

**2002 ATLANTIC BLUEFISH SPECIFICATIONS**

**ENVIRONMENTAL ASSESSMENT  
ESSENTIAL FISH HABITAT ASSESSMENT  
PRELIMINARY REGULATORY ECONOMIC EVALUATION**

**DECEMBER 2001**



**MID-ATLANTIC FISHERY MANAGEMENT COUNCIL  
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## ENVIRONMENTAL ASSESSMENT (EA)

### INTRODUCTION - PURPOSE AND NEED FOR ACTION

The bluefish fisheries in U.S. waters of the western Atlantic Ocean are managed under the Bluefish Fishery Management Plan (FMP) that was prepared cooperatively by the Mid-Atlantic Fishery Management Council and the Atlantic States Marine Fisheries Commission. The plan was approved by NMFS in March, 1990 and adopted by the Commission in October, 1989. The FMP was amended in 1999 to bring it into compliance with the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) of 1976 as amended by the Sustainable Fisheries Act (SFA), and the Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA). The MSFCMA requires that the management measures proposed in an FMP be consistent with ten national standards for fishery conservation and management. Under ACFCMA, if a state does not implement management measures required by an FMP or amendment, the federal government may impose a moratorium on the landing of the species covered by the FMP in that state.

The management objectives of the FMP are as follows:

- 1) increase understanding of the stock and of the fishery;
- 2) provide the highest availability of bluefish to U.S. fishermen while maintaining, within limits, traditional uses of bluefish;
- 3) provide for cooperation among the coastal states, the various regional marine fishery management councils, and federal agencies involved along the coast to enhance the management of bluefish throughout its range;
- 4) prevent recruitment overfishing;
- 5) reduce the waste in both the commercial and recreational fisheries.

To attain these management objectives the FMP specifies the following measures that may be specified annually:

- \* commercial quotas;
- \* minimum fish size and minimum mesh size;
- \* gear regulations;
- \* recreational harvest limit;
- \* recreational possession and size limits, and seasonal closures.

This document is an examination of the impacts to the environment that would result from the implementation of the 2002 management measures recommended for the bluefish fishery. These measures include a commercial quota, recreational harvest limit, and a possession limit for the recreational fishery. The Council met jointly with the Commission's Bluefish Board and adopted measures at their August, 2001 meeting.

### 1.0 ANNUAL SPECIFICATION PROCESS

Comprehensive measures enacted by Amendment 1 were designed to rebuild the bluefish stock. Amendment 1 regulations require that a commercial quota be based on projected stock size estimates as derived from the latest stock assessment information. Estimates of stock size coupled with the target fishing mortality rate allow for a calculation of total allowable landings (TAL). Based on the historic proportion of commercial and recreational landings for the period 1981-1989, 17% of the total allowable landings are allocated to the commercial fishery. Amendment 1 stipulates that if 17% of the TAL is less than 10.5 million lb (4.762 million kg), then the commercial quota can be increased up to 10.5 million lb if the recreational fishery is projected to land less than 83% of the TAL for the upcoming year.

Amendment 1 also established a schedule to eliminate overfishing and rebuild the bluefish stock. For the first two years of the rebuilding plan (1999-2000), F was set at 0.51. The target F is 0.41 in years 3-5 (2001-2003) and 0.31 in years 6-9 (2004-2007). During the rebuilding period, the target F for the next fishing year would be set at the level specified in the rate reduction schedule or the level estimated for the most recent year, whichever is less. This schedule would allow for stock rebuilding to the level which would support harvests at or near MSY by the year 2007 or earlier.

The Amendment also established a Monitoring Committee which meets annually to review the best available scientific data and make recommendations regarding the total allowable landings and other management measures in the plan. The Committee's recommendations are made to achieve the target mortality rates established in the amendments to reduce overfishing. The Committee bases its recommendations on the following information: (1) commercial and recreational catch data; (2) current estimates of fishing mortality; (3) stock status; (4) recent estimates of recruitment; (5) surplus production model; (6) target mortality levels; (7) levels of regulatory noncompliance by fishers or individual states; (8) impact of fish size and net mesh regulations; (9) sea sampling data; (10) impact of gear other than otter trawls on the mortality of each species; and (11) other relevant information.

