁹</td>
<td>3.1</td>
<td>9.5</td>
<td>1.2</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>3.6</td>
<td>10.2</td>
<td>0.8</td>
</tr>
<tr>
<td><strong>Ancestry (percent)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portuguese 29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>French 11.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English 11.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other 14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English 17.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>French 9.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English 15.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>median age (years)</td>
<td>36.7</td>
<td>35.9</td>
<td>41.2</td>
</tr>
<tr>
<td>% under 18 years</td>
<td>24.6</td>
<td>24.9</td>
<td>21.7</td>
</tr>
<tr>
<td>% 65 year or over</td>
<td>14.1</td>
<td>16.7</td>
<td>19.5</td>
</tr>
<tr>
<td><strong>Household Composition</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>total households</td>
<td>205,411</td>
<td>38,178</td>
<td>6,622</td>
</tr>
<tr>
<td>% family household</td>
<td>68.5</td>
<td>63.1</td>
<td>64.2</td>
</tr>
<tr>
<td>% female headed households</td>
<td>13.0</td>
<td>18.9</td>
<td>11.0</td>
</tr>
<tr>
<td>% households with children under 18</td>
<td>35.6</td>
<td>34.1</td>
<td>30.3</td>
</tr>
<tr>
<td>% households with individuals over 65</td>
<td>25.8</td>
<td>29.0</td>
<td>32.0</td>
</tr>
<tr>
<td>average household size</td>
<td>2.54</td>
<td>2.4</td>
<td>2.38</td>
</tr>
</tbody>
</table>

⁹ "Other" ancestry is a category of ancestry of the U.S. Bureau of Census for those who do not choose to self identify with the categories offered. In New Bedford, people of Cape Verdean descent may use this category (Lovinger 2002)
<table>
<thead>
<tr>
<th>Education Level</th>
<th>Bristol County</th>
<th>New Bedford</th>
<th>Fairhaven</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than 9th grade</td>
<td>13.1</td>
<td>24.3</td>
<td>9.4</td>
</tr>
<tr>
<td>9th to 12th grade, no diploma</td>
<td>13.7</td>
<td>18.1</td>
<td>13.8</td>
</tr>
<tr>
<td>high school graduate or above</td>
<td>73.2</td>
<td>57.6</td>
<td>76.8</td>
</tr>
<tr>
<td>bachelors degree or above</td>
<td>19.9</td>
<td>10.7</td>
<td>16.9</td>
</tr>
</tbody>
</table>

**Income**

<table>
<thead>
<tr>
<th>Income Measure</th>
<th>Bristol County</th>
<th>New Bedford</th>
<th>Fairhaven</th>
</tr>
</thead>
<tbody>
<tr>
<td>median household income</td>
<td>43,496</td>
<td>27,569</td>
<td>41,696</td>
</tr>
<tr>
<td>median family income</td>
<td>53,733</td>
<td>35,708</td>
<td>52,298</td>
</tr>
<tr>
<td>% below poverty level</td>
<td>10</td>
<td>20.2</td>
<td>9.0</td>
</tr>
<tr>
<td>% 18 years and over below poverty level</td>
<td>8.9</td>
<td>17.2</td>
<td>8.3</td>
</tr>
</tbody>
</table>

**Employment**

<table>
<thead>
<tr>
<th>Employment Measure</th>
<th>Bristol County</th>
<th>New Bedford</th>
<th>Fairhaven</th>
</tr>
</thead>
<tbody>
<tr>
<td>population over 16</td>
<td>417,857</td>
<td>73,287</td>
<td>13,085</td>
</tr>
<tr>
<td>labor force (#/%)</td>
<td>275,122/65.8</td>
<td>42,308/57.7</td>
<td>8278/3.3</td>
</tr>
<tr>
<td>unemployed civilian (% labor force)</td>
<td>5.8</td>
<td>8.7</td>
<td>3.9</td>
</tr>
<tr>
<td>Armed Forces (% population &gt;16)</td>
<td>0.1</td>
<td>0.2</td>
<td>0.4</td>
</tr>
</tbody>
</table>

**Employment Industries**

<table>
<thead>
<tr>
<th>Occupational Sector (%)</th>
<th>Bristol County</th>
<th>New Bedford</th>
<th>Fairhaven</th>
</tr>
</thead>
<tbody>
<tr>
<td>management, professional and related</td>
<td>30.7</td>
<td>20.8</td>
<td>29.8</td>
</tr>
<tr>
<td>service occupations</td>
<td>15.4</td>
<td>19.8</td>
<td>14.0</td>
</tr>
<tr>
<td>sales and office occupations</td>
<td>26.3</td>
<td>23.6</td>
<td>27.5</td>
</tr>
<tr>
<td>farming, fishing and forestry</td>
<td>0.4</td>
<td>1.0</td>
<td>1.5</td>
</tr>
<tr>
<td>construction, extraction and maintenance</td>
<td>9.5</td>
<td>9.8</td>
<td>9.5</td>
</tr>
<tr>
<td>production, transportation, and material</td>
<td>17.8</td>
<td>25.1</td>
<td>17.8</td>
</tr>
<tr>
<td>NAICS 1999 (employment by establishment)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>farming, fishing, hunting, and agriculture</td>
<td>347</td>
<td></td>
<td></td>
</tr>
<tr>
<td>mining</td>
<td>59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>utilities</td>
<td>969</td>
<td></td>
<td></td>
</tr>
<tr>
<td>construction</td>
<td>8090</td>
<td></td>
<td></td>
</tr>
<tr>
<td>manufacturing</td>
<td>47389</td>
<td></td>
<td></td>
</tr>
<tr>
<td>services (all other employment categories)</td>
<td>141426</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5. Demographic and labor information for Bristol County, New Bedford, and Fairhaven, MA from U. S. Bureau of Census
Figure 6. Bristol County and surrounding counties in Massachusetts and Rhode Island.

Figure 7. Municipalities within Bristol County. From https://www.archivepublishing.com/images/maps_ma_bristol
The more recent fishery is for food rather than for fuel, and includes species of the New England groundfish fishery, sea scallops, monkfish, and lobster. Groundfish and sea scallops are the most sought after species. Within the last few years scallop landings have dominated in terms of value and pounds landed. Selected characteristics of the municipality are presented in Table 4.

New Bedford has a diverse population with regard to ethnicity based on national origin and/or ancestry (Table 5). New Bedford has a large population of Portuguese heritage, some of whom have been part of the community since the days of whaling and some much more recent immigrants. The importance of the Portuguese population can be deduced noting that the city has a Portuguese Consulate, a Portuguese language branch of the public library, Museum of Madieran Heritage, and festivals celebrating Portuguese heritage. Other ethnicities represented in New Bedford include French Canadian, Asian, and “Mayan”. The French Canadians are now mainly native born U. S. citizens identified by a French surname. Two Asian groups, Philippinos and Cambodians, in addition to the Mayan peoples, are important in the fishing community as they make up part of the processing workforce.

_Municipality- Fairhaven_

_Overview_

Fairhaven is located on the east side of New Bedford harbor. Historically, Fairhaven has benefitted from the generosity of Henry Huddleston Rogers, a native son who made his fortune in oil, and who provided funding for development of the library and improving the town. Fairhaven has a more “town” flavor, with larger lots, a higher proportion of single family detached structures, and more open space than the city of New
Fairhaven. Fairhaven has a mix of economic activities including retail, fishing, and resort activities. The majority of the community is made up of residential properties, with retail activity focused on Route 6 and the downtown area; fishing and ship yards focused on the harbor area between the hurricane barrier and the Route 6 bridge; and the resort area found on Sconticut Neck.

Fairhaven was incorporated in 1812. The town began as an agricultural community, and this character persisted from its settlement until the middle of the 18th century. At that point, the economy shifted to a focus on shipbuilding, whaling, and overseas trade. Although New Bedford may have been the busiest whaling port in the nation, Fairhaven was second in the 1800's, employing over 1,300 men and bringing in over a half million dollars in whale products. When the trade in whale products faced its demise, due in part to the discovery of oil, other industries became important, especially The American Tack Company. Fairhaven became more suburban in character in the late 1870's when a rail line connected Fairhaven to New Bedford, and this character prevails to the present (www.state.ma.us/dchd/profile/094.pdf).

County-Bristol

Overview

Bristol County, Massachusetts is located on the south shore of the state (Figures 6 and 7). It is bounded on the west by the Massachusetts-Rhode Island border, on the north by Norfolk County, on the east by Plymouth County, and on the south by Buzzard's Bay. Bristol County has economic and social influences from the two major cities in the region. The northern part of the county has a stronger influence from Boston, while the southern and western portion of the county has more interactions with and influence from
Providence, RI as can be determined through the inclusion of the areas into the larger cities’ metropolitan statistical areas by the U. S. Bureau of Census.

Bristol County began as part of Plymouth Colony. The County was subsequently incorporated in 1685. Through history, there has been a shift in the economic base of the county. During the Colonial era, the major industries included shipbuilding, metal smithing, pottery making, and early textile manufacturing. During the 1800s, increased manufacturing occurred, with Fall River becoming a global center for cotton textiles; Attleboro and Taunton became nationally known for working in precious metals and jewelry manufacturing (http://www.bristol-county.org/about/history.shtml). During this period, New Bedford also became a global center, but in this instance for whaling and provision of whale oil and other products from whales. While these industries were strong in the 19th and early 20th Centuries, more recently the area has shifted its focus to tourism and retail while retaining some manufacturing. In addition to manufacturing, fishing is also locally important and is focused in the New Bedford harbor area.

Cape May Area Communities

Cape May Fishing Community

Although described as the Cape May fishing community, the vast majority of participants work on vessels that tie up in Lower Township. A few additional vessels offload and/or tie up in Wildwood, but the harbor area in that municipality is in decline subsequent to the movement of clam vessels to Atlantic City. Cape May is a moderately sized fishing community. Permit data from NMFS shows that 126 vessels list Cape May as their primary port. Of these, 48 vessels hold limited access scallop permits. There is a diversity of gear used by those who hold scallop permits. According to the permit data by gear
type, 26 vessels are permitted for scallop dredges, three use the small dredge and nine use trawl gear. In Cape May Harbor, the fishing community is small enough that most people know each other, which vessels they work on, and where those vessels tie up. In addition to fishermen, boat owners, dock owners and processors, and their families, the Cape May fishing community has two gear suppliers and a boat yard. Cape May also has high level of recreational fishing activity, but due to the fact that scallops are harvested only by commercial vessels in this area, little discussion of the recreational fishing community ensues in this description.

Although a good number of transient vessels offload at the Cape May docks, the core of Cape May fishermen tend to come home with their catches. Cape May is midway along the east coast, and vessels from both north and south are reported to land there. During my period of participant observation, I noted several vessels from North Carolina and Virginia, but few if any from points north. A few vessels from the south, mainly from North Carolina, come up for the entire summer and return south for the winter. Only one scalloper is known locally to go north and land in New Bedford regularly, but even he does not dock there; he docks in New York.

Those who are more permanent residents discussed the reasons that they come home with the catch. One reason is that dock owner/processors are also vessel owners. These owners need to maintain both properties, so the vessels come home to provide product for the dock. Some individuals may view the ownership of the docks and vessels as consolidating economic power, and decreasing the flexibility to land at the port nearest the area fished. This perspective is not uniformly held, however. A captain who had owned a vessel in the past explained his choice to be a hired captain by saying “I used to come home and then be responsible for the boat. Now if something happens, I come in
and tell 'em 'it's broke;’ I’m not responsible for getting it fixed.” Another fisherman when considering the possibility of moving to another port to fish for a prolonged period said “I’d hate that. I like knowing I’m coming home.” A final reason that the vessels come to Cape May was for the ease of regathering the crew. The same captain who spoke above said “you land and stay somewhere else you have to hunt up your crew. At home you know where to find them.”

With regard to ethnicity, all of the dock owners were white. Like New Bedford, most of the boat owners were white “Yankees” (in this case, American as opposed to a New England Yankee). One exception is a fleet owner who is Vietnamese. The vessels were referred to locally as “the Vietnamese Navy.” Captains and crews in the harbor overall were mixed in terms of race and nationality. The captains I interviewed were white, but some of the vessels were entirely staffed by African-Americans. In addition to these groups, some Mexicans were found on vessels from Cape May, and recently there was an influx of Russian young people who had been working for the resort activities, but some have begun to look into work in fishing.

Two major processors on Ocean Drive hire people who in New Bedford would be considered “Mayan.” McCay and Cieri (2000) note that the Mexican population resides in one of the nearby counties. On the docks, those who lump and drive trucks appear to dominantly be Yankees. At Schellenger’s Landing, it is a bit difficult to determine who is working for the restaurant and who works the docks, but it appears that the Mexican people who work in the area are working for the restaurant.

Most of the fishery participants live in southern Cape May County. Several of the boat owners live in North Cape May which is part of Lower Township, while others live in the City of Cape May. In addition to residing in the southern section of Cape May
County, a few of the fishermen have homes as far away as Philadelphia according to an informant who is a fleet owner in Cape May. Finally, an informant from Rockland, Maine told me that about 30 fishermen from Rockland travel as far as Cape May to meet their vessels.

It is becoming increasingly difficult for boat owners to find crew in the Cape May area. A former captain opined that this is due to an influx of vessels, largely under the ownership of the major fleet owners and an insufficient supply of labor for crew.

There are two fisheries organizations associated with Cape May. The first is Garden State Seafood Association, and the other is the Cape May Seafood Association. The fleet owners/processors all are members of the organizations, but both organizations are perceived by both fishermen and local citizens to be affiliated with a single boat owner/processor. When discussing management issues with a captain, crew, dock foreman and lumpers on one of the docks, they told me that fishery management discussions tend not to include them. The fleet owner/processors “tell us what they want us to know” and apparently the employees do not feel free to offer suggestions and ideas for improving management.

The larger fleet owners have a preference for ITQs, much like their counterparts in New Bedford. All the larger fleet owners who talked with me discussed a real preference for efficiency, or having fewer vessels that could work more days. However, the Cape May vessel owners, including the fleet owners, have agreed with FSF to see that any additional closures were small in size, tend to be areas that are not producing most of the current product and had guaranteed re-openings. The owner-operators tend to defer to FSF’s positions saying “they know more about management than I do.”
Port - Cape May Harbor

The harbor area overall is characterized more by recreational than commercial use. Marinas and recreational boating and fishing comprise greater area in terms of frontage upon the harbor than commercial fishing. Cape May is home to several major recreational fishing activities in terms of tournaments, and these both bring fishermen and money to the harbor. In addition to the fishing uses, there is a Coast Guard facility at the mouth of the harbor, which is the main training facility for the entire United States Coast Guard.

The state of New Jersey has the Coastal Area Facilities Review Act which requires permitting for development within the designated CAFRA zone, with an exemption for permitting under special circumstances. Of the areas in Cape May, only the dock area nearest the canal at Shellenger’s Landing is exempted. The township’s planner discussed the local situation, and had tried to assist the owners of the Ocean Drive docks in gaining an exemption, but the state denied the exemption.

The docks are somewhat scattered spatially. Four docks are located on Ocean Drive, three on one side of the channel, the fourth at Two Mile Landing and the final area at Schellengers Landing. For an aerial photo depicting these locations, see Figure 8.

Three of the docks on Ocean Drive are in operation, but one additional dock in this area went out of business in 2002. Of the three operating docks, two are under a single ownership, and the other is owned by another person. The docks on the west side of the channel have location to tie up vessels, processing, fuel, and ice facilities. In addition to these docks and processing locations, a major clam company plant is located across Ocean Drive. The dock on the east side of the channel, in the area known as Two Mile Landing, also can provide some processing, and is associated with a waterfront restaurant and marina. Generally surrounding this area is an expanse of saltmarsh, with a
number of marinas fringing the harbor area.

The dock at Schellengers Landing is located approximately two miles away from the docks on Ocean Drive, near the juncture of the harbor and the canal which cuts between the Atlantic Ocean and the Delaware Bay. This dock location is associated with two restaurants, fish wholesaling and a retail fish market, processing, ice and fuel facilities as well as boat provisioning and a fisherman’s wharf tour. At this location, there are numerous adjacent uses. Uses that one might expect adjacent to a commercial fishing dock include a marine railway, and two gear businesses. Also found in the area are tourism-related uses including marinas with charter/head/party boats and personal vessels, two whale watching businesses, bait and tackle shops, restaurants, higher density residences (condominiums), and some retail sales.

Although the port has landings of several species of fish and shellfish, increasingly strict regulations and declining abundance of other species has caused a decline in their importance. Reliance on scallops as the major economic species for commercial fishing has increased substantially in the last few years.

**Infrastructure**

Processing, ice and fuel is provided at the docks. These businesses are owned by the dock owner, who also is a processor, and in all cases is a boat owner as well. Vertical integration appears to be the rule for this locality. While the dock owners are also boat owners, not all boat owners are dock owners. The general opinion is that the dock owners are providing a service to the other boat owners, and that it is appreciated.

In addition to the docks, the Cape May area has a marine railway and two gear providers. Wholesale and retail sales for fish are also found locally, with some of the sales
through retail operations adjacent to the docks.

In contrast to New Bedford, the municipality provides few services for the fishing sector. The only service that was offered, in addition to those of the general public (for example, roads or emergency services,) is through a loan that is available for any business located in the township and provides jobs as a result. Generally, the fishing industry does not use this loan because the county provides a loan specifically intended for fishing businesses with a higher cap. The county loans are provided through the Department of Tourism. Applications are reviewed and approved or rejected by a board that is made up of fishermen and interested parties including bankers and fishery scientists.

_Municipality - Lower Township_

**Overview**

As noted in the description of the fishing community, the designation of this port as Cape May is something of a misnomer. In fact, the fishing docks are located within the borders of Lower Township and Wildwood, but both are within Cape May County, and the Lower Township docks are also on Cape May harbor. Lower Township is a dominantly residential community located to the north of Cape May and mainly west of Wildwood (Figure 9). In addition to residences, Lower Township has additional land uses. Diamond Shores is a resort area within Lower Township that is situated between Cape May and Wildwood Crest. Shopping and other commercial land uses are found in the villages of North Cape May and Villas in western Lower Township. Agricultural uses are found on higher land in the central portion of the township, and commercial and recreational fishing focused on the north side of the Cape May harbor in the southern area of the township. Selected characteristics of the community are presented in Table 6.
Wildwood is a resort community with numerous hotels and restaurants along the waterfronts. In addition, Wildwood has a boardwalk with amusements to occupy visitors looking for games and rides. The Wildwood area has an urban density of development for most of its area and numerous shops, which suggests a more urban character. Landings of scallops are extremely limited at Wildwood. The vast majority of landings are in Lower Township, and thus, Wildwood will not be discussed further as a fishing community for the purposes of this dissertation.