Based on the recommendations of the Monitoring Committee, the Mid-Atlantic Council's Bluefish Committee makes a recommendation to the Council which in turn makes a recommendation to the Regional Administrator. The Regional Administrator reviews the recommendation and may revise it if necessary to achieve FMP objectives. In addition, because the FMP is a joint plan with the Commission, the Commission's Bluefish Board (Board) adopts complementary measures.

An update on the status of the bluefish stock (Lazar 2001) indicates that fishing mortality rates on bluefish peaked in 1991 at 0.84 and have steadily declined since then to 0.326 in 2000. A two year projection (using a constant fishing mortality rate  $F=0.326$  - equal to the 2000 rate) indicates that the bluefish stock will increase from an estimated 2001 biomass of 59.64 million lb (27.05 million kg) to 78.44 million lb (35.60 million kg) in 2002.

## 2.0 METHODS OF ANALYSIS

The basic approach adopted in this analysis is an assessment of various management measures from the standpoint of determining the impacts upon the environment. In order to conduct a more complete analysis, impacts were examined in three ways (Table 1). The first analysis examines the commercial quota and recreational harvest limit recommended by the Council and Commission, the preferred alternative (the least restrictive commercial quota and the highest allowed under the current FMP). The second analysis examines the impacts of the commercial quota and recreational harvest limit based on projections of stock biomass assuming no transfer to the commercial fishery (the most restrictive commercial quota). The third analysis examines the impacts of the commercial quota and recreational harvest limit based on projections of stock biomass and yield assuming a commercial quota of 9.583 million lbs.

Table 1. Commercial quotas under each alternative compared to 2000 landings (in pounds).

|                                  | Commercial<br>TAL | Percent of<br>2000 Landings | Percent<br>Change |
|----------------------------------|-------------------|-----------------------------|-------------------|
| <b>Quota Alternative 1</b>       |                   |                             |                   |
| Council Preferred<br>Alternative | 10,500,000        | 131.48                      | 31.48             |
| <b>Quota Alternative 2</b>       |                   |                             |                   |
| Projection Based<br>Alternative  | 4,567,000         | 57.19                       | -42.81            |
| <b>Quota Alternative 3</b>       |                   |                             |                   |

|                             |           |        |       |
|-----------------------------|-----------|--------|-------|
| Amendment Based Alternative | 9,583,000 | 120.00 | 20.00 |
|-----------------------------|-----------|--------|-------|

### 3.0 DESCRIPTION OF PROPOSED AND OTHER ALTERNATIVES

#### 3.1 No Action

In the absence of not publishing annual quota specification in the Federal Register, there would be a total Federal closure on Atlantic bluefish. However, NMFS is legally obliged to publish annual Atlantic bluefish specification. Regulations implementing the Atlantic Bluefish FMP prepared by the Council appear at 50 CFR part 648, subparts A and J. Regulations requiring annual specifications are found at § 648.160. The FMP and the regulations require that the Council recommend to NMFS, on an annual basis, a TAL, which is comprised of a commercial quota and a recreational harvest limit. NMFS is responsible for reviewing these recommendations to assure they achieve the FMP objectives, and may modify them if they do not. NMFS then must publish proposed specifications in the Federal Register. After considering public comment, NMFS must publish final specifications in the Federal Register. Therefore, a No Action alternative cannot be considered.

#### 3.2 Alternative 1 (Preferred)

The Council and Board recommended a coastwide 2002 TAL of 26.865 million lb (12.185 million kg) for 2002. The 2002 TAL is divided between the commercial and recreational components of the fishery using the historic proportion of commercial and recreational landings for the period 1981-1989; 17% of the TAL would be allocated to the commercial fishery and 83% to the recreational fishery. Using these proportions, the commercial sector would receive 4.57 million lb (2.07 million kg) as a quota and the recreational fishery would receive 22.3 million lb (10.12 million kg) as a harvest limit.