From its settlement in 1631 until the early 1900s, Lower Township was predominantly an area of farming and fishing peoples. The county as a whole in the early 1800s had 70% of its population employed in these occupations. Cape May, then called Cape Island, was the main focus of early tourism and recreation activities. After 1900, real estate speculation began with the development of the harbor with congressional funding approved in 1907. Shortly thereafter, with World War I, came development of the harbor area for military uses. Between World Wars I and II, fishing became the predominant activity in the area. The largest fish plant in the country at that time was located in Cape May County. With World War II, military uses again came to the fore, and further development of the harbor area with the construction of the canal was undertaken. In the postwar period, local planning officials noted that the area had shifted from farming and fishing as the base of its economy to tourism. (Dorwart 1996).

In consultation with long term residents, it also appears that there has been a long term decline in the importance of commercial fishing. They recognize the period of the dominance of fishing as being sometime in the 1970s (within their lifetimes), and that since the early 1980s, tourism has become the major economic emphasis in the area. Fishermen
Figure 9. Aerial photo of Lower Township and its surrounding areas at 32 m resolution. From USGS (http://terraserver.homeadvisor.msn.com/image.aspr?S=14&T=1&lat=38.975&lon=74.9)
<table>
<thead>
<tr>
<th>Geography</th>
<th>Map/aerial photo</th>
<th>Cape May County</th>
<th>Lower Township</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Figures 9, 10 and 11</td>
<td>Figures 9 and 11</td>
</tr>
<tr>
<td>Distance to Major Cities</td>
<td>Atlantic City - approx. 35 mi from central Cape May County Philadelphia - approx. 90 mi</td>
<td>Cape May - abuts</td>
<td>Atlantic City - 45 mi.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Philadelphia - approx. 90 mi</td>
</tr>
<tr>
<td>Metropolitan Statistical Area</td>
<td>Atlantic City-Cape May</td>
<td></td>
<td>Atlantic City-Cape May</td>
</tr>
<tr>
<td>Governance</td>
<td></td>
<td>Board of Selected Freeholders and County Manager</td>
<td>Council-Manager</td>
</tr>
<tr>
<td>Services</td>
<td></td>
<td>44 departments including nursing home oversight, libraries, planning, public safety, mosquito control, department of tourism (incorporating economic development)</td>
<td>water and sewer, police, fire and emergency services, recreational facilities, oversees the elementary school, planning and economic development</td>
</tr>
<tr>
<td>Transportation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air</td>
<td>limited - Cape May County airport</td>
<td>limited - Cape May County airport</td>
<td></td>
</tr>
<tr>
<td>Rail</td>
<td>limited - excursion only</td>
<td>limited - excursion only</td>
<td></td>
</tr>
<tr>
<td>Highway</td>
<td>Yes-Garden State Parkway</td>
<td>Yes-Garden State Parkway</td>
<td></td>
</tr>
<tr>
<td>Maritime</td>
<td>Yes - Cape May-Lewes Ferry</td>
<td>Yes - Cape May-Lewes Ferry</td>
<td></td>
</tr>
</tbody>
</table>

Table 6. Selected community characteristics for Cape May County and Lower Township
<table>
<thead>
<tr>
<th></th>
<th>Cape May County</th>
<th>Lower Township</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>1,203,264</td>
<td>22,945</td>
</tr>
<tr>
<td>% male</td>
<td>48.1</td>
<td>47.5</td>
</tr>
<tr>
<td>% female</td>
<td>51.9</td>
<td>52.5</td>
</tr>
<tr>
<td>Racial and Ethnic Composition(%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>one race</td>
<td>98.8</td>
<td>99.1</td>
</tr>
<tr>
<td>white</td>
<td>91.6</td>
<td>96.3</td>
</tr>
<tr>
<td>black/African American</td>
<td>5.1</td>
<td>1.4</td>
</tr>
<tr>
<td>American Indian and Alaska Native</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Asian</td>
<td>0.6</td>
<td>0.5</td>
</tr>
<tr>
<td>Native Hawaiian and Other Pacific Islander</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>some other race</td>
<td>1.3</td>
<td>0.7</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>3.3</td>
<td>1.9</td>
</tr>
<tr>
<td>Ancestry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irish</td>
<td>28.2%</td>
<td>32.0%</td>
</tr>
<tr>
<td>German</td>
<td>21.7%</td>
<td>24.8%</td>
</tr>
<tr>
<td>Italian</td>
<td>17.1%</td>
<td>16.6%</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>median age (years)</td>
<td>42.3</td>
<td>41.8</td>
</tr>
<tr>
<td>% under 18 years</td>
<td>22.3</td>
<td>23.7</td>
</tr>
<tr>
<td>% 65 year or over</td>
<td>20.2</td>
<td>20.7</td>
</tr>
<tr>
<td>Household Composition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>total households</td>
<td>42,148</td>
<td>9,328</td>
</tr>
<tr>
<td>% family household</td>
<td>64.9</td>
<td>68.4</td>
</tr>
<tr>
<td>% female headed households</td>
<td>10.9</td>
<td>11.7</td>
</tr>
<tr>
<td>% households with children under 18</td>
<td>28.6</td>
<td>31.0</td>
</tr>
<tr>
<td>% households with individuals over 65</td>
<td>34.4</td>
<td>15.0</td>
</tr>
<tr>
<td>average household size</td>
<td>2.36</td>
<td>2.43</td>
</tr>
<tr>
<td>Education (% of population over 25 years of age)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% less than 9th grade</td>
<td>4.6</td>
<td>4.3</td>
</tr>
<tr>
<td>% 9th to 12th grade, no diploma</td>
<td>13.6</td>
<td>18.6</td>
</tr>
<tr>
<td></td>
<td>Cape May County</td>
<td>Lower Township</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>----------------</td>
<td>---------------</td>
</tr>
<tr>
<td>% bachelors degree or above</td>
<td>22.0</td>
<td>13.1</td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>median household income</td>
<td>41,591</td>
<td>38,977</td>
</tr>
<tr>
<td>median family income</td>
<td>51,402</td>
<td>45,058</td>
</tr>
<tr>
<td>% below poverty level</td>
<td>8.6</td>
<td>7.7</td>
</tr>
<tr>
<td>% 18 years and over below poverty level</td>
<td>7.6</td>
<td>6.7</td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>population over 16</td>
<td>81,988</td>
<td>18,068</td>
</tr>
<tr>
<td>labor force (#/% population &gt;16)</td>
<td>49,201 / 60.0</td>
<td>10,648 / 58.9</td>
</tr>
<tr>
<td>unemployed civilian (% labor force)</td>
<td>8.2</td>
<td>9.9</td>
</tr>
<tr>
<td>Armed Forces (% population &gt;16)</td>
<td>0.9</td>
<td>0.7</td>
</tr>
<tr>
<td>Employment Industries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>occupational sector (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>management, professional and related</td>
<td>31.5</td>
<td>23.9</td>
</tr>
<tr>
<td>service occupations</td>
<td>21.1</td>
<td>24.1</td>
</tr>
<tr>
<td>sales and office occupations</td>
<td>27.3</td>
<td>27.7</td>
</tr>
<tr>
<td>farming, fishing and forestry</td>
<td>0.8</td>
<td>1.4</td>
</tr>
<tr>
<td>construction, extraction and maintenance occupations</td>
<td>11.2</td>
<td>13.7</td>
</tr>
<tr>
<td>production, transportation, and material moving occupations</td>
<td>8.0</td>
<td>9.2</td>
</tr>
<tr>
<td>NAICS 1999 employment by industry based on location of establishments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>agriculture, forestry fishing and hunting</td>
<td>90</td>
<td>N/A</td>
</tr>
<tr>
<td>mining</td>
<td>20-99</td>
<td>N/A</td>
</tr>
<tr>
<td>utilities</td>
<td>100-249</td>
<td>N/A</td>
</tr>
<tr>
<td>construction</td>
<td>2,222</td>
<td>N/A</td>
</tr>
<tr>
<td>manufacturing</td>
<td>781</td>
<td>N/A</td>
</tr>
<tr>
<td>services</td>
<td>21,324-22439</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Table 7. Demographic information for Cape May County and Lower Township from U. S. Bureau of Census
decline of importance of fishing for the Cape May area.

_Cape May County_

**Overview**

Cape May County is the southernmost county in New Jersey. It is surrounded by water on the east, south and west. The Atlantic Ocean is to the east; Delaware Bay is to the south and west of the county (Figures 10 and 11).

The major economic base of Cape May county is recreation and tourism. From consultation with county officials, retail and other activities, which might not be within the considered tourist related, are considered so for Cape May County. The Cape May County Chamber of Commerce provides literature on available activities county, and the bulk of these brochures focus on hotels, restaurants, beach activities, recreational uses, ecotourism such as bird and wildlife watching, and party/charter/head boat fishing.

Fishing has long been pursued in the Cape May area, beginning with whaling which was the occupation of the settlers of the Townbank village area of Lower Township on Delaware Bay. Fishing and crabbing as recreation as well as for subsistence goes back into the colonial era of the United States with the beginning of Cape May as an early resort for those from Philadelphia. In addition to fishing as recreation, fresh fish as desirable food was also advertized in association with recreating in early Cape May (Dorwart, 1996).

The Atlantic coastal areas of Cape May, Wildwood, Ocean City and Sea Isle City (Figure 11) are fairly urbanized with high density development and multi-story structures. These seaside locations provide most of the hotel and restaurant facilities within the county. The seaside cities are located on barrier islands or sand dune areas with marshy
Figure 10. Map of Cape May County, NJ and its surrounding counties.

Figure 11. Municipalities in Cape May County. Base map from NJDEP (http://www.state.nj.us/dep/gis)
bays just inland. West from the marshes are agricultural and residential areas of Lower, Middle and Upper Townships.

Following tourism, commercial fishing is the second most important economic base of the county (Table 7). Recreational fishing occurs from numerous localities within the county, but commercial fishing is focused in Lower Township (but still on Cape May Harbor) and in the dock area of Wildwood. There is some bay fishing for blue crab and eels, but the sea fisheries undertaken in the Atlantic are more important economically.

**Seaford Area Communities**

*Seaford Fishing Community*

In Seaford, VA, the fishing community is rather small. Twenty-two vessels list Seaford as their primary port, and 19 of those hold limited access scallop permits. All the limited access scallop vessels use the same gear, which is the scallop dredge. One company provides the docks, ice, gear, supplies, cold storage, and wholesale sales. This company shares office space with another. Vessels owned by four fleet owners typically come into Seaford, one of whom is also the owner of the docks. There is a welder who works on the vessels that is located nearby.

Two of the fleet owners are Anglo-American and two are Mexican-American. The captains and crews are a mix of Americans and Mexicans.

Few if any of the fishing community members reside in York County or Seaford as determined by tax records. Seaford is such a small fishing community that the members know each other by face and name.

One of the boat owners served on the Mid-Atlantic Fisheries Management Council
and was on the scallop advisory committee to the NEFMC. He provided information back and forth between the council and others in the fishing community of Seaford. Although he was not on the New England Council, he was appointed by the Mid-Atlantic Council to serve on the Sea Scallop Committee of New England Council, which has responsibility for management.

**Port**

The port is localized in a small location near the mouth of Back Creek. A map and an aerial photo of the area are shown in Figures 12 and 13. The port serves two companies that share local facilities. Processing (packing and shipping), ice, cold storage and wholesale marketing is undertaken at the location. Retail sales of products from this location are found in Grafton at a fishing supply and seafood store on U. S. Route 17.

In the past, neighbors had some complaints with regard to the plant (McCay and Cieri 2000), but now there seems to be little conflict. Surrounding uses are dominantly residential, but on the creek there are two marinas and a welding shop. Although most of the vessels found at the marinas are recreational vessels, a few deadrisers (local crab and clam boats) also tie up at the marinas.

**Infrastructure**

The port area provides ice, packing, shipping, cold storage and wholesale scallops in addition to docks and some ship repair at the welding shop. All these facilities are privately owned.

**Locality- Seaford**

**Overview**

In Virginia, there are no cities within the counties. If a county exists, it is the most
Figure 12. Map of the Seaford, VA area. From USGS

Figure 13. Aerial photo of Seaford, VA (8 m resolution). From USGS
http://terraserver.microsoft.com/image.aspx?t=1&s=13&x=233&y=2573&z=18&w=2
<table>
<thead>
<tr>
<th>Geography</th>
<th>York County</th>
<th>Seaford</th>
</tr>
</thead>
<tbody>
<tr>
<td>Map</td>
<td>Figure 14</td>
<td>Figures 12 and 13</td>
</tr>
<tr>
<td>Distance to major cities</td>
<td>Newport News - abuts</td>
<td>Newport News - approx. 7 mi</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Norfolk - approx. 45 mi.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Washington, D. C. - approx. 155 mi</td>
</tr>
<tr>
<td>Metropolitan</td>
<td>Norfolk-Virginia Beach-</td>
<td>Norfolk-Virginia Beach-</td>
</tr>
<tr>
<td>Statistical Area</td>
<td>Newport News</td>
<td>Newport News</td>
</tr>
<tr>
<td>Governance</td>
<td>County Supervisors</td>
<td>None</td>
</tr>
<tr>
<td>Services</td>
<td>coordinates water and</td>
<td>Only at the York County</td>
</tr>
<tr>
<td></td>
<td>sewer services, schools,</td>
<td>level</td>
</tr>
<tr>
<td></td>
<td>garbage collection,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>recycling, mosquito</td>
<td></td>
</tr>
<tr>
<td></td>
<td>control, emergency</td>
<td></td>
</tr>
<tr>
<td></td>
<td>services, planning,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>economic development,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>recreation</td>
<td></td>
</tr>
<tr>
<td>Mode of transportation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highway</td>
<td>Interstate 64</td>
<td>None</td>
</tr>
<tr>
<td>Air</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Rail</td>
<td>Yes - freight, passenger runs through county, but no stops</td>
<td>None</td>
</tr>
<tr>
<td>Maritime</td>
<td>Yes - freight to refinery, military</td>
<td>Limited - recreational and commercial fishing vessels</td>
</tr>
<tr>
<td></td>
<td>York County</td>
<td>Seaford (zip code 23696)</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Population</td>
<td>57,297</td>
<td>3,441</td>
</tr>
<tr>
<td>% male</td>
<td>49.1</td>
<td>49.8</td>
</tr>
<tr>
<td>% female</td>
<td>50.9</td>
<td>50.2</td>
</tr>
<tr>
<td>Racial and Ethnic Composition(%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>one race</td>
<td>98.0</td>
<td>99.2</td>
</tr>
<tr>
<td>white</td>
<td>80.0</td>
<td>94.2</td>
</tr>
<tr>
<td>black/African American</td>
<td>13.4</td>
<td>3.4</td>
</tr>
<tr>
<td>American Indian and Alaska Native</td>
<td>0.3</td>
<td>0.4</td>
</tr>
<tr>
<td>Asian</td>
<td>0.7</td>
<td>0.8</td>
</tr>
<tr>
<td>Native Hawaiian and Other Pacific Islander</td>
<td>0.1</td>
<td>0</td>
</tr>
<tr>
<td>some other race</td>
<td>0.9</td>
<td>0.3</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>2.7</td>
<td>1.6</td>
</tr>
<tr>
<td>Ancestry</td>
<td>Other Ancestries 26.9%</td>
<td>English 17.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>median age (years)</td>
<td>36.5</td>
<td>41.2</td>
</tr>
<tr>
<td>% under 18 years</td>
<td>29.1</td>
<td>24.6</td>
</tr>
<tr>
<td>% 65 year or over</td>
<td>9.1</td>
<td>12.4</td>
</tr>
<tr>
<td>Household Composition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>total households</td>
<td>20,000</td>
<td>1,290</td>
</tr>
<tr>
<td>% family household</td>
<td>79.4</td>
<td>78.1</td>
</tr>
<tr>
<td>% female headed households</td>
<td>9.4</td>
<td>6.0</td>
</tr>
<tr>
<td>% households with children under 18</td>
<td>44.9</td>
<td>36.7</td>
</tr>
<tr>
<td>% households with individuals over 65</td>
<td>18.0</td>
<td>23.0</td>
</tr>
<tr>
<td>average household size</td>
<td>2.78</td>
<td>2.61</td>
</tr>
<tr>
<td>Education (% of population over 25 years of age)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% less than 9th grade</td>
<td>2.6</td>
<td>3.1</td>
</tr>
<tr>
<td>% 9th to 12th grade, no diploma</td>
<td>5.7</td>
<td>6.9</td>
</tr>
<tr>
<td>% high school graduate or above</td>
<td>91.7</td>
<td>89.9</td>
</tr>
<tr>
<td>% bachelors degree or above</td>
<td>37.4</td>
<td>28.7</td>
</tr>
<tr>
<td>Table 9. Demographic information for York County and Seaford, VA from U.S. Bureau of Census and Bureau of Labor Statistics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>median household income</td>
<td>57,956</td>
<td>64,392</td>
</tr>
<tr>
<td>median family income</td>
<td>64,892</td>
<td>72,431</td>
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<tr>
<td>% below poverty level</td>
<td>3.5</td>
<td>3.3</td>
</tr>
<tr>
<td>% 18 years and over below poverty level</td>
<td>3.3</td>
<td>3.1</td>
</tr>
<tr>
<td><strong>Employment</strong></td>
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<td></td>
</tr>
<tr>
<td>population over 16</td>
<td>41,855</td>
<td>2,671</td>
</tr>
<tr>
<td>labor force (#/% population &gt;16)</td>
<td>29,669 / 62.5</td>
<td>1,830/68.5</td>
</tr>
<tr>
<td>unemployed civilian (% labor force)</td>
<td>2.8</td>
<td>1.9</td>
</tr>
<tr>
<td>Armed Forces (% population &gt;16)</td>
<td>8.4</td>
<td>4.8</td>
</tr>
<tr>
<td><strong>Employment Industries</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>occupational sector (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>management, professional and related</td>
<td>45.9</td>
<td>45.8</td>
</tr>
<tr>
<td>service occupations</td>
<td>13.1</td>
<td>12.1</td>
</tr>
<tr>
<td>sales and office occupations</td>
<td>24.3</td>
<td>21.0</td>
</tr>
<tr>
<td>farming, fishing and forestry</td>
<td>0.3</td>
<td>0.8</td>
</tr>
<tr>
<td>construction, extraction and maintenance occupations</td>
<td>7.3</td>
<td>12.4</td>
</tr>
<tr>
<td>production, transportation, am material moving</td>
<td>9.1</td>
<td>8.1</td>
</tr>
<tr>
<td><strong>NAICS 1999 employment by establishment location</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>agriculture, forestry, fishing and hunting</td>
<td>20-99</td>
<td>N/A</td>
</tr>
<tr>
<td>mining</td>
<td>0-19</td>
<td>N/A</td>
</tr>
<tr>
<td>utilities</td>
<td>100-249</td>
<td>N/A</td>
</tr>
<tr>
<td>construction</td>
<td>1806</td>
<td>N/A</td>
</tr>
<tr>
<td>manufacturing</td>
<td>455</td>
<td>N/A</td>
</tr>
<tr>
<td>services</td>
<td>10,116 - 11,653</td>
<td>N/A</td>
</tr>
</tbody>
</table>
local form of government recognized. Cities are independent of counties and are considered county equivalents both by the U. S. Bureau of Census classifications and in terms of provision of service and delegated authority.

In terms of governance and organization, Seaford is much more like a neighborhood than a city or town. The area has no governmental organization other than at the county level (York County), and it has no official boundaries. The area is somewhat isolated from other unincorporated communities of York County (Table 8). It is separated from Dandy, also known as Goodwin Neck, by Back Creek, and there does seem to be some distinction between the Seaford area and Grafton.

Seaford is off the main roads of the county, about five miles from U.S. Route 17, which is the nearest major road. The area is between suburban and rural in development intensity. More recent developments have a suburban density, but older areas have a rural character with larger lots and older, often smaller, homes.

The main business area has a small grocery store, post office, churches, and an elementary school focused on Seaford Road. A secondary business area is found along Back Creek and consists of the scallop port, a welding shop, and a marina.

Prior to European settlement, the area of Seaford was populated by Native Americans. With settlement, the Seaford area was patented to several owners, but three plantations, Back Creek, Cheeseman, and Bay Tree were all located on Crab Neck (Stall 2001). Although fishing did occur, it was secondary to farming in the area until technologies improved making fishing more economically reliable. Back Creek was once a focus for crab vessels and pound netters, but more recently, crabbing and pound netting have declined. Stall (2001) notes that now few people in the area work on the water as
Figure 14. Selected counties and independent cities of southeastern Virginia. Note the location of York County, and the cities of Hampton and Newport News.
was done in the past, but observes that the scallop companies continue the tradition of fishing in the area.

Local people recognize Seaford as the area located on Crab Neck, between Back Creek and Chisman Creek and between Goose Creek and the marshy area between Claxton Creek and Bay Tree Creek (Stall, 2001). A map of the area is provided in Figure 12. Note that the endmost area of the neck, Bay Tree Island, is not considered by the local people to be part of Seaford. Despite local definitions, that area is considered part of the census tract and zip code area for Seaford by the U. S. Bureau of Census.

**York County**

**Overview**

York County, Virginia, has a long history beginning with the settlement by the English and the development of the country. Just a few miles away, at Jamestown, the English settlement of the United States began in earnest. Yorktown, within the county, is the site at which the British under General Cornwallis surrendered ending the Revolutionary War. Presently, York County is a dominantly suburban area, with nearly 36% of the county held by the Federal government - mainly by the Navy and the Coast Guard, but also with properties owned by the National Park Service.

York County is part of the greater Hampton Roads area. It is adjacent to Hampton, Newport News and Williamsburg. The Virginia tidewater area, also known as Hampton Roads, is well known for its emphasis on the military and for taking advantage of the resources of the Chesapeake Bay in addition to tourism based on the local history. Despite its proximity to the two larger cities, Seaford was considered distinct in terms of
the population’s demographic characteristics, particularly age and ethnicity, and income characteristics (Table 9). York County is part of the suburban ring surrounding the four major cities of Hampton Roads-- Virginia Beach, Norfolk, Hampton, and Newport News (Figure 14).

The area has numerous museums that interpret the local area’s importance during the Revolutionary and Civil Wars. Other institutions focus upon the natural systems of the area and human’s relation to those systems, including the Watermen’s Museum located in Yorktown. Much of the focus of that museum is on older technologies and vessels, but this museum was the only one of those visited in the four communities that had an exhibit specifically on scalloping. In addition, the county’s Economic Development department lists the sea scallop businesses and the associated cold storage facility jointly as among the largest employers in the county (http://www.yorkdevelopment.com/indstry/top_employers.asp).

Hampton Roads Area Communities

The Hampton Roads area of Virginia is regional in geographic context. In the general use of the term, the cities of Virginia Beach, Norfolk, Suffolk, Hampton, Portsmouth, Chesapeake, and Newport News are considered the Hampton Roads region often with the addition of the cities of Poquoson, and Williamsburg and York, Isle of Wight, James City, Gloucester, and Matthews Counties. For the purposes of this dissertation, however, two cities - Hampton and Newport News, will be described as Hampton Roads.

Hampton Roads Fishing Community
The Hampton Roads fishing community consists of fishermen, processors, boat owners of Hampton and Newport News and their families, a small ship supply, a boat yard, and the Newport News Fishing Industrial Park employees. The processors activities range from packing and shipping to more advanced processing of products, such as scallop medallions. In addition to scallops, products processed locally include shrimp, fresh and frozen fish and blue crab. Bay fisheries include gillnet, haul seine, blue crab (pot, scrape, and dredge), and pound net fisheries which provide blue crab, croaker, spot, and a number of other species. Compared to the other fish products, scallops have high volume and high value. In 2000, scallops overcame blue crabs to become the most valuable species landed in Newport News and Hampton (Ingram 2002).

According to the NMFS Vessel permit data, 60 vessels listing Hampton or Newport News as their principle port have permits for marine fisheries, and of those, 48 hold limited access scallop permits. Thirty six permits in the vessel category permit file have dredge permits; one has a small dredge permit, and 10 have net permits.

For Newport News, the city’s industrial park administrator said that a fair portion of the employees walk to work. This is consistent with the logic that induced the city to develop the property; the industrial park was created to provide jobs for the southeast neighborhood, which is a section of the city with a high population of low income people. Boat owners, like most of the residents of the general Hampton Roads area, reside elsewhere in the metropolitan region. One family who runs scallop company has a member who lives in Hampton while the rest of the family resides in Suffolk. Another vessel owner’s boats are in Newport News, but he lives in York County. Area of residency for captains and crews falls into three categories. First is the local category,
which consists of the metropolitan region. The next category is anywhere in the U. S. because some fishermen are transient and may come from as far away as Alaska to work. The final category is outside the U. S. There is a group of people from Mexico who are recruited to work the vessels who work and during employment reside locally, but often return to Mexico in the autumn and early winter.

Owners of processing facilities and vessels that were interviewed were white. Crews were mainly Mexican, but captains and mates were generally Anglo-Americans. Processing employees were a mix of Anglo-Americans, African-Americans, and Mexicans. One scallop company owner told me, "We used to mainly hire blacks, but now they're being replaced by Mexicans." He also noted that there is some seasonality in availability of crew as the Mexican people like to go home to Mexico between Thanksgiving and New Years.

In addition to having boats and processing facilities, one of the processors in Hampton provides gear for marine fisheries. Another supplier is found in the downtown Hampton area, but that supplier appears to mainly serve the estuarine fisheries. Also in Hampton, one processor has only recently begun taking scallops again. They had processed scallops in the past, but found they had problems in the days of meat count regulation so refused to take scallops until the last year.

Port

The port area of Hampton Roads is somewhat dispersed. In Hampton, there are
Figure 15. Aerial photo of Hampton area with docks denoted. From USGS http://terraserver.microsoft.com/image.aspx?x=138&y=238&z=18&w=2
three main sites downtown, Phoebus, and Sunset Creek. In Newport News, the fishing port is situated in the Seafood Industrial Park. In the downtown Hampton area, major activities include recreational uses, commercial fishing, and some limited passenger traffic. While the major concentration of the harbor is near the downtown, not all the commercial docks are located there. One dock is located about two miles away near Phoebus, and another is located at the mouth of Sunset Creek. These locations are marked on the aerial photo in Figure 15.

The Phoebus location has had processing associated in the nearby area, but this has moved to Suffolk (roughly some 20 miles distant) due to conflicts over what people in Phoebus considered an unpleasant odor. In addition to the docks and packing of the product to the processing location, these owners also have a seafood restaurant adjacent to the dock area. Surrounding uses in the area include residences, antique and other retail stores, restaurants, and Fort Monroe military base.

The Sunset Creek location has docks, and supplies available. This location is surrounded by waterfront residences in the immediate area, but further up the creek is a small fish house, and where the creek meets the main street that leads into Hampton, there is a recreational boat dealership.

The downtown dock area has a fish house, processing, ice, and shipping available. Surrounding uses include marinas, a gear supplier, a university extension office, a crab processor, a major museum, an historical carousel, upscale retail stores, the city visitors center, and a major hotel. In review of local planning and economic development documents, this area is primarily designated for high tech and cultural uses, and thus, the fishing area is not likely to undergo further development in the downtown area.
Frey (1996) gives a very brief history of the Newport News Seafood Industrial Park. He notes that Newport News has traditionally had a smaller scale of commercial fishing development than Hampton. The Seafood Industrial Park was started in 1979 with the development of a seawall and other improvements to the small boat harbor. Frey (1996) described the area as having spotty success at first. Drawn to the area were two fishing companies out of Texas who came up to participate in scalloping, both of which left when “overfishing had cleared scallop beds all along the Atlantic coast.” One of the companies was reputed for leaving “bills and rows” (Frey 1996:321).

The Seafood Industrial Park is currently operating with an income provided to the city of $700,000 per year through mooring fees, leases, and taxes. The operating expenses are roughly $60,000 for the Industrial Park, plus the salaries of one full time harbor master and one part time secretary. The harbor master would like to add another pier. The pier would serve two purposes. First, it would provide more services as there is currently a waiting list for 1,000 linear feet for moorings; and second, it could bolster the current revenue to the city’s general fund through fees and taxes increasing the contribution of the Seafood Industrial Park to $1,000,000. (Ingram 2002).

The Seafood Industrial Park location is adjacent to U. S. 664 and near to the Newport News section of the Port of Virginia major cargo shipping terminal. An aerial photo of the area is provided in Figure 16. In the Seafood Industrial Park, there are scallop, and crab businesses, a shrimp processor, a shipyard, a fuel dock, and a Virginia Marine Resource Commission office. Now defunct are a harbor tour company and restaurant, but the company
Figure 16. Aerial photo of the Newport News small boat harbor, also known as the Seafood Industrial Park. From USGS http://terraserver.microsoft.com/image.aspx?t=1&s=11&x=935&y=10230&z=18&w=2
still pays rent, therefore, the city has not assigned the area to other potential users.

Although the Seafood Industrial Park focuses on fish and seafood, other commercial vessels such as tugs are allowed to tie up along the long pier that juts out into the James River.

**Infrastructure**

In addition to the docks, Hampton's port facilities also include gear suppliers, which are located at the docks at Sunset Creek and at the downtown location, processing and packing facilities, ice, and a university extension location. Other than the university extension office, the facilities within the city limits of Hampton are all in private ownership.

Newport News has a slightly broader range of services available for fishermen and processors. A fuel dock, a shipyard, and the headquarters for the Virginia Marine Resources Commission (VMRC) are situated alongside the docks and processors in the Newport News Seafood Industrial Park. The dock owners have ice and docking locations to tie up vessels, unloading facilities, and processing in the form of packing and shipping. The businesses are privately held, but the city provides the land on long term lease, owns the pier, and maintains the canal.

**Municipality - Hampton**

**Overview**

Hampton, Virginia is a city of nearly 150,000 people. The city has diverse areas and land uses in part due to its expansion by annexation in the early 1950s. The former city of Phoebus and the former Elizabeth City County now comprise neighborhoods in the
current city of Hampton. Hampton has a diverse population, with an even distribution of
50% African-American and 50% white population (Table 11). Hampton is home to a
historically black college, Hampton University. There is a substantial amount of
coordination between Hampton and the other Hampton Roads communities for
transportation, planning, water and sewage services, and economic development. At one
point in recent history, there was even consideration of the cities annexing and becoming
one large city, but the concept did not gain acceptance. Despite regional coordination,
each municipality retains its own regulations, goals, and image. Hampton strives to be a
modern high-tech community with appropriate services and development.

Hampton was settled in 1610 in the area of Keocoughtan. During its early history
Hampton served as a trade center and port for cargo. During the Revolutionary War, the
War of 1812, and the Civil War, Hampton became increasingly important for the
protection of the Chesapeake Bay and later a guardian to a major route to Washington,
D.C. (Williamson 1993). At the end of the Civil War, much of the local land area was not
productive for food products, and so, for sustenance, local residents began to more
completely exploit the Chesapeake Bay. Hampton became a major center for seafood and
associated fish products with processing of menhaden for oil, canning of crab, and
shucking, canning and packing oysters occurring in the city (Stensvaag 1985).

In the past, Hampton was known as “Crabtown” (Frey 1996). “Crabtown,”
according to Frey (1996), had problems with the odor for the scrap which was processed
for chicken feed. He notes the decline of fisheries and offers the following:
### Geography

<table>
<thead>
<tr>
<th>Geography</th>
<th>Hampton</th>
<th>Newport News</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance to major cities</td>
<td>Newport News - abuts</td>
<td>Hampton - abuts</td>
</tr>
<tr>
<td></td>
<td>Norfolk - approx. 2 mi.</td>
<td>Norfolk - approx. 3 mi.</td>
</tr>
<tr>
<td></td>
<td>Richmond - approx. 75 mi.</td>
<td>Richmond - approx. 70 mi.</td>
</tr>
<tr>
<td>Metropolitan Statistical Area</td>
<td>Norfolk-Virginia Beach-Newport News</td>
<td>Norfolk-Virginia Beach-Newport News</td>
</tr>
</tbody>
</table>

### Governance

<table>
<thead>
<tr>
<th>Governance</th>
<th>Hampton</th>
<th>Newport News</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mayor - council with city manager</td>
<td>water and sewer, streets, garbage collection, mosquito control, emergency services, policing, tourism, courts planning and economic development, oversight of schools</td>
<td>water and sewer, streets, garbage collection, mosquito control, public housing, emergency services, policing, tourism, courts, planning and economic development, oversight of schools</td>
</tr>
</tbody>
</table>

### Services

<table>
<thead>
<tr>
<th>Transportaton</th>
<th>Hampton</th>
<th>Newport News</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Rail</td>
<td>Yes-freight</td>
<td>Yes - passenger and freight</td>
</tr>
<tr>
<td>Highway</td>
<td>Yes- I 64</td>
<td>Yes- I 64</td>
</tr>
<tr>
<td>Maritime</td>
<td>Yes-cruise, ferry, recreational, fishing</td>
<td>Yes-freight, commercial fishing</td>
</tr>
</tbody>
</table>

Table 10. Selected community characteristics for Hampton and Newport News.
<table>
<thead>
<tr>
<th>Population</th>
<th>Newport News</th>
<th>Hampton</th>
</tr>
</thead>
<tbody>
<tr>
<td>180,150</td>
<td>146,437</td>
<td></td>
</tr>
<tr>
<td>% male</td>
<td>48.4</td>
<td>49.6</td>
</tr>
<tr>
<td>% female</td>
<td>51.6</td>
<td>50.4</td>
</tr>
<tr>
<td>Racial and Ethnic Composition(%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>one race</td>
<td>97.2</td>
<td>97.6</td>
</tr>
<tr>
<td>white</td>
<td>53.5</td>
<td>49.5</td>
</tr>
<tr>
<td>black/African American</td>
<td>39.1</td>
<td>44.7</td>
</tr>
<tr>
<td>American Indian and Alaska Native</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Asian</td>
<td>2.3</td>
<td>1.8</td>
</tr>
<tr>
<td>Native Hawaiian and Other Pacific Islander</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>some other race</td>
<td>1.8</td>
<td>1.0</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>4.2</td>
<td>2.8</td>
</tr>
<tr>
<td>Ancestry (percent)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Ancestries</td>
<td>46.7</td>
<td>48.4</td>
</tr>
<tr>
<td>German</td>
<td>9.6</td>
<td>9.0</td>
</tr>
<tr>
<td>English</td>
<td>8.3</td>
<td>7.8</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>median age (years)</td>
<td>32</td>
<td>34.0</td>
</tr>
<tr>
<td>% under 18 years</td>
<td>27.5</td>
<td>24.2</td>
</tr>
<tr>
<td>% 65 year or over</td>
<td>10.1</td>
<td>10.3</td>
</tr>
<tr>
<td>Household Composition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>total households</td>
<td>69,686</td>
<td>53,887</td>
</tr>
<tr>
<td>% family household</td>
<td>66.5</td>
<td>66.6</td>
</tr>
<tr>
<td>% female headed households</td>
<td>17.9</td>
<td>16.4</td>
</tr>
<tr>
<td>% households with children under 18</td>
<td>393</td>
<td>36.8</td>
</tr>
<tr>
<td>% households with individuals over 65</td>
<td>19.0</td>
<td>20.5</td>
</tr>
<tr>
<td>average household size</td>
<td>2.5</td>
<td>2.49</td>
</tr>
<tr>
<td>Education (% of those over 25 years of age)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% less than 9th grade</td>
<td>4.2</td>
<td>4.1</td>
</tr>
<tr>
<td>% 9th to 12th grade, no diploma</td>
<td>11.3</td>
<td>10.4</td>
</tr>
<tr>
<td>% high school graduate or above</td>
<td>84.5</td>
<td>85.5</td>
</tr>
<tr>
<td></td>
<td>Newport News</td>
<td>Hampton</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>--------------</td>
<td>----------</td>
</tr>
<tr>
<td>% bachelors degree or above</td>
<td>19.9</td>
<td>21.8</td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>median household income</td>
<td>36,597</td>
<td>39,532</td>
</tr>
<tr>
<td>median family income</td>
<td>42,520</td>
<td>46,110</td>
</tr>
<tr>
<td>% below poverty level</td>
<td>13.8</td>
<td>11.3</td>
</tr>
<tr>
<td>% 18 years and over below poverty level</td>
<td>11.1</td>
<td>9.5</td>
</tr>
<tr>
<td>Employment</td>
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<td></td>
</tr>
<tr>
<td>population over 16</td>
<td>135,532</td>
<td>115,091</td>
</tr>
<tr>
<td>labor force (#/% population &gt;16)</td>
<td>92,586 / 68.3</td>
<td>71,790 / 62.4</td>
</tr>
<tr>
<td>unemployed civilian (% labor force)</td>
<td>5.6</td>
<td>6.6</td>
</tr>
<tr>
<td>Armed Forces (% population &gt;16)</td>
<td>7.2</td>
<td>5.8</td>
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<tr>
<td>Employment Industries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>occupational sector (%)</td>
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<td></td>
</tr>
<tr>
<td>management, professional and related</td>
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<td>32.1</td>
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<td>service occupations</td>
<td>17.6</td>
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<td>sales and office occupations</td>
<td>27.6</td>
<td>27.8</td>
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<tr>
<td>farming, fishing and forestry</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>construction, extraction and maintenance occupations</td>
<td>10.4</td>
<td>11.0</td>
</tr>
<tr>
<td>production, transportation, am material moving occupations</td>
<td>13.6</td>
<td>13.7</td>
</tr>
<tr>
<td>NAICS 1999 employment by location of establishments</td>
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<td>agriculture, forestry fishing and hunting</td>
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<td>20-99</td>
</tr>
<tr>
<td>mining</td>
<td>None reported</td>
<td>20-99</td>
</tr>
<tr>
<td>utilities</td>
<td>100-249</td>
<td>100-249</td>
</tr>
<tr>
<td>construction</td>
<td>3927</td>
<td>2410</td>
</tr>
<tr>
<td>manufacturing</td>
<td>24845</td>
<td>5497</td>
</tr>
<tr>
<td>services</td>
<td>55724-55803</td>
<td>39545-39564</td>
</tr>
</tbody>
</table>

Table 11. Demographic information for Newport News and Hampton, VA from U. S. Bureau of Census
“(s)ome think the problem is more political than technological. Other find it sociological with the fishery and industry in too many small competitive pieces, some operators not speaking to each other. Talk of cooperation usually come to nothing (p. 302).”