However, Amendment 1 stipulates that if 17% of the TAL is less than 10.5 million lb (4.762 million kg), then the commercial quota could be increased up to 10.5 million lb (4.762 million kg) if the recreational fishery is projected to land less than 83% of the TAL for the upcoming year. Given recent trends in recreational landings for the past few years; 14.3 million lb in 1997, 12.3 million lb in 1998, 8.3 in 1999, and 10.2 in 2000 (Table 2), it is anticipated that the recreational fishery will harvest less than 83% of the TAL in year 2002. As such, the Council and Board recommended that the commercial TAL in year 2002 be 10.5 million lb. That is, a transfer of 5.933 million lb (2.69 million kg) was made from the recreational sector to the commercial sector. As such, the recreational TAL for year 2002 will be 16.365 million lb (7.423 million kg). The entire allocation process is summarized in Table 3.

Table 2. Bluefish commercial and recreational landings ('000 lb), 1981-2000.

| Year | Commercial Landings | Recreational Landings |
|------|---------------------|-----------------------|
| 1981 | 16,454              | 95,288                |
| 1982 | 15,430              | 83,006                |
| 1983 | 15,799              | 89,122                |
| 1984 | 11,863              | 67,453                |
| 1985 | 13,501              | 52,515                |
| 1986 | 14,677              | 92,887                |

|               |        |        |
|---------------|--------|--------|
| 1987          | 14,504 | 76,653 |
| 1988          | 15,790 | 48,222 |
| 1989          | 10,341 | 39,260 |
| 1990          | 13,779 | 30,557 |
| 1991          | 13,581 | 32,997 |
| 1992          | 11,477 | 24,275 |
| 1993          | 10,122 | 20,292 |
| 1994          | 9,453  | 15,541 |
| 1995          | 8,004  | 14,306 |
| 1996          | 9,295  | 11,746 |
| 1997          | 9,063  | 14,302 |
| 1998          | 8,253  | 12,334 |
| 1999          | 7,052  | 8,253  |
| 2000          | 7,986  | 10,155 |
| Average 81-00 | 11,824 | 41,958 |
| Average 96-00 | 9,434  | 16,420 |

Table 3. Summary table of bluefish allocation process.

|   |  |                       |
|---|--|-----------------------|
| Bluefish TAL                            |  | 26.865 lb (12.185 kg) |
| Commercial TAL (before transfer)        |  | 4.567 lb (2.072 kg)   |
| Recreational TAL (before transfer)      |  | 22.298 lb (10.114 kg) |
| Final Commercial TAL (after transfer)   |  | 10.5 lb (4.762 kg)    |
| Final Recreational TAL (after transfer) |  | 16.365 lb (7.423 kg)  |

In the annual specification process for 2002, the Council approved a research set aside amount equal to 2 percent of the total allowable harvest for bluefish. Assuming that NMFS approves the preferred TAL alternative for bluefish, the set-aside amount would be 537,300 lb.

**3.3 Alternative 2 (Non-Preferred)**

The overall TAL under Alternative 2 is identical to that under Alternative 1, except that no transfer is made to the commercial fishery. As such, the commercial quota for 2002 would be 4.567 million lb (2.07 million kg) and the recreational harvest limit would be 22.298 million lb (10.11 million kg). This alternative would result in the lowest possible landings in 2002 for the commercial sector.

### **3.4 Alternative 3 (Status Quo)**

The overall TAL under Alternative 3 is identical to that under Alternative 1, except that a transfer of 5.016 million lb (2.28 million kg) is made to the commercial fishery. This transfer would result in the same quota as 2001, 9.583 million lb. The resulting recreational harvest limit would be 17.282 million lb (7.84 million kg); for year 2002.

## **4.0 AFFECTED ENVIRONMENT**

### **4.1 Status of the Stock**

The status of the bluefish stock is re-evaluated annually. The most recent assessment, completed in August, 2001 indicates that the bluefish stock is overfished, but overfishing is not occurring with respect to the overfishing definition (Lazar 2001). The fishing mortality rate declined from 0.84 in 1991 to 0.326 in 2000. The 2000 F is less than the threshold F of 0.40, and the target F of 0.36. The complete assessment is detailed in Lazar (2001), "An Update on the Status of the Bluefish Stock, The Surplus Production Model."