With the advent of urban redevelopment that commenced in the 1950s, and with more recent redevelopment, Hampton effected to shake its “Crabtown” image (Frey 1996). While the city sponsors Bay Days as a celebration of the water and its heritage, the city’s planning districts appear to be squeezing out fishing related businesses, particularly in the downtown area. Hampton has decided to develop its downtown to have a strong tourist and retail emphasis. This area was at one time in the past a major focus of fishing activity, but now has hotels, museums, and marinas. While possibly more aesthetically appealing, this gentrification has limited the further development of fishing activities in Hampton.

In addition to downtown redevelopment for aesthetics, the city makes efforts to strengthen its links with higher education and high technology. The city of Hampton promotes itself as having the highest concentration of people with advanced degrees in science and technology in the United States. In part, this is due to the presence of military contractors and the facilities at Langley Field, which include a NASA installation, and in part, to connections with Hampton University. These factors contrast distinctly with Hampton’s early history of dependence on the local environment, and displays a desire for an economic base that is associated with high incomes and prosperity.

*Newport News*

*Overview*

As noted in the overview of the City of Hampton, the cities in the Hampton Roads
area substantially coordinate on issues of transportation, planning, water and sewer facilities, and economic development. While the communities coordinate, they also maintain their own identities.

Newport News, in particular, is recognized as providing a significant number of jobs for the Hampton Roads area. The former Newport News Shipyard, now Northrup Grumman, was in 1980 the major employer for the entire Commonwealth of Virginia (Tazewell and Friddell 2000). In addition to the Shipyard, the city provides a number of industrial locations, which include the Jefferson Labs, the Seafood Industrial Park (also known as the small boat harbor), the Newport News-Williamsburg Airport (Table 10), and locations near Fort Eustis. Along with high industrial employment, retail sales are also strong in the community; there are several shopping centers and what has recently been reputed to be one of the highest revenue malls in the country.

Newport News, like Hampton, joined in the annexation movement in the 1950s and engulfed Warwick City (formerly Warwick County) in 1958 (Tazewell and Friddell 2000). Newport News geographically is a long and narrow, having a substantial waterfront area. At the southernmost portion of the city is the commercial waterfront, including the Small Boat Harbor, one terminal of the Port of Virginia, and the Shipyard area. Just north of this is downtown Newport News, and then progressively northbound, the development of the area becomes progressively more suburban. The northern area of the city is made up of a large park that provides a greenspace to separate Newport News from Williamsburg and York County.

Early history of Newport News is much like that of York County. The greatest portion of the area was composed of farms, with ancillary fishing. By 1830, the Newport
New area was the second most productive area in production of pickled fish in Virginia, and oyster fishing was becoming sufficiently exploited that local people petitioned the Virginia Assembly to place regulations on who could have access to oyster grounds and to create seasons for harvesting (Quarlstein 1996). In the post-Civil War era, the major industrial development of the area began with the development of the railroad for shipping coal, and the institution of the Newport News Shipbuilding and Dry Dock Company by Collis P. Huntington. To this day, the shipyard is one of the largest employers in the area. Important to local fishing is the city’s involvement with the Newport News Seafood Industrial Park. It was begun in 1979 to provide employment for the low income area known as the southeast neighborhood. Currently, the area is fully rented and provides a location for scallop and crab companies, a ship repair facility, a state marine fisheries office, fuel suppliers, and as a shrimp processing company.
Chapter 4. Longitudinal study

The following longitudinal study was undertaken to assess the socioeconomic effects of proposed Amendment 10 to the Sea Scallop Fishery Management Plan through review of the effects of the existing area management. The expectation is that similar effects will continue to occur, but possibly affecting different communities, and that the severity of the impacts may increase. Reasons for the difference in communities affected and increase in severity of effects include the location of the areas closed, their extent, historical productivity, and historic use of the area.

Area management has been in existence since 1994 for the three closed areas in New England, and since 1997 for two areas in the Mid-Atlantic (Figure 17). All of these management areas have been subject to closures and re-openings of at least portions of their extent. The communities under study, therefore, have experience with adjusting to this form of management. However, expansion of area management may exacerbate local problems that have developed due to ad hoc area management, subsequent to the ad hoc area management or, alternatively, similar effects may impinge upon other communities due to changing conditions in those other communities.

Information on the socioeconomic effects of the current ad hoc management is
Figure 17. Map of location of area closures superimposed on 100 m bathymetric contour.
presented in the next section of this chapter. The information includes change over time in numbers of trips, variation in landings and in value of landings for each port. Also presented is a time series of dependency illustrated by change in employment indices for evenness of employment and location quotients. In addition to quantitative measures, qualitative data on the socioeconomic effects of the change to *ad hoc* area management is presented, as are concerns expressed by people within the communities gained from interviews and participant observation in the communities and at meetings.

**Socioeconomic Effects of *Ad Hoc* Area Management**

**Variation in Trips, Landings, and Value of Landings - The Potential for Developing Boom and Bust**

In general, it would not be expected that area management would affect all communities in a similar manner. A single indication that the effects might be different for different communities is the change in the number of trips, landings, and values of landed scallops. A graph of the number of trips is provided in Figure 18; the amount of landings is depicted graphically in Figure 19; and a graph of the values of landings is shown in Figure 20. Figure 21 depicts the areas closed and re-opened through *ad hoc* area management, and Figure 22 depicts the areas proposed for opening and closure in Draft Amendment 10 to the Sea Scallop Fishery Management Plan.

The sea scallop landings display a level of seasonality. Landings tend to peak in the early summer, usually around June, and decline to a minimum in the late autumn and winter. According to an informant in Hampton, the peak corresponds with a peak in
demand. The lesser landings in the late autumn and winter reflect the more difficult weather conditions and the effects of days-at-sea limitations in more recent years.

New Bedford experienced a decline in trips, landings, and value prior to the initiation of the closure for landings of scallops. However, in 1994, commensurate with the first year of closure of the three areas near or on Georges Bank, the lowest level of annual landings since 1990 was recorded. Corresponding with a decline in landings, the number of trips declined approximately 20% from the previous year. The greatest change in the number of trips occurred in the first half of the year. During the remainder of the closure, New Bedford's landings declined to one third the typical landings for the years 1990 to 1992. Reopening of areas began in 1999 with the reopening of a portion of Closed Area II. In 2000, two peaks in landings were noticeable. The first peak corresponded to the time of opening of the portion of Closed Area II and a part of Nantucket Lightship Area, which was approximately midyear, and the second peak corresponds to the reopening of a portion of closed Area I in the autumn. Peaks were also observed at the same general time on the charts for trips and landings indicating an increase in both the number of trips and in the value of scallops landed in New Bedford. It, thus, appears that New Bedford is at least somewhat subject to booms which coincide with re-openings subsequent to the busts during closure for the areas of Georges Bank and South Channel (Closed Areas I and II and Nantucket Lightship).

Cape May’s landings are somewhat more difficult to interpret. The port also experienced a decline in landings beginning in 1993, but there was a minor surge in landings between 1994 to 1996. During the period of decline, landings were
Figure 18. Landings in pounds for the four study communities. Note that data was not available for Seaford prior to 1997, thus is reported as zero.
Figure 19. Number of trips landing at the ports within the study communities. Seaford data was unreported prior to 1997, therefore is treated as zero.
Figure 20. Value of landings in current dollars at the study communities. Note data unavailable for Seaford prior to 1997, thus treated as zero.
Figure 21. Map of three digit statistical areas (blue lines), area closures (in gray) and selected areas for re-openings (exclusion areas - outlined in red) for the period up to 2003. Note that only the Virginia Beach closure and the exclusion area (re-opening) for Nantucket Lightship are wholly within a single statistical area.
Figure 22. Map of areas designated for opening (green) and closure (red) overlaid on three digit areas (blue lines) during the 2004 and 2005 fishing years by NEFMC. New closure areas have no border, while longer term areas have gray borders. Blue lines designate three digit statistical areas.
approximately half that of 1990 and 1991. The minor surge appears to correspond to increased activity of the fleet from New Bedford moving south and offloading in Cape May for at least some of the trips. This interpretation was confirmed by the use of GIS analysis, which illustrated increased landings from the Delmarva area also being landed in New Bedford, and information from interviews. In 1997 and 1998, while Hudson Canyon closure was added, landings were approximately one third less than the previous two years. Contemporaneous with the reopening of Georges Bank areas and the reopening of Hudson Canyon, landings in Cape May rose to equal or higher than landings prior to the closure of Hudson Canyon. In 2001, both landings and the value of landings exceeded the highest levels of the prior eleven years.

Data for Seaford are insufficient to determine the level of effect of the Georges Bank area closures or the effect of the Virginia Beach/NC closure, but from the time period of 1997 to the end of 2001, landings and values have increased while the number of trips has remained stable.

Over the full twelve year period depicted in the graphs, general trend of increase of landings has occurred in Hampton Roads. The trend is disturbed during two phases, 1992 and 1993, and again in 1997 and 1998. The later disturbance coincides with the first two years of the closure of the two Mid-Atlantic areas. In terms of dollar value of the catch, demand apparently did not substantially decline as the value shows a lesser decline during the two time periods noted. Alternatively, supplies of scallops from other ports may have been so low that the overall paucity of supply may have kept prices high.

Of the four communities, it appears that New Bedford has been the most affected in terms of development of boom and bust, or more appropriately bust and boom,
associated with area management.

**Time Series of Economic Dependency**

Indicators of economic dependency used in this dissertation are the Shannon-Weaver index and the Location Quotient. These indices were constructed for the two digit SIC codes. The Shannon-Weaver index is shown over time in Table 12 for the study communities and graphically in Figure 23. Note that Newport News and Hampton are listed individually rather than aggregated. The location quotient for the study communities is provided in Table 13. Again, Newport News and Hampton are listed individually and the values were calculated at the county level.

From the Shannon-Weaver index, it can be shown that over time, all communities except York County have been essentially stable or more diversified over time. Cape May County appears to have increased in diversification of employment, whereas Bristol County and the Hampton Roads communities have remained stable. Overall, Bristol County has the highest diversity of employment; York County and Hampton Roads has moderate diversity, and Cape May County has the lowest of the study communities.

Location Quotients display which categories of employment a community is reliant upon when compared to the state average. A value of one means that the county or equivalent has the same proportion of employment in that category as has the state, less than one means a lower proportion of employment than the state, while greater than one means the category is more important to the county in terms of employment than it is for
Table 12. Shannon Weaver Index time series from 1990 to 2000 for the counties containing the study communities.

<table>
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<td>0.79765</td>
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<td>0.64008</td>
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<td>0.63525</td>
<td>0.63632</td>
<td>0.74606</td>
<td>0.70071</td>
<td>0.69797</td>
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<tr>
<td>York County and Poquoson</td>
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<td>0.77050</td>
<td>0.76585</td>
<td>0.77064</td>
<td>0.77546</td>
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<td>0.76764</td>
<td>0.70528</td>
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<td>0.68111</td>
<td>0.68646</td>
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<td>0.74390</td>
<td>0.74949</td>
<td>0.75419</td>
<td>0.75410</td>
</tr>
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Figure 23. Graph of the 1990 to 2000 time series of the Shannon-Weaver Employment Diversification Index for Counties and County equivalents in which the study communities are located.
Bristol County Location Quotient

Figure 24. Location quotients by occupation category for Bristol County, MA.
Figure 25. Location quotients by occupation for Cape May County, NJ.
York County and Poquoson Location Quotient

Figure 26. Location quotients by occupation category for York County and the City of Poquoson, VA.
Figure 27. Location quotient by occupation category for the City of Hampton, VA
Figure 28. Location quotient by occupation category for City of Newport News, VA.
In review of the Location Quotient, Bristol County is more reliant on farm employment, agricultural services, forestry, fishing and other employment, and retail employment than the state throughout the time series. Cape May was highly dependent upon agricultural services, forestry, fishing and other employment in the first nine years, and this dependency declined in the last three years. However, this is difficult to be certain because of the lack of reporting of any employment in the category for the last two years although it was obvious that some people were still employed in fishing. Of the Virginia communities, York County is more dependent upon fishing employment than both the state and the Hampton Roads community. Of the study communities, only Hampton Roads is less dependent upon fishing than the state. Over the time series, nearly all counties exhibited a decreased reliance on the agricultural services, forestry, fishing and other sector.

GIS Analysis of Areas Fished with Reference to Area Management

This section considers the effects with regard to areas fished, and which communities had the greatest changes over time. To determine adjustments that may be attributed to area management, the areas fished before, during and after closures were mapped for each port of landing. Of importance to note, these data relate to weight of scallops at ports of landing and not home port or primary port. If a vessel landed at other than its primary or home port, that data is not presented here due to difficulties in determining both home port and primary port as both terms are still ambiguously defined. The concept of homeport is important, though, for the considerations of mobility of the fleet with respect to area management. Port of landing was selected because in the Draft
...there is a close overall connection between homeport and port of landing. Despite the significance of landings from particular areas – the closed area II in 1999 or other reopened areas in 2000—overall the increase in landings came mainly from vessels home-ported in the same county in which they landed their catch...

To assess the changes in area fished, the landings for the ports were mapped by three digit areas for each month of a period from 1990 to 2001 for all areas but Seaford. Seaford data were only available from 1994 to 2001, and therefore, that time series for Seaford is somewhat shorter. The areas closed and re-opened are not fully commensurate with the three digit areas used for analysis. Despite the apparent dissimilarity of geographic units, this data set was used because it was reasonably easily available; the three digit areas corresponded with geography that scallop fishermen recognized because it was a required field in the log books; and the areas are used to delineate harvest in data presented by the National Marine Fisheries Service. The three digit areas are sufficient to show an overall trend in areas fished, and pounds harvested over time. In addition, the landings by three digit area show changes in pounds landed and location of harvest corresponding to closures and re-openings. The full set of monthly maps for each community are provided in Appendix 1 on CD in ArcView format. Descriptions of the areas fished are based on aggregations of three digit areas used by NMFS in description of catches (NMFS 2003). A map of the aggregated areas is shown in Figure 24.

New Bedford fishing patterns
Figure 29. Three digit areas aggregated to regions for discussion of areas fished.
For vessels that landed in New Bedford, the years of 1990 to 1993 display a seasonal pattern of vessels fishing in areas to the south of New Bedford; mainly these areas were in New York Bight, Southern New England, Georges Bank, and South Channel for the months of January through approximately May. Following the spring pattern, by May or June, vessels landing in New Bedford appear to begin focusing fishing effort in the Georges Bank area (including the South Channel) until the end of the calendar year. Occasional landings may have come from any of the areas NMFS recognizes as scallop areas.

In 1994, commensurate with the closure of the three areas near or on Georges Bank, Closed Areas I and II and Nantucket Lightship, landings in New Bedford resulted from a more dispersed harvest area. The majority of the landings came New York Bight and Southern New England, but the Delmarva area and episodically the Virginia/North Carolina area also contributed landings to New Bedford between 1994 and 1999.

Opening of the exemption area within Closed Area II began on June 15, 1999. The opening lasted until the bycatch total available catch (TAC) of Yellowtail flounder was reported to be 100%, which occurred approximately November 1; the area was subsequently closed on November 2, 1999. For 1999, the spring pattern was roughly similar to that of the earliest three years, with possibly a slightly greater emphasis on the New York Bight area. In June, Georges Bank North was re-opened. The vast majority of the exemption area fell within three digit area 562, was the source of the highest level of landings between June and October.

Landings for the early portion of the 2000 fishing year (the months of March, April and May) had high levels of landings unattributed to three digit areas. However, this did not coincide with allowable fishing within the exemption areas. In 2000, the same
exemption area in Closed Area II was made accessible for fishing from June 15 to August 14. The three digit area associated with the Closed Area II exemption (562) again was a major source of landings for June, and July, but August was dominated by the landings from the three digit area that enclosed the Nantucket Lightship exemption area (526) within Georges Banks South. The re-opening continued through September, and three digit area 526 in Georges Bank North contributed the greatest volume of landings for the month. October 1 through December 31 was marked by the opening of the exemption area in Closed Area I, the greatest part of which was within three digit area 522. For this three month period, three digit area 522 was the source of the greatest volume of landings for each month.

In 2001, none of the three exemption areas were re-opened, but the Hudson Canyon area and the Virginia Beach-North Carolina area were re-opened. Landings in New Bedford, increasingly came from New York Bight areas in spring (February, March, and April), and autumn (August, September, October, and November). This points to a more year-round harvest in areas to the south of the original pattern from 1990 to 1993 when closures were in place for Georges Bank and South Channel.

**Cape May Fishing Patterns**

Between 1990 and 1993, the fishing pattern for scallops landed in Cape May consisted of fishing nearly exclusively in the Delmarva and New York Bight areas from January until approximately late spring-early summer. During the summer (June to August), trips were landed from Georges Bank North and South as well as the South Channel, Delmarva and New York Bight. The Gulf of Maine also contributed to landings in July of 1992. Finally, in the autumn, usually about October, trips landed were from areas south of southern New England, including New York Bight, the Delmarva area,
and occasionally the Virginia/North Carolina area.

In 1994 and 1995, the first two years of the closures of Areas I and II and Nantucket Lightship, landings in Cape May were dominated by harvests from the Delmarva and New York Bight areas year round. In 1996, the previous pattern of seasonal landings from Georges Bank and South Channel appeared to be re-established, but with some variation in timing (some landings from South Channel occurred in December). In 1997 and 1998, the pattern appeared consistent with that of the period from 1990 to 1993 with the majority of landings from the Delmarva and New York Bight areas supplemented in the summer by landings from Georges Bank and the South Channel. Despite the closure of the Hudson Canyon Area (which runs across three three digit areas in the Delmarva and New York Bight areas), this pattern was re-established.

With re-openings on Georges Bank and Nantucket Lightship, there was an increase in harvest of the Georges Banks areas and South Channel relative to the Delmarva and New York Bight areas. This was exemplified in August of 2000 when the three digit area containing the re-opened portion of Nantucket Lightship became a dominant area for harvest- equaling or exceeding the highest harvest in any three digit area of the Delmarva and New York Bight areas. In 1999, the harvest from Georges Bank was prolonged to later in the year, which reflected the lengthened re-opening.