The assessment also provided information to develop stock projections and quota recommendations for the 2002 fishery. This information indicates that if fishing mortality rate remains at 0.326 in 2002, then biomass is projected to be 78.44 million lb (35.6 million kg) in 2002.

#### **4.1.1 Stock Characteristics and Ecological Relationships**

The updated stock assessment indicates that a strong year classes in 1981, 1984, and 1989, and poor recruitment thereafter. General trends of biomass index increased in late 1970's and declined from the early 1980's to low levels in 1993 and 1994, then increased slightly in 1995 and 1997. The 1999 index increased indicating a possibility of a good 1998 year class. Trend of the fisheries CPUE (catch per unit effort) peaked in 1982 and declined to low levels in 1993 and 1994, with a moderate increase in 1995, 1997, and 1999 (Lazar 2001).

### **4.2 Economic Environment**

#### **4.2.1 Commercial**

Commercial landings of bluefish decreased 52% from 16.5 million lb in 1981 to 8.0 million lb in 2000. Commercial landings in 2000 were approximately 13% above the 1999 level and approximately 32% and 15% below the 1981-2000 mean and the 1996-2000 mean, respectively (Table 2). On average (1985-1994), the exvessel value of bluefish commercial landings from state waters was about twice those from EEZ waters. From 1991-2000, the exvessel value of bluefish commercial landings ranged from slightly over \$2.6 million in 1992 to \$3.2 million in 1993. In 2000, the value of bluefish landings was slightly below \$2.8 million, which represented approximately a 1.1% decrease from 1999 and slight decrease (1.5%) relative to the 1999-2000 average. Average exvessel price of bluefish was \$0.35 per pound in 2000 or 17% above the 1991-2000 average.

Bluefish comprised 0.23% and 0.53% of the total exvessel value and pounds landed of all finfish and shellfish species landed along the Atlantic coast of the U.S. in 2000, respectively. The contribution of



bluefish to the total value of all finfish and shellfish vary by state, ranging from 0.00% in Maine, South Carolina, and Georgia to slightly over 1% in North Carolina and New York. The contribution of bluefish to the total pounds landed of all finfish and shellfish vary by state, ranging from 0.00% in Maine, South Carolina, and Georgia to 4.38% in New York. Relative to total landings by state, bluefish were most important in New York and North Carolina, contributing the largest percentage of exvessel value of all commercial landings in those states (Table 4).

Table 4. The percentage contribution of bluefish to the total landings and value of all species combined bluefish from Maine through East Coast of Florida, 2000. Source: NMFS pers. comm., Silver Spring, MD, 2001.

| State           | Pounds of Bluefish as a Percentage of all Species | Value of Bluefish as a Percentage of all Species |
|-----------------|---|--|
| ME              | ??  | ??   |
| NH              | ??  | 0.07%  |
| MA              | ??  | 0.04%  |
| RI              | ??  | 0.16%  |
| CT              | 0.17%   | 0.04%  |
| NY              | 4.38%   | 1.06%  |
| NJ              | 0.78%   | 0.51%  |
| DE              | 0.43%   | 0.19%  |
| MD              | 0.17%   | 0.04%  |
| VA              | 0.12%   | 0.14%  |
| NC              | 2.18%   | 1.03%  |
| SC              | 0.00%   | ??   |
| GA              | ??  | ??   |
| FL (East Coast) | 0.43%   | 0.12%  |
| Total           | 0.53%   | 0.23%  |

The economic impact of the commercial bluefish fishery relative to employment and wages is difficult to determine. However, it can be assumed that only a small amount of the region's fishing vessel employment, wages, and sales are dependent on bluefish since bluefish represented only 0.53% of the total landings (by weight) and 0.23% of the total value of all finfish and shellfish on the Atlantic coast in 2000.