In 2001, the three exemption areas on Georges Bank closed and the Hudson Canyon and Virginia Beach areas were reopened. Cape May’s fishing pattern reflected these closures and re-openings through limited access of the three digit areas on Georges Bank, and a focus of fishing effort upon the three digit areas within the Delmarva and New York Bight regions. Only two months of 2001 had landings outside the Delmarva and New York Bight areas. In January Southern New England and South Channel
provided mid-range landings; in November, South Channel provided the lowest level of
landings.

**Fishing Patterns for Seaford**

Due to limited data availability, Seaford's fishing patterns were only plotted from
1994 to 2001. This precludes a description of the fishing pattern before any of the
scallop area closures were begun, but still allows for discussion of the pattern prior to,
during, and subsequent to the closure of the nearest area, the Virginia Beach/North
Carolina area as well as during the exemption area re-openings.

In the period from 1994 to 1996, when the area closures were in effect for Closed
Area I and II and Nantucket Lightship, but all areas to the south were open, the vast
majority of harvest landed at Seaford came from the Delmarva three digit areas. Other
areas were harvested and provided landings at Seaford, including New York Bight, Gulf
of Maine, South Channel, and more infrequently than might be expected by proximity, the
Virginia/North Carolina area.

Contemporaneous with the closure of Hudson Canyon and the Virginia
Beach/North Carolina areas, there was some shift in location of three digit areas
contributing landings to Seaford. For the period of 1997 and 1998, New York Bight
became the highest producing area for landings in Seaford for 12 of the 24 months,
compared to only 3 months in the previous three years. In addition to New York Bight,
the Delmarva, Southern New England, and the Virginia/North Carolina areas were also
sources for landings in Seaford, with the Delmarva area being the second most important
area in nearly all months.

In 1999, New York Bight and Delmarva provided, respectively, both the largest
and the second largest source of landings for Seaford for the year. During the months of
October and November, however, landings also were provided from sources in the Georges Bank north and Georges Bank south areas. These landings occurred contemporaneous with the re-opening of the Closed Area II exemption areas and were from three digit areas included in the re-opening.

In 2000, landings from sources in the Delmarva and New York Bight areas predominated. In the month of July, some scallops were landed from Georges Bank South, during which time the Closed Area II exemption opening was in effect. Little of the Closed Area II exemption falls within the Georges Bank South area, but whether it was the contributing region cannot be determined with these data.

In 2001, contemporaneous with the re-openings of Hudson Canyon and the Virginia Beach/North Carolina areas and the shut down of the Georges Bank and Nantucket Lightship exemptions, scallops from the Delmarva and New York Bight areas provided the vast majority of landings to Seaford. The pattern most closely emulates that of the first three years of reported landings by three digit area.

Hampton Roads Fishing Patterns

For the period from 1990 to 1993, vessels that landed in Hampton Roads harvested scallops from a broad area including the Gulf of Maine, Georges Bank North, Georges Bank South, South Channel, Southern New England, New York Bight, the Delmarva, and Virginia/North Carolina areas. The Delmarva and New York Bight tended to be the core of year-round activity, while the areas off New England were visited more seasonally in the summer. This pattern was less pronounced in 1993; the region off New England that was harvested was restricted to the South Channel.

In 1994, coinciding with the closure of the two areas on Georges Bank and the
South Channel, no harvest of product from those areas was offloaded in Hampton Roads for the months which had data available (the month of April had no landings attributed to three digit areas). In addition, landings from sources in the New York Bight area occurred in fewer months.

In 1995, New York Bight again became a major source of landings for Hampton Roads, with some landings coming from the area year-round again. In addition, landings began to return from as distant an area as the Gulf of Maine in July. Other more northerly areas, such as Georges Bank South and Southern New England, were sources of landings in additional months. This pattern persisted until 2001 for those months with a good attribution of landings. Again, the months of March through May of 2000 had a large proportion of landings unattributed to three digit areas. Despite the wide ranging areas that were harvested for landings in Hampton Roads, the most noticeable change in pattern from 1995 through 2001 was the persistence of the Delmarva area as the source of the highest level of landings by three digit area from 1998 to the end of 2001. In 2001, landings from Georges Bank South occurred only in May; for the year, the Delmarva and New York Bight areas predominated as the source of Hampton Roads landings.

Concerns Expressed by Community Members and Fishery Participants Regarding Area Management

A number of concerns were articulated by members of the four study communities and fishery participants. In general, they fall into broad categories as follows:

- safety and health concerns,
- financial and economic considerations,
- seasonality, loss of autonomy,
- enforcement and incentive concerns,
- an increasing reliance upon scallops caused by restrictive regulations in other fisheries,
- the development of increasingly privileged groups within the fishery,
- infrastructure maintenance during closure periods,
- difficulty in recruiting crew, and the potential for closures becoming de facto permanent closures especially those designated for other species,
- requirements for additional science to challenge stakeholders with negative perceptions of fishing.10

**Safety and Health Concerns**

In general, the fishermen did not bring up the health and safety issues, but this was a concern for the wives, the women who work with the men shoreside, and the vessel owners. One captain’s wife from New Bedford discussed the effects on the men on her husband’s crew and her husband due to the superabundance of scallops that occurred with the stock rebound. She described, “when my husband gets home, he’s shucking scallops in his sleep for the first couple of nights. His arms and shoulders are so swollen . . .” She also said that “in the summer, the guys come back emaciated; they can lose 10 pounds. These guys take supplements and look after themselves, but they come back in bad shape.” In addition, a vessel owner’s wife from Seaford was concerned that there was insufficient crew for two full watches. The end result was an exhausted

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10 These concerns were expressed by fishery participants, and other members of the fishing community from the four port communities. Although quotes are attributed to individuals, the comments were checked by triangulation for concern among at least a segment of industry participants and are not only the concern of specific individuals.
crew because the captain and crew were working long hours in single shifts rather than splitting between two watches. In addition, a male vessel owner also brought up a problem with earlier requirements to rig at sea so that scallops from other areas were not attributed to scallops from the exemption areas. One of his crewmen fell overboard while rigging and was lost at sea. This rigging requirement has been changed, and Coast Guard is also now reviewing restrictions for safety concerns.

**Financial and economic concerns**

Financial and economic considerations associated with area management include the potential for glut of product commensurate with limited re-opening periods, economic declines due to low harvest caused by area closures, and a "trickle-down" of declining income for fishermen and fishing related service providers.

A glut of product with limited re-opening periods was observed with the re-opening of the exemption areas. In addition to the data from the areas fished, Rago (2000), noted the decline in price for U-10 scallops (typically the highest value) in 1999 caused by a glut of large scallops commensurate with the re-opening of Georges Bank. A vessel owner in Fairhaven also recognized this possibility for the re-opening of Nantucket Lightship, "You watch, when they open Asia Rip the price will go down on those prize scallops."

In addition, New Bedford operators experienced a decline in landings income from scallops due to the closures of Closed Areas I and II and Nantucket Lightship. This was particularly troublesome because of the lack of available groundfish (which was the source of concern by the management agency leading to closures for rebuilding of groundfish), which might have offset the decline in landings of scallops for the
community as a whole. At the time of the closure of the Virginia Beach/North Carolina area and Hudson Canyon, industry participants were included in the decision, and understood that the area was unlikely to produce an economic return until the scheduled opening; this particular set of closures, thus, met with less resistance. In addition, the vessels in the southern communities have additional permits for other species, and therefore, the fishery as a whole was somewhat more resilient and less affected.

As noted above, the economic effects due to a decline in landings were more intense in New Bedford than in the other communities. This had a stronger “trickle down” effect in that shipyards, gear suppliers, grubbers and other service providers were also negatively impacted. At a meeting on the effect of the closures in New Bedford, one ship supplier expressed it in these terms “I thought of passing down this business to my children, now I’m likely to be the last in the family.” The decline in landings also affected crews on two fronts. First, their wages declined because of reduced landings. Second they were asked to take a reduced crew share under the lay system because the vessel operators still had to cover fixed costs. To remain competitive, vessel operators in Cape May also were required to offer the same crew share. One Cape May owner-operator told me that he tried to hold out as long as he could before reducing the crew share, but that in the last couple of years he also had to decrease what he could offer the crew.

Seasonality

An issue that sprang from discussions with a Hampton Roads processor also relates to periodic gluts of product. He found that there are times when he has more scallops than he can process, and had concerns that area management would increase the problem of periodic glut. Hampton Roads processors may have difficulties processing all
the product available if openings are scheduled in the early summer when the largest landings tend to occur. Illustrated in Figure 18, episodic pulses of landings also occurred in New Bedford with the re-openings of the exclusion areas. Despite the recognition of increased landings episodically in New Bedford, the problem of having sufficient processing capability was not discussed in interviews there.

**Loss of Autonomy**

Loss of autonomy was a matter for discussion in several interviews. One former fisherman from New Bedford, a fisherman’s wife also from New Bedford, and an operator in Cape May, in particular, discussed the issue in some depth.

The operator in Cape May discussed the requirement to go to specified areas to fish in terms of the expenditure on fuel and the use of days-at-sea for “steam time.” He saw no need to use “non-renewable resources to meet requirements to preserve renewable resources,” or in other words, why should he have to expend money and fuel to chase to distant areas to meet the requirements for the rebuilding of scallops. At the time, fuel costs were a concern because prices had just increased, and he was also concerned that he would be directed where to fish by the regulatory agency.

The fisherman’s wife told me of the situation in New Bedford that ratcheting down on the vessel owners or operators tended to pressure the hired captains and crews. The captains no longer would get the option of determining when to leave port or when to return, and this could make for problems if the weather was not optimal or if someone in the crew fell ill. This restriction on autonomy was then felt in the family as the men were more pressured.

The final comments on the loss of autonomy were made by a former fisherman
from New Bedford who had been observing the development of management quite closely. His concern was that the scientists and the council were interested in “micromanagement” of the fishery. His concern stemmed from the changes made between early discussions on developing a rotating management scheme and the current draft. In draft Amendment 10, the areas described for the fixed boundary alternatives are much smaller than the originally described areas, and taken in concert with the current requirement for vessel monitoring through satellite data, he perceived that vessels were not only being told what to do, but being checked up on to make sure it was done. He was concerned that although not yet the policy, by extension this may be possible in the future.

**Enforcement and Incentive Concerns**

Two groups of concerns fell within the category of enforcement and incentive concerns. The first is characterized by the interpretation of the regulations for enforcement. In one instance, determination of who may be fishing within the closed areas by Coast Guard was discussed. An owner-operator from Cape May described hearing Coast Guard on the radio encountering a nearby vessel while fishing Georges Bank. At the time, Coast Guard was stating that a one mile distance from the line of closure was needed to conform to meeting the requirements of the closure boundaries. Also, a captain from New Bedford discussed the interpretation of pounds landed. He wanted to know what would happen if someone went over the quotas for the re-openings by some minimal amount: “(w)hat kind of punishment are you going to get? It would be ridiculous to give somebody the full punishment if they were only over by one pound.” He suggested that averaging trips could allow for minor slippage without overharvesting
the re-opened areas or that the overage be donated to local food banks so that there is no incentive of more money for those who overharvest.

The second group of concerns stems from the potential to require fishing in re-opened areas or restriction of fishing in the re-opened areas based on history of participation. These concerns have lead to some participants fishing within the re-opened areas although the trade-off of days-at-sea per trip has not been advantageous. To overcome these concerns, the participants, particularly vessel owners, have suggested that either a higher quota in the re-opened areas or limiting the number of days-at-sea to the actual number used as opposed to a set number of days being removed from a vessel’s days-at-sea for any trip into a re-opened area.

**Loss of Availability of Other Species and Increasing Reliance on Scallops**

The loss of availability of other species because of low stock levels and increased regulation was most discussed in New Bedford and Cape May. In New Bedford, it appears that there is an increased reliance upon the scallop fleet since the groundfish fleet is allowed few days to fish, and the stocks have not yet rebounded for at least one of the groundfish species, cod. In Cape May, the discussion revolved around increasing regulation on species other than scallops, the departure of vessels that had fished for surf clams and ocean quahogs, and the increased reliance on scallops at present.

The three closures off New England, Closed Areas I and II and Nantucket Lightship, were designated to provide for rebuilding of groundfish stock. New Bedford was particularly reliant upon both the scallop and groundfish fisheries for its fishing community, and the closures had substantial negative effect according to interviews with fishermen, fishing family members, service providers and gear providers. Scallops rebuilt
much more quickly than the groundfish, and thus, reliance on scallops has increased in the
time period since 1999. Although the groundfish vessels are tied up for much of the year,
the scallop vessels with an improved harvest have been able to undertake vessel repair
and to purchase gear in a fashion that they had not in the early to mid 1990s. One of the
Fairhaven shipyard operators told me that vessels are now being repaired and kept up
better, and that has meant more business after a decline for them. The other Fairhaven
shipyard underwent expansion between 2000 and 2001. This expansion was partially in
response to a need to service additional vessels, including fishing vessels.

Other service providers have noticed similar responses. A fuel company
employee told me that they were glad to have some vessels working again. He stated
“(t)hey may not be buying as much fuel as if they had to hunt around for the scallops, but
it’s good to see them back out and fishing.” The major gear provider for scallopers also
told me that the major effect of re-opening has been more prompt payment for gear. In
the difficult period from about 1993 to 1999, they had carried the accounts (allowed
vessels to get gear on credit) and that carrying accounts was no longer needed.

Cape May was somewhat more fortunate during the period of closures. Many of
the vessels had multiple permits, so they could be used for harvesting multiple species.
An employee of the local ship repair told me that they had seen no major decline or
reinvigoration of their services. “Most of the guys have been coming in every year, just
like usual” was the description in Cape May. Through the 1990s to the present, however,
there has been an increase in regulation of fishing, clam operations have shifted location
to Atlantic City; and several vessels shifted to scallops as a dominant catch. This points
to increasing reliance on scallops. One owner-operator told me of his shift from squid to
scallops as the major catch within the last two years. A former fisherman, one denied a permit for lobster because he missed the window for determining fishing history, now lumps for one of the local docks. He was very disappointed with the denial of a permit for the off-shore lobster fishery and noted that “scallops are the only game in town,” and thus he participates in a different position than he might if allowed his own choice. He is still, though, employed in fisheries.

These instances point to the increasing importance of scallops for New Bedford and Cape May. A similar effect has been noted for Hampton Roads as well. In an article in the Daily Press, the Hampton Roads newspaper, it was noted that blue crab and scallops have been the main fisheries for Hampton Roads for a number of years and that scallops have become dominant (Ingram 2002). Of late, blue crab landings have been in decline and scallops have become a more dominant source of landings and value. For all these communities, regulation affecting scallops, thus, becomes more critical to the fishing community.

**Development of New “Privileged” Groups**

Two new groups have gained in importance since the development of area management and the rebound of the scallop resource. These groups are considered privileged by industry participants of long standing. The first group that has developed is the group of people who fish for 400 pounds per day of scallops under general category permits as a directed fishery. The perception of limited access vessel owners is that the number of participants in the 400 pound directed fishery and their incomes have been increasing with the improved scallop stock and the increasingly stringent regulation on other fisheries. The second group that has developed over time, and has been advantaged
with the close proximity of the Hudson Canyon area, is the small dredge vessels. Scallopers with a part-time permit can exchange that permit for a full-time small dredge permit, and scallopers with an occasional permit may exchange for a part-time small-dredge permit. These vessel are often smaller, have only five crew members, and use less fuel. These vessels are allowed into the re-opened areas since they are limited access vessels. These small dredge vessels are more prevalent around Cape May, and at least one of the part-time vessel captains related that as these small dredge vessels use less fuel and have equivalent landings that next year he would switch as well.

**Infrastructure Maintenance During Closures**

As noted earlier, infrastructure was negatively affected in New Bedford during the periods of closure. Service industries were hard hit due to the closure of both the areas on Georges Bank and South Channel to both of the harbor's major fisheries. These infrastructure services included the shipyards, gear suppliers, fuel suppliers, settlement houses, grubbers, water providers, and small scale vessel repair such as welders.

Negative effects on infrastructure appeared to be less of an issue for Cape May and the Virginia communities. However, if scallop closures occur during downturns for other fisheries, there may be increased difficulty in maintaining infrastructure especially due to development pressures for waterfront properties.

Finally, gear suppliers have commented upon the need for carrying increasing stock of gear as each fishery has different requirements. The institution of 10 inch mesh for the exemption areas posed a problem for New Bedford in that the supplier there needed a one year lead time to get that size mesh from producers in Portugal. While gear providers in the other communities did not have the same problem, they all found that
they needed to keep in stock an increasing amount of gear overall. The increased pressure to keep funds in inventory decreases business flexibility, and therefore, makes them more vulnerable to economic downturns or other changes. Requirements for special gear for newly reopened areas or changing gear requirements were not viewed positively if the existing stock could not be sold and used.

**Difficulty in Recruiting Crew**

Two aspects of difficulty in recruiting crew were discussed in interviews and participant observation. The first is that there are few new people entering the fishery in some communities, and the second is that there are more vessels landing and locating in some communities.

In New Bedford and Seaford, the discussion was with regard to the difficulty in getting new people into the fishery because of the limited number of crew allowed per vessel. The desire for an additional person who would be “learning the ropes” would also help fill out the crew sufficiently that there would be two watches. It was expected that this eighth crew member would be someone young and not yet terribly productive, so that he would not substantially increase the fishing capacity. However, considering the fact that there could be no guarantee that this eighth position would be a new youngster and that there would be two watches, this idea has problems with regard to acceptance by the regulatory agency.

In Cape May, the difficulty in obtaining crew stems more from the number of vessels becoming reliant on scallops. A former fisherman who now works in the industry shoreside told me that “there’s increased competition due to more boats coming to Cape May rather than that people are leaving the fishery.”
The Potential for Closures Becoming de Facto Permanent Closures

A concern that came up in discussion of area management was the perception that areas could be closed but not re-opened. The perception was that based on concerns that there could be a lack of funding for assessment of stock, a change in the determination of sufficient stock, requirements for protection of other species, or difficulty of enforcement which could close areas essentially permanently.

A fleet owner from Cape May expressed concern about the use of scientific criteria to be used for re-openings. He asked "(w)hat if the funds for the agency get cut so that the survey doesn't occur?" He and others in Cape May contended that the areas could become "black holes," which would never be used for harvesting again. In addition to concerns that the survey may not occur as required, there was also concern that the requirements would become more stringent for determining the areas to re-open. A past history of management in which the determination of overfishing has fluctuated is often described by participants as "moving the goal posts." With this history, they are concerned that similar fluctuations on area re-openings criteria may also occur.

History also plays a part in the perception that areas closed for other species may be essentially permanent. In Amendment 10, there are nine alternatives proposed for protection of groundfish and other organisms through the requirements for essential fish habitat (EFH). The areas closed as Areas I, II and Nantucket Lightship were not to be closed indefinitely at the outset of their designation, but thus far have been closed with the exception of the exemption areas for eight years. Additional EFH closures are expected, and this also may mean essentially permanent closures to the fishermen.