#### 4.2.2 Recreational

MRFSS catch data by mode indicates that 47% of bluefish were caught by private and rental boats during the period 1991-2000 (Table 5). Private vessels range in size and value from small inshore skiffs to large offshore yachts. It is not possible to determine the percentage of each type of vessel used for bluefish fishing or the cost expenditures by sub-class of vessel. It is probable that most of the private vessels used are larger than skiffs and therefore involve sizable expenditures for procurement and maintenance, thus

contributing greatly to measures of economic impact. However, it is likely that private vessels are also used to fish for species other than bluefish and for several non-fishing purposes. Therefore, any expenditure and/or cost data attributed to bluefish fishing would have to be prorated to account for this multi-purpose use.

In addition to private and rental boats, 43% of bluefish were caught from shore and 10% from party and charter boats (Table 5) during the 1991-2000 period. The original Bluefish FMP did not require party/charter vessels carrying passengers for hire to have a federal permit when fishing for bluefish within U.S. EEZ. However, with the implementation of Amendment 1, party and charter boats carrying passengers for hire will be required to have a federal permit to fish for bluefish within U.S. EEZ. Without individual logbooks, the total number of party and charter vessels actually directing trips on bluefish is difficult to determine. In 1985, a total of 528 party and 1,997 charter boats operated out of Atlantic coast ports from Maine through Florida (Sport Fishing Institute (SFI) 1988). These vessels generated a yearly revenue of \$160 million. However, documentation of the demand for bluefish fishing on party and charter boats and cost breakdowns per trip for specific regions along the coast are lacking. In 1994, a total of 545 party and about 1,950 charter boats operated out of ports along the Atlantic seaboard (ASMFC 1994). It is estimated that in recent years approximately 2,063 party/charter vessels may have been active and/or caught bluefish along the Atlantic coast (See PREE, Sec. 3.1).

Table 5. The percentage (%) of bluefish caught and landed by recreational fishermen for each mode, Maine to Florida, 1991-2000. Source: MRFSS.

| Mode           | Catch (Number) | Landing (Weight) |
|----------------|----------------|------------------|
| Shore          | 43             | 17               |
| Party/Charter  | 10             | 27               |
| Private/Rental | 47             | 56               |

Because of the importance of bluefish to recreational anglers, a short-term decline in expenditures by these anglers as a result of bluefish management measures would impact the sales, service, and manufacturing sectors of the recreational fishing industry. In 1985, Atlantic coast direct sales related to recreational fishing amounted to \$2.6 billion (SFI 1988). These sales and services required 42 thousand person years of labor and generated wages of \$522 million (SFI 1988).

The report prepared by SFI (1988) also included estimates of the economic activity specifically associated with bluefish. The estimates desegregated the regional economic impacts of bluefish based on the percent of total trips where bluefish were reported as the target species. The minimum estimate uses the target percent as given. The maximum estimate assumes that those individuals who did not identify a target species have the same distribution of species preferences as those who did express a preference. The resultant ranges of estimates of the economic activity associated with the 1985 recreational bluefish fishery on the Atlantic coast are: retail sales -- \$390.7 to \$574.1 million; person years of employment -- 6,412 to 9,445; and wages and salaries -- \$79.7 to \$117.0 million (SFI 1988). Since that period, bluefish landings have generally declined, reflecting a drop in availability, abundance, and/or anglers interest. As such, it is likely that fishery expenditures, employment, wages, and salaries associated with the bluefish recreational sector have decreased in recent years. In addition, the number of fishing trips as reported by anglers in the intercept survey indicating that the primary species sought was bluefish in the Atlantic coast has decreased from 5.8 million in 1991 to 1.2 million in 2000 (Table 6).

Table 6. Number of bluefish recreational fishing trips, recreational harvest limit, and recreational landings from 1991 to 2002. Source: MRFSS.

| Year | Number of Fishing Trips <sup>a</sup> | Recreational Harvest Limit ('000 lb) | Recreational Landings ('000 lb) <sup>b</sup> |
|------|--------------------------------------|--------------------------------------|--|
| 1991 | 5,811,446                            | None                                 | 32,997                                       |
| 1992 | 4,261,292                            | None                                 | 24,275                                       |
| 1993 | 4,041,335                            | None                                 | 20,292                                       |
| 1994 | 3,414,337                            | None                                 | 15,541                                       |
| 1995 | 3,403,068                            | None                                 | 14,174                                       |
| 1996 | 2,583,782                            | None                                 | 14,735                                       |
| 1997 | 2,019,000                            | None                                 | 14,244                                       |
| 1998 | 1,879,354                            | None                                 | 12,117                                       |
| 1999 | 1,316,939                            | None                                 | 8,253  |

|      |           |        |        |
|------|-----------|--------|--------|
| 2000 | 1,225,162 | 25,745 | 10,155 |
| 2001 | NA        | 28,258 | NA     |
| 2002 | -         | 26,866 | -      |

<sup>a</sup> Number of fishing trips as reported by anglers in the intercept survey indicating that the primary species group sought was bluefish, North Atlantic, Mid-Atlantic, and South Atlantic regions combined. Estimates are not expanded.

<sup>b</sup> Atlantic Coast from Maine to Florida.

N/A = Data not available.

The total value recreational anglers place on the opportunity to fish can be divided into actual expenditures and a non-monetary benefit associated with satisfaction. In other words, anglers incur expenses to fish (purchases of gear, bait, boats, fuel, etc.), but do not pay for the fish they catch or retain nor for the enjoyment of many other attributes of the fishing experience (socializing with friends, being out on the water, etc.). Despite the obvious value of these fish and other attributes of the experience to anglers, no direct expenditures are made for them, hence the term "non-monetary" benefits. In order to determine the magnitude of non-monetary benefits, a demand curve for recreational fishing must be estimated. In the case of bluefish, as with many recreationally sought species, a demand curve is not available. Part of the problem in estimating a demand curve is due to the many and diverse attributes of a recreational fishing experience: socializing, weather, ease of access and site development, catch rates, congestion, travel expenditures, and costs of equipment and supplies, among others. A recreational angler's willingness-to-pay for bluefish must be separated from the willingness-to-pay for other attributes of the experience. Holding all other factors constant (expenditures, weather, etc.), a decrease in the catch (or retention rate) of bluefish would decrease demand and an increase in the catch (or retention rate) should increase demand. Each change will have an associated decrease/increase in expenditures and non-monetary benefits.

Although a recreational demand curve for bluefish is unavailable, some studies have estimated the value of a recreational fishing day. Rockland (1983) presented value per trip for marine recreational fishing at nine sites in Delaware. This study used the Travel Cost Method with a variety of estimation approaches. The range of average values for the boat fishing sites was \$20.58 to \$39.90 per day, whereas the range for shore fishing was \$37.47 to \$62.53 per day. A study of recreational striped bass fishing on the Atlantic coast presented estimates of \$39 to \$169 per day (Norton *et al.* 1983). A 1982 study conducted for the state of Florida derived estimates of \$18.97 to \$57.99 per day for all marine species (Bell *et al.* 1982).

A more recent study by Strand *et al.* (1991) also estimated average total cost for day trips by mode, for selected states along the Atlantic coast (Table 7). Included in the estimates were costs for travel and services, where services could include costs for bait, tackle, cleaning, fuel, pier fees, and boat fees. Fishing from the beach was the least costly, ranging in price from \$13.77 per day in New York to \$44.44 per day in Delaware. Charters and rentals were the most expensive, ranging in price from \$52.25 per day for a rental in Maryland to \$237.03 per day for a rental in North Carolina (Table 7).

Table 7. Average total cost<sup>a</sup> for a day trip, by mode for selected states (1980-1989). Source: Adapted from Strand *et al.* 1991.

| State      | Mode    |         |         |         |         |         |
|------------|---------|---------|---------|---------|---------|---------|
|            | Pier    | Beach   | Party   | Charter | Rental  | Private |
| New York   | \$16.09 | \$13.77 | \$43.35 | \$59.88 | \$78.19 | \$44.38 |
| New Jersey | 21.10   | 16.32   | 45.36   | 146.66  | 92.41   | 40.93   |

|                |       |       |        |        |              |       |
|----------------|-------|-------|--------|--------|--------------|-------|
| Delaware       | 34.15 | 44.44 | 69.69  | 73.66  | <sup>b</sup> | 40.33 |
| Maryland       | 21.71 | 23.31 | 57.27  | 181.08 | 52.25        | 41.19 |
| Virginia       | 20.14 | 15.20 | 36.00  | 74.00  | 122.47       | 44.50 |
| North Carolina | 24.85 | 18.69 | 137.00 | 222.81 | 237.03       | 53.03 |

<sup>a</sup>Travel and services (services might be composed of a combination of the following: costs for bait, tackle, cleaning, fuel, pier fees, and boat fees).