In New England, concern focused upon the fact only small exemption areas in
Chapter 5. Matrix of Factors to Consider for Assessing the Potential for Community-based Co-management for the Four Study Communities and Effects of Area Management

As discussed in Chapters II and III, I find the most cogent framework for assessing the potential for community-based/co-management for fishing communities is that used by Berkes et al. (2001) for small-scale fisheries with some additions to account for factors that are implied by the definition of small-scale fishery communities. Those factors included in the definition of small-scale fishing communities may or may not be present in large-scale fishing communities, and therefore, become variables to assess.

To reiterate, the factors of Berkes et al. fall within three levels, the supra-community level, the community level, and the individual level. There are basically two social factors, the legal right to organize and external agents, at the supra-community level. In addition to those, one could also consider that environmental conditions, and technological conditions are also supra-community level factors.

At the community level there are thirteen factors that these authors consider relevant. The factors include (1) clearly defined boundaries, (2) clearly defined...
membership, (3) group cohesion (for example: high homogeneity of gear, kinship, religion, ethnicity, language), (4) participation by those affected or inclusivity, (5) cooperation and leadership at the community level, (6) leadership (by action, example, and direction), (7) empowerment (training and awareness of participants in taking on responsibilities), (8) property rights over the resource that are defined (although collectively held), (9) local organizations with defined membership, a right to exist, that are autonomous from the central government, and are representative of a majority of the resource users of the community, (10) sufficient finances, (11) partnerships and a sense of being a full partner, (12) accountability and transparency in decision-making, and (13) a strong co-management institution for making decisions as well as for managing conflict.

The final level of factors is the individual level. At the individual level there were two factors, an appropriate incentive to encourage individual participation and credible rules with equitable and effective enforcement. These individual level factors may also be considered aggregate community concerns in that if they do not exist, individuals may choose not to participate with the community.

In addition to these factors, I determined that it was also important to consider isolation of the fishing community, dependency of the community upon fishing, and a perceived “need to do something.” This determination was based upon the characteristics of small-scale fishing communities discussed by Berkes et al. (2001) and the recognition of the “need to do something” for development of a clam spawner sanctuary (McCay 1989). Isolation and dependency both have qualitative and quantitative indicators. The perception of the need to do something has only qualitative indicators. These indicators are added at the community level of factors because they relate to the community’s
perceptions in leading to community-based co-management. They may also be
considered at the individual level for determining if an individual would participate at the
community level, but for this dissertation the emphasis is on the aggregate community’s
cconcerns.
<table>
<thead>
<tr>
<th>FACTOR</th>
<th>New Bedford</th>
<th>Cape May</th>
<th>Seaford</th>
<th>Hampton Roads</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supra Community level</td>
<td>No-not a community under CDQ or co-management agreement</td>
<td>No-Not a community under CDQ or co-management agreement</td>
<td>No-not a community under CDQ or co-management agreement</td>
<td>No- not a community under CDQ or co-management agreement</td>
</tr>
<tr>
<td>Right to Organize (and</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>control resource)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External agents to</td>
<td>Yes- SMAST, MIT/SeaGrant, VIMS</td>
<td>Yes - NJ SeaGrant, VIMS</td>
<td>Yes - VIMS, VA SeaGrant</td>
<td>Yes - VIMS, VA SeaGrant</td>
</tr>
<tr>
<td>advise/assist/facilitate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clearly defined boundaries</td>
<td>Somewhat-seldom go beyond Southern New England</td>
<td>No- tend to fish anywhere north of the Delmarva</td>
<td>No-broad range of fishing area</td>
<td>No-broad range of fishing area</td>
</tr>
<tr>
<td>Clearly defined membership</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owners</td>
<td>Yes- permit holders</td>
<td>Yes-permit holders</td>
<td>Yes-permit holders</td>
<td>Yes-permit holders</td>
</tr>
<tr>
<td>Captain</td>
<td>Moderate -some owner operators hold permit</td>
<td>Moderate - some owner operators hold permits</td>
<td>Mainly hired captains - do not hold permit</td>
<td>Mainly hired captains - do not hold permit</td>
</tr>
<tr>
<td>Crew</td>
<td>No-crews highly mobile</td>
<td>No-crews highly mobile</td>
<td>No-crews highly mobile</td>
<td>No-crews highly mobile</td>
</tr>
<tr>
<td>Group cohesion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within industry</td>
<td>Low to moderate- a high proportion of active organizations that do not all have same goals, has locales for interaction (hang-outs)</td>
<td>Moderate- high proportion of fleet owners, monument set up by fishermen</td>
<td>High- all fleet owners, museum includes scallopers (set up by local fishing family)</td>
<td>Moderate- high proportion of fleet owners</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Industry-municipality</td>
<td>Moderate- city provides services and interacts with industry, works with industry to have monuments</td>
<td>Low- little to no interaction</td>
<td>Low- little to no interaction</td>
<td>Low to Moderate-Hampton little to no interaction, Newport News provides services</td>
</tr>
<tr>
<td>Participation by those affected</td>
<td>Comparatively high- easy access to meetings, high participation (funding) to FSF</td>
<td>Moderate- moderate participation in meetings, some participation with FSF</td>
<td>Low-participate with FSF, little participation at scallop meetings</td>
<td>Moderate- some participation with FSF, participate in industry advisors meetings</td>
</tr>
<tr>
<td>Cooperation and Leadership at the Community Level</td>
<td>For industry</td>
<td>High- site of FSF, also a number of other fishing interested NGOs</td>
<td>High- particularly for a single dock/fleet owner who provides info to others</td>
<td>Moderate- one of the fleet owners serves as liaison, but has more connection for Mid-Atlantic Council</td>
</tr>
<tr>
<td>For municipality</td>
<td>Comparatively high - local officials will participate in discussions/legal cases regarding fisheries</td>
<td>Moderate- local officials tend to ignore fishing except in the case of provision of low interest loans at the county level</td>
<td>Low- local officials not fully cognizant of off-shore fishing</td>
<td>Low-Hampton does not recognize fishing as desired activity. Newport News does, but does not participate in management meetings of other interventions</td>
</tr>
<tr>
<td>Leadership</td>
<td>High-FSF and municipality willing to enter management</td>
<td>High-local organization (Garden State Seafood) willing to participate in management</td>
<td>High- potential exists, but due to distance and more local management agency, tends to work with Mid-Atlantic Council</td>
<td>High- Interested people participate at the Mid-Atlantic Council and as industry advisors</td>
</tr>
</tbody>
</table>

<p>| Empowerment |  |
| Fleet owners | High-have resources to be able to participate in meetings | High-have resources to be able to participate in meetings | High-have resources to be able to participate in meetings | High-have resources to be able to participate in meetings |
| Owner-operators | High-participate locally and organizations take concerns to meetings | Moderate- may participate in local, but often overridden by fleet owners | N/A | Not determined |</p>
<table>
<thead>
<tr>
<th>Captains/crews</th>
<th>Moderate to high-dependson fleet or individual vessel owner taking concerns or other organizations taking concerns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property rights over resource</td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td>Implied through limited access permits, but as such, no</td>
</tr>
<tr>
<td>Municipality</td>
<td></td>
</tr>
<tr>
<td>Appropriate local organizations</td>
<td>Yes- FSF and other groups, also city task force</td>
</tr>
<tr>
<td>Adequate financial resources</td>
<td>Yes- through FSF</td>
</tr>
<tr>
<td></td>
<td>Low- at dock as told by crew/captains and lumpers “owners tell us what they want us to know”</td>
</tr>
<tr>
<td>Moderate-owners take concerns to council if deemed appropriate</td>
<td></td>
</tr>
<tr>
<td>Low- owners tend not to take concerns of others unless also theirs</td>
<td></td>
</tr>
<tr>
<td>Implied through limited access permits, but as such, no</td>
<td>Implied through limited access permits, but as such, no</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No (other than as part of FSF)</td>
</tr>
<tr>
<td>Yes - Garden State Seafood and Cape May Seafood Associations</td>
<td>Yes - through FSF</td>
</tr>
</tbody>
</table>
Partnership and a partner sense of ownership of the co-management process

<p>| Industry | No- typical response on dealing with council is &quot;I don't need to go to Danvers to be disrespected&quot;, also ITQs not to be considered | No- interested parties could not promote ITQs as an alternative to area management, also from Industry Advisor meeting - sense that this was first real communication | No- interested parties could not promote ITQs as an alternative to area management | No- from Industry Advisor meeting - sense that this was first real communication |
| Municipality | No- only communication as intervenor in groundfish case | No- no communication with NEFMC or NMFS to speak of | No- no communication with NEFMC or NMFS to speak of | No- no communication with NEFMC or NMFS to speak of |
| Accountability and Transparency | Moderate - FSF tends to have review, but not necessarily all contributors participate | Moderate - FSF tends to have review, but not necessarily all contributors participate | Moderate - FSF tends to have review, but not necessarily all contributors participate | Moderate - FSF tends to have review, but not necessarily all contributors participate |
| Strong Co-management Organizations | No - no recognition of any organization to participate in co-management | No - no recognition of any organization to participate in co-management | No - no recognition of any organization to participate in co-management | No - no recognition of any organization to participate in co-management |
| Isolation | Low | Low | Low | Low |</p>
<table>
<thead>
<tr>
<th>Dependency</th>
<th>Low</th>
<th>Moderate-High</th>
<th>Low</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shannon-Weaver Index</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Location quotient</td>
<td>High</td>
<td>Moderate</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Social dependency</td>
<td>Moderate - Low at present except for desire to open parts of CA I, II and Lightship</td>
<td>Moderate - some perceived need to take pressure off Delmarva area</td>
<td>Low - current OK, but would like to consider less intervention (i.e. ITQ)</td>
<td>Low - current OK, but would like to consider ITQ</td>
</tr>
<tr>
<td>Perceived “need to do something”</td>
<td>Moderate - Low at present except for desire to open parts of CA I, II and Lightship</td>
<td>Moderate - some perceived need to take pressure off Delmarva area</td>
<td>Low - current OK, but would like to consider less intervention (i.e. ITQ)</td>
<td>Low - current OK, but would like to consider ITQ</td>
</tr>
</tbody>
</table>

**Individual level factors**

Appropriate incentive to encourage individual participation

- In community-based co-management
  - Not for fleet owners, they prefer individual decision making
  - Not for fleet owners, they prefer individual decision making
  - Not for fleet owners, they prefer individual decision making
  - Not for fleet owners, they prefer individual decision making

- In area management
  - Not always for re-openings, need more quota per trip to make economically viable for areas beyond CA I, II and Lightship
  - Not for Mid-Atlantic openings due to abundance outside the re-opened areas
  - Not for Mid-Atlantic openings due to abundance outside the re-opened areas
  - Not for Mid-Atlantic openings due to abundance outside the re-opened areas
<table>
<thead>
<tr>
<th>Credible Rules with Effective and Equitable Enforcement (For area management)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not all rules are seen as credible - recent entry into Nantucket Lightship is an example of individual seeing lack of credibility. Also enforcement via VMS has been problematic.</td>
</tr>
<tr>
<td>Strong questions re: justification for directing effort heard in interview may show credibility lack. Also enforcement questioned by another interviewee.</td>
</tr>
<tr>
<td>Questions as to potential to evade enforcement a potential concern. (Virginia Beach area close enough to avoid getting caught with VMS).</td>
</tr>
<tr>
<td>Questions as to potential to evade enforcement a potential concern. (Virginia Beach area close enough to avoid getting caught with VMS).</td>
</tr>
</tbody>
</table>
Effects related to the development of Amendment 10 to the Sea Scallop FMP

Vulnerability and Resilience in the Four Study Communities

Three factors were selected to assess vulnerability and resilience to the potential effects of Amendment 10 on the fishing community and of the general community for the four study communities. These factors included the following: (1) dependency of the general community upon fishing as determined through economic and social indicators, (2) port issues that could be exacerbated by area management, (3) the perception of fishing and fishermen by the broader community, and (4) cohesiveness of the fishing community.

Dependency

Two factors of dependency are economic and social dependency. Economic dependency is the reliance upon a given activity or economic sector for income and/or employment. Two indicators of community dependency were calculated, a diversification index and a location quotient. Considering first the diversification index, a community with a lower level of diversity in employment would be expected to be less resilient to shocks affecting the sector(s) upon which it is most reliant. An additional economic indication of dependency is the concentration of employment within a sector when compared to a standard (in this case the state), which is the basis of the location quotient indicator. Social dependency relates more to the community’s conception of itself, and the focus of local activities based upon fishing. Indicators selected included the presence of parks and/or monuments to fishermen and fishing, festivals, and museums, a recognition of the importance of fishing in newspaper articles, discussion with local officials, or participant-observation. Further indicators of social dependency include local opinion of fishing and
fishermen and cohesiveness of the fishing community.

Economic dependency

The diversification of employment across the various sectors was calculated using a normalized Shannon-Weaver index. An index value of less than one was related to a high level of dependency. An evenly distributed labor force, as indicated by an index value approaching one, should have greater resilience to economic downturns or shocks that may affect single sectors. Of the four communities, Cape May is the least diversified, and therefore, it is the most likely to be vulnerable to destabilizing events for all except the last three years. New Bedford is highly diversified, and thus, should be able to be resilient to events affecting individual sectors. The Virginia communities are moderate in diversification, and thus, they may be expected to be somewhat more resilient than Cape May, but less so than New Bedford. Over time, all communities except Seaford have been essentially stable or more diversified over time.

The location quotient serves as an indicator of dependency upon the employment categories for the communities. Of the communities studied, only Hampton and Newport News are less dependent upon fishing than the state. The most dependent community in terms of location quotient was Cape May in the period from 1990 to 1998. Cape May County was five times more dependent upon agricultural services, forestry, fishing and other employment until 1998 when it appears less dependent. However, there is some problem of interpretation. Newport News and Cape May have some values of zero which may be attributed to changes in reporting rather than a total loss of employment in the sector. Cape May is the single case in which that is difficult to display; the zeros more likely reflect a change in reporting or confidentiality of data.
**Social Dependency**

Social dependency centers upon the community’s perception of itself as a fishing community or of the importance of fishing within the community as a focus of social activity. Indicators include the presence of parks, museums, monuments and festivals focusing on fishing (as opposed to festivals undertaken to enhance tourist visits) and a recognition of the importance of fishing in newspaper articles, discussion with local officials, or participant-observation. Further indicators of social dependence include local opinion of fishing and fishermen and the cohesiveness of the fishing community.

New Bedford has the highest level of social dependency by the presence of parks, museums and festivals and a recognition of the importance of fishing. New Bedford parks and monuments related to fishing include Thommesen park adjacent to the State Pier, and the Whaling National Historic Park. Monuments related to fishing also include the statue across the street from City Hall entitled “a dead whale or a stove boat,” and the statue of Paul Cuffee who made the first two-part harpoon, and a lighthouse on Route 6. The Whaling Museum celebrates whaling as fishing activity and has an exhibit on trawl fishing. The National Park Visitor Center also has information on the modern fishery, and the proposed Oceanarium is set to focus on both the species and fishing. The largest festival in the city is the Summerfest, which grew out of the original scallop festival. Summerfest now includes cultural events representing the various ethnic groups in the city, folk music, and food booths, which dominantly sell seafood. In addition, the local newspaper frequently, on the order of weekly, discusses fishing issues in New Bedford in articles, problems related to management, and the seafood auction data are posted daily. Discussion of working on a vessel or for a processor comes up regularly in local
conversation. Examples include conversations overheard in a local coffee shop of men comparing “war stories” from their younger days, and being thankful that in bad weather they were not working in fishing any longer, and highschool-aged students overheard in the public library talking about first jobs and the desirability or lack thereof for working for a fish processor.

Cape May has a low to intermediate level of social dependency by the measures employed above. There is a monument to fishermen lost at sea overlooking the harbor, and, according to a former fisherman who now works at one of the docks, it is still visited virtually every evening by someone associated with fishing. There is an additional routed wood plaque in downtown Cape May that recognizes those lost at sea, but it is often hidden behind a too-full trash can. No museum exhibits or parks other than the small one containing the monument are dedicated to fishermen in Cape May. At one time there was a festival celebrating the fishing community of Cape May area that was held in the area of Schellenger’s Landing, but it appears to have gone defunct. The Cape May County Historical Museum sponsors a day that focuses on fishing history to some extent and serves clams among the food available, but that is the current extent of local festivals.

With regard to the importance of fishing to the locale, it is little discussed in everyday conversation. Many business owners and employees that serve the tourist activity do not even know it exists. The Cape May Chamber of Commerce, the city level chamber, was astonished that I asked about fishing at all, and although several of the fishing companies participate in the county level of the Chamber of Commerce, it is not general knowledge of the receptionists/information desk staff. The Lower Township planner is acquainted with the fact that commercial fishing is prosecuted in the area and landed within the
township, and he has a positive attitude about the businesses associated with the fisheries, but has little time to devote to enhancing the business as other economic development has required his time and energies.

York County, the locality that serves Seaford, is also slightly to moderately socially dependent upon fishing as it has a museum but no monuments or parks related to fishing. The museum is the Watermen’s Museum which is situated on the shore of the York River in Yorktown. Of all the locations and museums visited, this museum had the only exhibit on scalloping. In addition, the museum has information on other types of fishing prosecuted locally, older vessels and technologies are displayed, and it hosts the local festival in July. The festival includes sales of trinkets with maritime themes including wildlife models and model boats, food sales such as scallops and crab cakes, and boat races. The boats that participate in the races are dominantly all the smaller bay-oriented vessels, with the largest class being Chesapeake deadrises. Perhaps one of the more interesting races to observe, though, is the small boats, usually only about 15 to 20 feet in length. The major local paper is the same one that serves Newport News and Hampton, which carries surprisingly little news on commercial fisheries. Local fishing is discussed, but most often blue crabs, oysters, and recreational fishing are the topics of discussion.

Hampton is only slightly dependent socially upon fishing. There is one statue in front of the City Hall with the caption “From the Sea to the Stars,” which is the city motto. It has a man with a fishing net in one hand, and the other uplifted. It is ambiguous as to whether it is a fishing monument as it appears that the desire is to leave fishing behind. No museums or parks center on fishing in the city. The city does have one festival which could by extension be considered a festival of fishing, that being Bay Days.
The central focus of Bay Days has been more on the Chesapeake Bay and its ecosystems and secondarily on the culture. Although historically fishing and fish processing were important economic activities, their importance has substantially declined since the 1960s. At best about once per year is there an article in the local paper, The Daily Press, on commercial fishing, and it is not something that is the major subject of discussion.

Like Hampton, Newport News is only slightly socially dependent upon fishing. There is no monument or park dedicated to fishing. The Mariner’s Museum has information on use of land, water, and biota of the Chesapeake area, particularly the lower bay, but there is little on the current fisheries. The dominant theme of the Mariner’s Museum is on vessels, and a high proportion of those are recreational vessels. Newport News has no festival celebrating fishing. As the same local paper covers both Hampton and Newport News, again there is little recognition of fishing in the local paper. Newport News industry is dominated by the Newport News Shipyard, and most discussion in the area is related to the shipyard, military concerns as there are several bases in the area, and development with regard to retail and housing.