<sup>b</sup>Not enough observations for precise estimates.

MRFSS estimates indicated that 456,400 shore-based and 774,490 boat-based trips (60,710 party/charter trips; 683,780 private/rental trips) targeted bluefish in 2000. An estimate of total expenditures made to go fishing for bluefish can be calculated by multiplying the number of trips by an estimate of average cost per day, but it is not possible to estimate the total non-monetary benefit without more sophisticated statistical techniques which allow estimation of the marginal value per trip.

It is important to note that the average cost of a bluefish trip or fishing day is not equivalent to the marginal value of a recreationally caught bluefish. The distinction is sometimes overlooked when estimating economic impacts. Attributes of a recreational fishing day other than catching fish are valued by anglers, so all expenditures are not dependent on bluefish catch. The marginal value of bluefish catch must be estimated, and as with any normal good, marginal value declines with increasing quantity. Agnello (1989) determined the marginal value of recreationally caught bluefish by considering fishing success as a shift factor in the demand for bluefish trips. Using the travel cost method, estimates of marginal value for the first bluefish kept by the average angler ranged from \$1.82 to \$5.71 (1987 dollars) depending on the specification of the regression model. Estimates for the average bluefish, about four fish per angler, ranged from \$.43 to \$1.36, indicating a declining marginal value for each successive bluefish kept.

Clearly, the economic impacts associated with Atlantic coast recreational fishing for bluefish are significant. However, estimates of aggregate economic value are not currently available. Addressing the economic value associated with marine recreational fishing when developing fishery management plans is important. Ideally, the value that anglers are willing to pay for the recreational opportunity that they enjoy should be considered when evaluating plans that affect both the recreational and commercial fisheries. Recreational fishing contributes to the general well being of participants by affording them opportunities for relaxation, experiencing nature, and socializing with friends. The potential to catch and ultimately consume fish is an integral part of the recreational experience, though studies have shown that non-catch related aspects of the experience are often as highly regarded by anglers as the number and size of fish caught. Since equipment purchase and travel related expenditures by marine recreational anglers have a positive effect on local economies, the maintenance of healthy fish stocks is important to fishery managers.

#### 4.3 Port and Community Description

The Sustainable Fisheries Act (SFA), which reauthorized and amended the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) made a number of changes to the existing National Standards, as well as to definitions and other provisions in the Magnuson-Stevens Act. In regard to National Standard 8, the SFA requires that the importance of the fishery resources to fishing communities to be taken into account when implementing conservation and management measures, "...in order to (1) Provide for the sustained participation of such communities; and (2) To the extent practicable, minimize adverse economic impacts on such communities."

The final guidelines state: *“The term ‘fishing community’ means a community that 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 fish processors that are based in such communities. A fishing community is a social or economic group whose members reside in a specific location and share a common dependency on commercial, recreational, or subsistence fishing or on directly related fisheries-dependent services and industries (for example, boatyards, ice suppliers, tackle shops).”* [Federal Register Volume 63, Number 64]

*“The term ‘sustained participation’ means continued access to the fishery within the constraints of the condition of the resource.”* [Federal Register Volume 63, Number 84]

According to NMFS, commercial fishermen in the western Atlantic landed approximately 1.5 billion lb of fish and shellfish in 2000. Those landings have been valued at approximately \$1.2 billion. Total landed value ranged from \$29 thousand in Pennsylvania to \$288 million in Massachusetts. The relative contribution of bluefish to the total value of all finfish and shellfish is low. Bluefish contributed with about 0.23% of the total value of finfish and shellfish landed on the Atlantic coast in 2000, ranging from 0.00% of the total landed value in Maine, South Carolina, and Georgia to 1.03% and 1.06% of the total landed value in North Carolina and New York, respectively (Table 4).