**Port issues that could be exacerbated by area management**

**New Bedford**

Interviews with people in New Bedford revealed some concerns with regard to the harbor. These concerns relate to services, gentrification, and equity of enforcement.

There is a need for additional infrastructure services from the city. The greatest need is for additional dock space and for areas which can be used for working on gear. In particular, there have been vessels rafted seven deep of late, and more vessels would be detrimental to accomplishing required tasks. One welder stated “(i)t’s hard to do your
job when you get there tired from hopping from boat to boat with your equipment.”

Further, some vessels are tying up perpendicular as opposed to parallel to the wharf, which means that the vessel is subject to more movement and higher potential for damage.

Additional benefits to the fisheries discussed in interviews and participant observation included the provision of space to work on nets and dredges, and increased security at night. One informant suggested using part of the area of the power station that is slated to become the Oceanarium’s parking lot as a space for working on gear. Increased participation on an intermittent basis that could occur due to area management may exacerbate these space problems by enhancing the need for more dock space for transient vessels. In addition, those transient vessels may also require space for working on gear, and that space is currently at a premium.

Gentrification has been interpreted by some of the fishery participants in New Bedford Harbor as the addition of cruise vessels and tourist activities. While the concerns were expressed, there is a recognition that New Bedford needs to diversify its economic base, and hopes were also articulated that careful design, planning and implementation of tourism focused on the fishing industry would alleviate potential conflicts. Again, this space issue may be exacerbated by having larger numbers of transient vessels in the harbor placing a squeeze on available space for dockage.

Finally, equity of enforcement has become an issue with regard to determination of “water dependent” uses for the Harbor Development Plan. In particular, the fishery participants expressed concerns that a hardware store located on Pope’s Island is not designated “water dependent,” so it pays a usage fee; yet, it provides materials that they use. While management of the scallop fishery has nothing to do with the determination of
water dependent uses, the concerns that this hardware store may leave the area due to increased fees may mean that sources of supplies for transient vessels could become more limited.

**Cape May**

Both the director of the Department of Tourism for the county and a local owner-operator discussed a problem about ice that may affect fisheries. Apparently, there is a problem getting ice in a reasonable time frame for someone who is attempting to offload and then undertaking a second trip in short order. The county official phrased it that “ice is a hot commodity” and that the county is attempting to ensure that people who come in for loans consider the potential for owning or upgrading an ice plant. The boat owner stated that in the summer “it can take up to a week to get ice,” and that the dock operators tend to provide for their vessels first. He said “I understand - it’s business, they look after their own first,” but it can make life difficult for those who don’t fish on the vessels owned by the dock owners.

Other concerns are longer term. There is a level of conflict between recreational and commercial fishermen. Albeit that one of the local scientists has been given to understand that the Cape May area’s recreational fishermen are more accepting of the commercial fishermen than other areas of the state, at least one recreational fisherman for marlin (a teenager) when hearing of the study of commercial fishermen blurted out “good, get rid of ‘em all.”

In addition to the competition between recreational and commercial interests, there is also a fair amount of gentrification along the harbor areas near Schellengers Landing. There are condominiums on both the Cape May and Lower Township sides of
the harbor, and not all people residing in the condominiums may be receptive to the sounds of diesel engines at early hours. Despite the concern over noise, some of the fishing community has successfully tapped into the tourist economy as well. At present the people who own and work at Shellengers Landing have taken advantage of the tourists’ visits, and viewing the vessels while eating seafood has become a necessity for some travelers.

Seaford

There had been some concern about conflicting uses with the docks and the nearby residential uses in the past (McCay and Cieri 2000). Of the companies visited, this location is well maintained and among the tidiest observed during the course of the project. In discussion with planning officials at the county, the conflict appears to be settled. However, without the conflict, the county planning official was largely unaware of the fact that a major port for sea scallops was located in the county. The general attitude toward fishing was negative from the official interviewed as he was familiar with conflicts regarding crab catches that have been declining and conflict with the state level of fisheries management. He then assumed that enforcement was lax for the scallop fishery as well, and he found it bothersome until he was informed of current monitoring and enforcement through the use of vessel monitoring systems.

Hampton Roads

For the City of Hampton, although not expressed in interviews with the dock owners interviewed in Hampton, others in the Hampton Roads area have expressed concern that gentrification in Hampton will eventually take over the downtown port area for high tech or other development. In observation of the downtown, it is particularly
difficult for trucks to get around the school buses that park on the streets around the museum adjacent to the fish houses. If user conflict occurs between these uses of the roadway, there is a good potential that the dock and processing facility will be invited to move, as opposed to the museum. At another dock and processing area, the Phoebus location, there has already been a conflict that drove processing to move to another regional community, which was more welcoming toward food processing businesses.

Newport News has possibly opposite concerns. If anything, the concern expressed by the Fishing Industrial Park manager in a recent article in the Daily Press (Ingram 2002) and in an interview, there is not enough area to open up to businesses desiring space, so that expansion may be necessary. He is looking for addition funding to undertake that expansion.

Local Opinion of Fishing and Fishermen

Local opinion of fishing and fishermen was derived from local newspaper coverage (or lack thereof), letters to the editor of local papers, discussion of perceptions of the broader public in interviews, and in participant observation in the communities. Local opinion is important in that those with a positive view of fishing and fishermen are more likely to come to the aid of the participants in times of trouble, whether managerial, economic, biological, health or weather originated, while communities that do not have a positive attitude toward fisheries are not likely to offer assistance.

New Bedford’s population has an inconsistent view of fisheries. Those within the industry view a good fisherman in a more positive light than they do someone who is a good businessman. This attitude also is shared within fishing families. However, the general public, while recognizing the importance of fishing as activity in providing jobs,
has a less positive view of fishermen and fishing. In part, it focuses upon local coverage of fisheries in the news. The local paper tends to identify too many people with problems as being fishermen. There was a series of articles relating to AIDS, drugs and the waterfront in the paper several years ago, and it has not been forgotten. In addition, at the time of writing, there is an ongoing court case on mafia connections into one of the fish houses. Coverage on this case is not positive for the scalloping community; the fish house involved is one of those that handles scallops.

In Cape May, commercial fishing and commercial fishermen are seen as an anachronism in a tourist community and economy. Few, if any, community members realize that the fleet at the one restaurant is actually a working fleet and not just another tourist gimmick. I conversed with a business owner on the beachfront and told him of my study, and he was surprised that scallops were landed in Cape May as they are one of his favorite foods, and he had worked in a shucking house in Florida handling calico scallops. One would expect that someone who had worked in fisheries might be in the know as to where activities were occurring even in other communities, but apparently this is not the case for Cape May. Recently there had been information in the local newspaper describing the loss of two fishermen to overdose from drug use, but little else could be described by local fishermen in articles about Cape May fisheries.

York County’s opinion of fishermen is based on local knowledge of unscrupulous dealings of some of the more local fishermen and the lack of enforcement. When I talked with a county official about the scallop fishery, he had not known that part of the offshore fishery fleet landed in York County. In addition, he did not know of the vessel monitoring system (VMS) requirements for monitoring, and the current restrictions. He was pleased
to hear that there was a measure of control on the offshore fishery, and wished that similar steps could be taken for the bay fishery.

Hampton Roads has little knowledge of fishermen or fishing and tends to ignore them for the most part. Fishing is seen as an important factor in local history, but not much of a factor in the modern Hampton Roads. When fishing on the Chesapeake is brought up, blue crabs and recreational fishing are recognized, but few realize that offshore fishing vessels land in Hampton Roads.

**Cohesiveness of the Fishing Community**

According to indicators of cohesiveness suggested by Berkes *et al.* (2001) the fishing communities that fish for scallops should be cohesive as they participate in the same fishery. There are some measures of unity among fishery participant. However, there are differences between groups of fishery participants. I have shown differences by locality, and there are still other divisions within the fishery.

A measure of unity is the high contribution level of fishery participants throughout the range to Fishery Survival Fund. The Fund serves as a center for the hiring of legal and scientific staff to encourage re-openings and participation in management meetings. The Fund is mainly made up of “five guys” and the director who is a settlement house owner. To date, their overwhelming success has been to leverage re-opening of the exemption areas in Closed Areas I and II and Nantucket Lightship.

An additional measure of unity is the assistance which may be expected due to the organization of the fishermen in association with dock owners, processors and service providers. In New Bedford, there is substantial assistance by the major gear provider and at least one settlement house. The gear provider has “carried” accounts during times of
difficulty, and appears to be prepared to do so in the future if necessary. The settlement house owner is also Director of Fisheries Survival Fund, and provides valuable assistance, energy, and knowledge to the fishing industry. Finally, it is recognized in New Bedford that there are “quasi-corporate” interactions between vessel owners and processors such that the vessel owners tend to be in long term business relationships with the processors to keep prices up for the vessel and crew and product available to the processor.

In the other communities, the dock owner/processors also tend to own at least some of the vessels that land product at their locations to assure that product is available. According to an informant associated with the New Bedford Seafood Auction, the re-openings saw a number of participants from communities other than New Bedford. Those participants would take two trips back-to-back, with one trip landing in New Bedford and the other “at home” to maintain the needs of the home area processors.

Despite the apparent unity, there are also divisions within the fishery based on various factors. One division is between the limited access fishing vessels and the general category vessels discussed earlier. Another is by gear - dredge versus nets. The participants who use dredges tend to see their efforts as allowing scallops to grow larger, and thus, gain in value as compared to the those who fish with nets. The participants who fish with nets contend that they have a right to harvest scallops, and that they can cull quickly enough to do little damage to the smaller scallops that are released. This may be the case, but the fishermen who use dredges are suspicious that rapid culling is not occurring.

In the case of area management, areas that re-open have thus far reopened only for limited access dredge permit holders. This has tended to neglect permit holders for trawl
permits, and may have negative effects on those vessel crews, owners, and captains who work on vessels with trawl permits because areas are denied to them. In addition, although small dredge permit vessels have been allowed into areas that have reopened, distant areas may be precluded from their access due to safety factors associated with distance from shore.

Another distinction is between vessel owners, particularly fleet owners, and captain/crew. Typically, if a boat owner does not fish he is not seen as part of the same subsection of the community or as concerned about the resource as the captains and crew whose livelihood is highly dependent upon available scallops of a good size.

I perceive the most divisive issue in scalloping at present is the desire for fleet owners to undertake consolidation while the owner-operators feel that they will be squeezed out of business. At least two fleet owners brought up consolidation and ITQ as the preferred change of management for Amendment 10; one was from New Bedford, and the other was from Cape May. While not said in so many words, fleet owners in Virginia wanted the least amount of government intervention, which I interpret as a tacit statement of preferring ITQ. Owner-operators have a preference for area management with the current days-at-sea and crew restrictions provided it is “done right.” In being done right, they want assurances that areas will reopen, preferably with a “drop dead” date for the closure, and that areas are selected that allow access to the most productive areas rather than shutting them down.

Projected Effects of Amendment 10 Area Management Strategies,

Suggested Strategies for Mitigation, and Support for Buybacks
Projected Effects of Amendment 10 and Suggested Strategies for Mitigation

The newly described areas for closure due to Amendment 10 as shown in Figure 22 are expected to have some negative effects for the industry participants of Cape May and Hampton Roads. Over approximately the last three to five years, an increasing proportion of the quantity landed at those ports has come from the three digit statistical areas in which the newly proposed closures are located. Effects on the municipalities may be more intense on Cape May, or more specifically, Lower Township, as the requirement for participants who land in that municipality to find new areas to fish is expected to lead to a decline in income. Hampton Roads communities, if the harvests are sufficiently strong in areas nearer the ports, may not be as negatively affected.

Re-opening may also have effects on the Hampton Roads fishing community. In the case of the previous re-opening of Georges Bank, some vessels essentially moved to New Bedford for a period of time. This meant that landings declined somewhat, and thus, negatively affected processors and processing employees and their incomes in the Hampton Roads fishing community. The renewed re-opening may have similar effects if the abundance, and price of scallops from Georges Bank is favorable compared to conditions of the resources and the prices nearer Hampton Roads.

New Bedford can expect a new flush of activity if areas are re-opened. In the approximately three years since the prior re-opening, it is expected that scallops not yet recruited to the gear at that time have now attained a high level of yield per recruit. That is to say that they have become large enough to be the most valuable size or age class of scallops. New Bedford may experience some negative effects with regard to available dock space with the number of groundfish vessels tied up, but if some provision is made to
possibly raft the groundfish vessels another one or two deep, there may be some openings for transient vessels that have not been in the area recently. In addition to the increase in vessels, as occurred in the last instance of re-openings, one could expect the price of scallops from Georges Bank and the South Channel to decline if harvests occur within a short period. Having the areas open for a full year, though, may allow the fishermen to adjust their schedules to lessen the glut effect.

These projections are dependent upon the areas that are being re-opened being more attractive than the areas external to the re-openings. If regulations do not allow for an improved financial situation by fishing inside the re-opened areas or preclude too many days-at-sea in the trip trade-off, the attractiveness of the re-openings may be minimal and thus the effects negligible.

Although not necessarily related to area management, there has been an increase in effort for participants on vessels with general category permits, which allow landing 400 pounds per day. Some of the participants are targeting scallops, while others are landing scallops as bycatch from other fishing activity. Limited access vessel owners desire limits on the targeted fishery. The major concern is that there are a large number of general category permits, and that with this large number of vessels, there is a high capacity for harvest. There is, however, a sector of fishery participants, particularly from Maine, who have historically participated in scallop fishing on an occasional small scale basis. In Amendment 10 there are new provisions to both allow the historic activity, yet restricts the further development of small-scale targeted fishing activity. The new restrictions appear to be supported by fishery participants.

One area of concern that has not been well addressed in Amendment 10 is a sunset
or “drop dead” date for closures. This has a fair proportion of the fishery participants concerned as expanding area management may mean that large areas over time may be closed off for very long periods or virtually in perpetuity. This concern can still be addressed by devising sunset dates for closures and improved institutional communication between the agency and the industry to assure that the science will be undertaken to determine areas set to re-open. Alternatively, the industry has shown a willingness in the past to fund activities to show that areas are “ripe” for re-opening (by meeting the stock criteria set out in this Amendment or by otherwise showing areas of high abundance of large scallops), but this will mean increased expense and coordination within the fishery and with researchers to undertake studies to challenge for re-openings. In the approved version of Amendment 10, the TAC set-aside will continue, at a rate of approximately 1 or 2% ($3 million). The continuation of the TAC set-aside will prolong the cooperation between fishermen, communities, and scientists.

Support for Buybacks and Criteria for Designing Buybacks

Buybacks were not recommended in the interviews and community participation undertaken in 2001 and 2002. Review of the comments from the Scoping hearings on Amendment 10, however, shows that there was some discussion of buybacks by participants at the Cape May hearings. Between the time of the scoping hearings and the time of interviews, there was a greater recognition of the limitations of government-sponsored buybacks. There is little in the regulations for flexibility if the government is involved in purchasing vessels and permits and retiring fishing effort.

In addition, there has been an evolving sense that the limited access fishery for scallops is, as one vessel and dock owner in Cape May stated, “de facto IFQ”
management. Rather than purchasing quota which could be available under ITQ, fleet owners have recognized that they can enhance their share of the quota by purchasing vessels and either placing the permit on a slightly upgraded vessel or retaining the purchased vessel with its quota as a part of the fleet. It is believed by various fishery participants in Cape May that one of the fleet owners has been using the strategy.

According to an industry news listing (Seafood.com News 2003), two scallop companies with vessels in New Bedford have recently joined forces to assure that they retain a good segment of the total available scallop days or *de facto* quota.

An additional factor in the loss of interest in buybacks was the increase in available scallop stock, and thus, the reduction in perception that selling a vessel was the only way to make any money (the perception from about 1993 and 1994 to approximately 1997). Some limited interest may still exist for selling vessels, but it currently is more of a factor for those who choose to leave fishing entirely, or those who look forward to retirement and view the vessel sale as a part of their retirement nest egg.
Chapter 6. Conclusions and Recommendations

Conclusions

This dissertation addressed three main questions:

1. What is the level of community support for area management?
2. What level of support exists in the industry and/or community for buybacks?
3. How can community and industry concerns be better included in fishery management?

In addition to those questions, subsidiary issues also emerged including: what adjustments to area management would industry or community members see as beneficial to mitigate social and economic effects of the area management strategy; what is the preferred method for funding a buyback, and what factors should be considered in developing a buyback strategy; and how can the community and industry plan to adapt to fishery management.

To the first question, it depends upon which faction of industry one asks, but in general, support is limited based upon the history of the current system of closures and re-openings. To address the subsidiary issue of what adjustments to area management are preferred, in general, fleet owners are less supportive than others in the fishing industry toward area management as they would prefer to see consolidation and ITQs. Owner-operators, crew and captains, and the organization representing the fishing industry, FSF,
are less negative toward area management, but advise that it needs to be "done right" with limited amounts of area closed, productive areas left open, and re-openings allowing enough harvest to make reasonable trips for the required days-at-sea trades required to access the re-openings.

The second question is more easily answered with respect to support for buybacks. The short answer is "none." The current status of the stock is high enough that there is little perception of a need for a government-sponsored buy-back. In addition, the attitude of vessel owners is such that any vessels perceived as needing to be removed from the fishery could be bought by a fleet owner, who, at his option, could either convert it to another fishery or hold the permits. With these considerations, there is no desire to find a method of funding, or of developing factors to be considered that should be considered in the buyback strategies.

The third question has more ambiguous findings. At present the development of community-based co-management or expanding current consultative management is problematic. First and foremost, I was surprised at the lack of interest of the municipality level of community in the fishing industry overall. Considered in terms of economic and social dependency, fisheries are not a strong sector of the economic or social base of these municipalities. Neither the fishing activities, nor the participants are viewed particularly positively by the members of the broader community. Finally, fishery management has been disembedded from the community. Management, through the Magnuson-Stevens Fishery Conservation and Management Act and other legal implements, yields municipalities that are not necessarily aware of management action that may have effects because the laws and regulations do not require notification of the municipalities. Neither
do the regulations require the input of the municipalities.

Secondly, the New England Fisheries Management Council is uninterested in expanding the responsibility of municipalities. In part, this determination is based on the perception that the region is the correct level of management, that community-based co-management is an environmentalist ploy to increase their visibility; and that although communities could aid the fisheries, often the assistance in preserving an ice house or other facility is not undertaken. At this point, communities are not even informed of management unless they take the effort to monitor fisheries, and with the multiple activities that municipalities are required to oversee, fisheries are the least of their worries.

Finally, there is the problem of timing. In developing this dissertation there has been both a waxing and waning of interest in community-based co-management. While times were tough, it appeared that fishery participants desired to show the effects rippling through the community, but when economic times improved, interest lessened. This points to a need for enduring associations that persist beyond time-bounded events. The New Bedford fishing community and the City of New Bedford still displays some interest, but largely due to the difficulties of the groundfish fleet. To overcome the timing issue, it is important to develop long-term relationships with the fishing communities to develop a measure of trust and experience in working with various institutions so that when stocks or economic situations do again decline, there are institutions and individuals who are trusted to assist. Currently, projects are ongoing in New England to develop the community/institutional linkage with the Massachusetts Fishermen's Partnership and MIT/Seagrant, and cooperative research is also contributing to knowledge and trust with community members.
Significance of this study

This dissertation has provided new information for the study of both social impact assessment and for factors that affect the development of community-based co-management. In terms of social impact assessment, historical and cumulative effects of management were described and used to project future impacts of formalized area management. For community-based co-management studies, this dissertation considers additional aspects of dependency, physical isolation and “perceived need to do something” to the factors currently being used by researchers in fisheries (Berkes et al 2001).

This dissertation has documented historical and projected concerns regarding the development of area management. In the typical social impact assessment, a review of past regulation and its effect has not been undertaken. This lack has been addressed through the analysis of interviews and GIS study of fishing patterns. Geographic information systems (GIS) analysis is a relatively new addition to the assessment of fishermen’s behavior. Although others have used different levels of analysis, for example the trip level (Rago 2000) or distance traveled for all trips (NEFMC 2002), it appears that this document is the first to present GIS analysis for a long time period to determine changes in behavior by port of landing for each month due to area closures and reopenings.

It has been recognized that the development of community-based (co-) management is situational. This dissertation has expanded upon some of the prior efforts of determining which criteria are beneficial for the development of community-based co-management by adding factors of dependency, physical isolation, and timing.

Until the current study, economic dependency indicators has not been used in the
fisheries related social impact assessments. Although not sufficient to determine dependency alone, since social dependency should also be considered, the measures of economic dependency allow for comparison between communities for the intensity of effects beyond the fishery participants and the ancillary businesses.

Physical isolation was not a factor for these four communities, since all were within recognized metropolitan areas and had substantial infrastructural linkage to other communities. Isolation may be important for fishing communities in outlying rural areas, and the criteria selected to determine isolation may help in defining isolated communities.

Perhaps the most important factor for this dissertation was the timing. When the project was instituted there was substantial concern that the communities were not well represented and that there was a need for more recognition of concerns. Over time, trust developed in Fisheries Survival Fund and its representation of the fishermen. In addition, scallop stock rebounded so that the perception was of lessened threat of additional closures and draconian measures to reduce fishing pressures. These factors made the “need to do something” decline, and therefore interest in community-based co-management has declined.

A distinct problem was observed with the use of the method selected due to the time needed to interview over one hundred people, and to have short-term participant observation (two three-week periods in the New Bedford and Cape May). This problem may be addressed by having additional investigators, so that efforts may be divided in data collection. Some form of training to have those investigators starting from similar perspectives would be necessary, however. If studies of this type are to be undertaken by an individual, they would not meet the short period of study needed for provision of data
for decision-making, such as the development of a new framework or amendment to the
fishery management plans. These types of studies could, however, assist in study of
cumulative impacts and for improving projections provided under the more standard social
impact assessments provided for each framework or amendment action.

Recommendations

At present, there is difficulty in including community concerns into fishery
management. In part, these difficulties stem from divergent opinions as to what level of
community should be represented; a lack of communities being viewed by others as well as
themselves as stakeholders; a preference by fishery participants to have rules the same
throughout the wide range of the fishery; and diverse interests overall within the fishery.
Despite these difficulties, recommendations can be made with regard to area management,
buyback strategy development, and development of community-based co-management for
fisheries.

Recommendations for Area Management

To address concerns that were discussed within the fishing communities and
industry, several ideas could be incorporated into the development of area management
strategies. These ideas include size and distribution of specified management areas,
incentives for use, timing of openings to prevent gluts, enforcement criteria, and a
guarantee that areas will be reopened to fishing.

Size and Distribution of Specified Management Areas

Industry is concerned that future areas could be as large as Closed Areas I and II.
To counteract that concern, industry through FSF has requested that areas be as small as possible to protect juvenile scallops yet allow access to large scallops. This recommendation appears sound with the proviso that the areas are large enough and properly situated (not too near shore for rapid entry and exit) for proper monitoring and enforcement of closures.

In addition to the size of closure, there is a suggestion that at least some portion of areas that are either currently or in the recent past have been productive remain accessible. Industry has suggested that areas be designated based on the criteria of the presence of small scallops, but that areas with a mix of large and small scallops remain open. Closure of areas to allow for growth of scallops is more positively viewed than closure for protection of other species. However, the poor quantity of scallops that were available when the Virginia Beach closure re-opened has shown that protection from harvest by scallop vessels may not be provide the desired results. The perception of fishermen is that the areas currently closed are sufficient to enhance the resource through spill-over of adults, protection of spawning adults, and as a source of larval scallops that are transported by currents. To provide clarification of the criteria for closure and reopening, agency consultation with the scallop biology researchers (including the Northeast Fisheries Science Center), FSF and/or the scallop advisory committee and the industry advisors committee to determine the mix of size of scallops would be acceptable to determine closures and re-openings should occur. This information can then be used to help determine areas to be closed. In addition, some areas that are not as productive may be worthwhile to close for short periods to determine if simply lessening disturbance may induce spat set and recruitment as a pilot program. Another factor to consider is if one of
the areas undergoes good spatfall but does not see good recruitment (as the Virginia Beach closure shows), the risk will be lessened to have small areas set aside rather than placing all expectations on one larger area.

Particular concern has been expressed to reopen the Georges Bank and Nantucket Lightship closed areas again since three years will have gone by between the last opening. The areas that have been closed for the entire time have the reputation of being filled with "clappers" (scallop shells that are the remains of dead scallops), and some fishermen are quite concerned that there is available stock that they are not permitted to access. Reopening some of these areas again would be beneficial for New Bedford fishery participants and those who can travel and find economic benefit to take advantage of the re-openings. This will help decrease the harvest pressure caused by a shift of effort to the south, and allow some areas of the Mid-Atlantic to respond to more typical levels of effort.

Finally, if areas are to be small, to avoid the potential for boom and bust for specific ports, distributing those areas throughout the scallop range is essential. The closure of Georges Bank that affected both the groundfish fishery and the scallop fishery was detrimental to the community of New Bedford as its base industries, such as manufacturing, were no longer active, yet there was a need for alternative employment and education for those affected. If several small areas are distributed throughout the range, no one community and no one group of industry participants should be harder hit than others with closure, and with multiple reopenings throughout the range, the potential for concentrating effort into one or two areas should be reduced.
Incentives for Use

At present, the allowable quotas for the re-opened areas of the Mid-Atlantic are not perceived to be sufficient to induce participation for most of the limited access vessels. The only group of permit holders to find much benefit in entering the Hudson Canyon area are those with small dredge vessels. This has created a privileged group among the limited access holders, and others find it inequitable. To offset this concern as well as to induce harvest among limited access vessels, the quota from the reopened areas will need to equal or exceed the catch for the days-at-sea tradeoff for areas that are generally accessible.

Timing of Openings

An issue brought up by a processor in Hampton Roads as well as by a boat owner in New Bedford was the fact that certain times of year may yield gluts of scallops. Timing openings of areas across the range may assist in keeping down the possibility that vessels will save their days-at-sea to take advantage of the opening of a single area which is thought to have been done with the reopening of Nantucket Lightship. In addition, having the openings last for an entire year rather than a few months should allow the vessel owners and operators to decide when to harvest within the reopened areas. The short window of the prior re-openings were another factor that may have promoted a run on those areas and market glut.

Enforcement Criteria

Two issues with regard to enforcement were discussed. The first of these issues is with regard to interpretation of the areas, and the second is with regard to interpretation of the quotas.

At the present time, there has been the interpretation by the Coast Guard that
fishermen should not be within a mile of the designated areas for closure. VMS and GPS are supposedly good to within three meters. The definition of the areas closed has no buffer included. A reasonable question is which interpretation is to be used in general practice. If at least a rule of thumb were distributed, lessened confusion may yield better response to both determining which areas should be closed, and may enhance compliance due to knowledge of what the Council has determined.

With regard to the quota from the areas, informants expressed concern about going over the quota by as little as a pound and no statement as to what would be the expected level of punishment. Fishermen recognize that to some extent they will have a command-and-control form of management through quotas. The fishermen have suggested that either the overage be donated to a food bank with no compensation to the fishermen or that catches be averaged. While averaging catches over two or three trips may be acceptable to fishermen, it would mean computer monitoring of catches and a requirement that all dealers participate in the system so that the averages could be taken whether or not the fisherman returns consistently to the same port. While a potential solution, it may prove difficult to enact. Averaging would still require penalties if the total landings exceed the allowed amount over the two or more trips. In addition, it would require better monitoring and that reporting would need to be virtually continuous. Donation of overage to a food bank may be acceptable if only a reasonably small amount, but there would need to be an understanding of how much could be donated without censure as resource protection would require monitoring the amount taken from the special management areas and enforcement of those rules would still be required.
Recommendations for Buyback

At present, there is no perceived need for a buyback, Federally funded or otherwise, by members of the scallop industry. Several reasons are given for the lack of a need for buyback, including that all participants are managing to make a living on the current days at sea and with the current stock. If fleet owners perceived a need to retire a vessel with whom they compete, they would prefer to purchase it and retire it themselves rather than have the Federal government serve as intermediary. The addition of the government is seen as adding a layer of decision-making, which the boat owners would be required to pay, and thus, it is not perceived as worthwhile.

Despite these concerns, the fishery still has excess capacity. There are a number of procedures outlined for setting up buybacks in the MSFCMA, and those requirements may inhibit development of alternative buyback strategies. If a buyback should be determined to be necessary in the future, those requirements would apply.

In light of stakeholder concerns and a lack of support for a buyback of either vessel and/or permits, the recommended option is to maintain the status quo of no buyback for the sea scallop fishery.

Recommendations for Developing or Enhancing Community-based Co-management

It appears that none of the communities studied at the municipality level are prepared to take the time and resources necessary to participate in community-based co-management at the present time. As a first step toward developing this strategy, assessment of which communities have the greatest potential to participate is essential. To enhance that potential, those that have potential and interest should be offered assistance
in enhancing their skills and capabilities for participating in management. In addition, development of community-based co-management entail several other factors that should be addressed. Among those additional factors are the perception of community-based co-management by agency, industry and communities; enhancing a network or multiple networks of researchers, agency staff, council members and industry participants; and discovering the appropriate timing of available services in response to perceived needs.

Prioritizing by Community Potential

Of the four municipalities studied, New Bedford is the most aware of its dependence on fishing and the most interested in fishery management. There is presently a new fishing industry task force (initiated after my field work) that could serve as a link between the city, industry, and the fishery management agency. An example of the link between the city and fishery management, the task force could present proposed management and the issues surrounding that management to the City Council. This should not be difficult because most of the members of the task force are employed by fishing-related businesses or are fishermen, and therefore, receive information on proposed regulation. In addition to the fishing industry task force, the new Harbor Development Plan also has recommendations for hiring two new staff; one of these new city staffers may be able to represent the city at fishery management meetings.

Cape May views its industries through a lens of tourism. Perhaps the best approach in hindsight is to undertake more time in studying the connections between tourism and the fishing industry, and showing how loss or degradation of the fishery would have negative effects (or not) on tourism. Within Lower Township, there appears
to be some interest in support of fisheries; however, due to the limited size of city staff and limited budgets to hire additional staff, fisheries are not a high priority.

For the Virginia municipalities, it appears that commercial fisheries are of very little concern. Although I would not entirely disregard the potential for developing co-management with these localities, it will require an investment in time that may not be fruitful. Of the Virginia communities, Newport News appears to be the most likely to be interested in community-based co-management in that the city provides services to the fisheries in return for employment in a distressed neighborhood. Future studies may show that the interaction between the fishery and the neighborhood are less than is currently thought, especially in light of migrants who may not qualify for public assistance participating in the fishery, and this may decrease the likelihood of interest for the city.

**Perception of Community-based Co-management**

Overall, another issue to overcome in the development of community-based co-management is the perception of the New England Fishery Management Council and industry participants toward co-management. At present, the example used by a number of fishermen is the management of fluke (summer flounder) in which states are seen as "the community" in that they were given quotas. Now fishermen find that to prosecute the fishery they must have landing permits in each state to be allowed to offload. This is seen as detrimental. However, this perception of community management is only one part of the co-management spectrum. Community-based co-management may include alternatives in which the communities participate in management, but are not given quota. Education of both industry and the Council to options that allow the community, which could be the municipality or fishing community participation in the form of monitoring,
setting management definitions, research, determining stock status, or enforcement (reporting), should provide better acceptance by fishery participants and the communities. In addition, there was a strong negative perception of community-based co-management within the council. The issues on the part of NEFMC members ranged from the consideration that the large area was the appropriate level for management; the perception that community-based co-management is a tool used by environmental groups to front their causes; and the history of community-based co-management of fluke. One Council member did suggest that there was a place for the communities to participate in fishery management, and that it is in either funding or otherwise assisting in retaining shoreside services such as icehouses or docks.

**Enhancing a Network or Multiple Networks of Researchers, Agency, Council, Municipalities and Industry Participants**

Cooperative research has been occurring in the sea scallop and other fisheries for a number of years. Overall, these studies have assisted in monitoring stocks, determination of reproductive activities, designing regulations, developing new technology or adapting existing technology to have fewer impacts on stocks and habitat, and serving as a bridge between researchers and fishermen. Continuing these efforts will be beneficial for understanding the needs of the two parties.

In addition to efforts to enhance participation of fishery participants in the biological sciences, there are programs to include fishery participants and community members in social science studies and social impact assessments. To date, only one of the study communities had such activity beginning. New Bedford is one of the communities selected by the Massachusetts Fisherman’s Partnership and MIT/SeaGrant to develop a
local method for making decisions regarding how emergency funding should be spent.

An additional consideration to which social scientists can contribute is the notification of municipalities of actions, which may have local impacts. Other efforts that social scientists could undertake to assist public officials include informing the officials how to obtain information on fishery management and updating the communities on potential socioeconomic effects of management. To assist the agency, social scientists could provide a list of interested public officials to the agency for outreach.

Discussion between the fishery science researchers and social science researchers is likely to become necessary so that fishery participants are not being placed under demands for data from both sets of researchers at the same time. Some fishermen expressed concern that they had shared information on other studies; were becoming exhausted with additional questions; and asked why coordination wasn’t pursued. In addition, there may be extended benefits if the fishery science researchers and social science researchers discuss what data are already available because often one group has access to data (published or unpublished) the other could find useful. Certainly, the recognition of data needs and assistance in finding material from published literature should pose few problems of sharing and privacy.

**Timing Issues**

In undertaking this project, the issue of timing of available services and the perceived need did not coordinate. At the outset of the project (during the grant application and project development phase), there was a desire expressed by at least some participants to consider buybacks. This interest was also invoked in the scoping hearings for Amendment 10. With improved catches and a developing perception that there were
enough scallops to “go around,” the interest in buybacks dropped. In addition, prolonged interaction with NEFMC and NMFS has led to a decline in trust that fishermen's considerations for management will be as well considered, and that lack of trust has been shown in comments to the effect that vessel owners would now prefer to purchase and retire vessels on their own rather than have the government as another layer of decision-making.

Also, the interest in community and fisheries waned somewhat during the time of project development. During the time period of project development and implementation, fleet owners determined that in cooperation with Fishery Survival Fund that they had enough scientific and legal support to be considered. In addition, fishermen are recognizing that the current management strategy is, in fact, an IFQ style of fishery because there is a limit on the number of vessels, days-at-sea, crew, and gear. To strengthen their presence, some fleet owners have begun buying additional vessels to attain a larger portion of the de facto quota. Secondly, the sunset date for consideration of ITQs was either in the near future or, now, past. This allows for additional leverage to be undertaken on the part of fleet owners should they desire ITQs.

For the municipalities and fishing communities, I found that New Bedford, in part due to the added stressor of Amendment 13 to the Groundfish Fishery Management Plan, is still more interested in the effects of management on the community. The other communities, due in part to their high level of fleet ownership in terms of vessels compared to owner-operators, are less inclined to be supportive of Amendment 10.
Appendix 1

Magnuson-Stevens Conservation and Management Act as amended to
The Sustainable Fishing Act

National Standards

(1) Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.

(2) Conservation and management measures shall be based upon the best scientific information available.

(3) To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.

(4) Conservation and management measures shall not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such
manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

(5) Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.

(6) Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

(7) Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

(8) Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.

(9) Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.
(10) Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.
Appendix 2

Brief overview of community theory

Warren (1963) defines community as "that combination of social units and systems that perform the major social functions of locality relevance. In other words, by community we mean the organization of social activities to afford people daily local access to those broad areas of activity that are necessary in day-to-day living" (emphasis by Warren). The functions with locality relevance are as follows: (1) production-distribution-consumption, (2) socialization, (3) social control, (4) social participation, and (5) mutual support. Warren further recognizes that these functions, while they have locality relevance, are not necessarily all undertaken at the locality level. To function in a modern system, a community often must be connected outside the locality to function. In this definition, function is more important than geographical location and the associated boundaries, but these factors need not be neglected. As seen in the description of the other concepts of community, Warren's communities are more satisfactory for studying resource-dependent communities.

Murdock's (1979) ecological model appears to place most of its focus on the concepts of ecology: adaptation, invasion, succession, competition and dominance. Murdock argues that the congruence of human ecology and ecology makes the human ecological studies the best for inclusion in environmental impact assessment. While Murdock's arguments have some validity, his concept does not focus on the concept of community (a concept that also has congruence with ecology) which is required under the
Magnuson-Stevens Fishery Conservation Management Act.

Kaufman's (1959) work emphasizes the variation of the "social field," or the actors and their influence on community and community projects. Kaufman limits his community to a limited geographic setting, and excludes players and events that are external to that "field." This limitation then precludes consideration of exogenous factors and their effects on the community, which would lead to a richer understanding of the actions of the community members as well as precluding the influence of the community upon external fields. This is model is then unsatisfactory for use in systems where dependence upon natural resources is present, and for consideration of actions of a distant governmental organization's policies and the effects of those policies and the management derived from those policies on the community.

Network approaches, especially that of Fisher (1982) appear to be focused more upon questions of increasing urbanization and degradation of commitments which were thought to have been the traditional description of "community." Fisher places the 55 communities he studied into a continuum from rural to urban, and through the use of survey he tests the hypothesis that increasing urbanization leads to breakdown of networks. The networks were characterized with regard to formal structure, spatial dispersion, homogeneity in age, and social support. Social support then focused on counseling, companionship, and practical support for the individual. There was no focus on support of the community as a whole, or of the network in the original survey method. Therefore, for a study of the effect of policy and management on a community, this method would need to have the survey revised to look at both support of the community or network in addition to the factors already considered.
Appendix 3

GIS maps of areas which were sources of landings of scallops by
month for the four ports from 1990 to 2001
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