Bluefish are very important to the recreational fisheries of the Atlantic coast of the U.S. For example, during the period 1981-96, bluefish accounted for 29% of the Atlantic coast recreational harvest of finfish by weight (the highest of any species), ranging from 42% in 1981 to 11% in 1995. In 2000, bluefish accounted for 14% of the Atlantic coast recreational harvest of finfish by weight. The number of participants in the marine recreational fisheries of the Atlantic coast has remained relatively constant in the last 19 years (e.g., 4.6 million in 1981 versus 4.3 million in 1999, increasing to 5.5 million in 2000; average of approximately 4.9 million participants for the 1981-2000 period). The number of trips (all modes combined) made during the same time period ranged from 28.3 million in 1981 to 46.4 million trips in 2000 (average of 38.1 million trips for the 1981-2000 period) (MRFSS).

During the 1980's, a significant portion of these participants and trips depended upon bluefish, particularly those in the Mid-Atlantic region from the party/charter mode. For example, in 1985 party/charter boats in the Mid-Atlantic region landed a total of 22.2 million lb of fish, over half of which were bluefish (12.3 million lb). Further evidence of the reliance of the party/charter sector was provided by a survey of party/charter boats from the region (Maine to Virginia) conducted by the Mid-Atlantic Council in 1990. The Mid-Atlantic Council conducted a survey of charter and party boat owners from this region in which they were asked to rank each species with respect to interest they had in them and their catch rate success on a scale of 1-5. For party boats, bluefish was the second most desired species and ranked first in the catch reported by party boat owners. For charter boats, bluefish ranked third in terms of desirability and second in terms of success rate. As the abundance of bluefish has declined since then, the contribution of bluefish to the catch from this mode has declined. In 1990 anglers fishing from party/charter boats in the Mid-Atlantic region landed a total of 15.9 million lb (all species), 23.8% of which were bluefish. The contribution of bluefish to the harvest of the Mid-Atlantic party/charter mode declined to 12.4% in 1995, and subsequently to 11.3% in 2000.

In order to identify the ports important to fisheries managed by the Mid-Atlantic Council and to identify the fisheries relatively important to those ports, the Council retained Dr. Bonnie J. McCay of Rutgers University to prepare a background document (McCay *et al.* 1993). This research covered ports from Chatham, Massachusetts, to Wanchese, North Carolina and was largely based on two data sources, 1992 NMFS landing statistics and information about the ports obtained from interviews with key informants. The quality of the port descriptions, therefore, partially depends on the information supplied by the informants. More recently, McCay and Cieri (2000) provided updated port descriptions for the states from New York to North

Carolina based on 1998 landings and personal interviews. The port descriptions that follow for Massachusetts to Connecticut were taken from McCay *et al.* 1993. The port descriptions for the states from New York to North Carolina were condensed from McCay and Cieri (2000). Since the port descriptions provided here are brief summaries of the material contained in McCay *et al.* (1993) and McCay and Cieri (2000), readers requiring more detailed information are encouraged to obtain the original reports. Information on how to obtain these and other Council documents referred throughout this specifications package can be obtained from the MAFMC office.

The socioeconomic characteristics of ports in the South Atlantic region are assessed by the South Atlantic Fishery Management Council in their Stock Assessment and Fishery Evaluation (SAFE) Reports. At this time there is insufficient data to completely identify and define fishing communities in the North Atlantic and South Atlantic regions. The following description of fishing communities provides information to explore ways of defining fishing communities that range from geographical regions to a well bounded municipality. With varied levels of research or data available for each state, descriptions of fishing communities will depend upon the amount of data available and the specific nature and timeliness of that data. In some cases, it may be possible to find a municipality that will clearly fit a definition of fishing community and meet a criterion for dependence upon fishing. In others, it may be a series of communities or counties designated a "fishing community" or possibly a particular sector of a large metropolitan area.

#### New Bedford, Massachusetts

"The dominant gear types in new Bedford are scallop dredges and otter trawls." Angler, summer flounder, spiny dogfish, *Loligo* squid, and scup are among the most important species landed in New Bedford. Some bluefish is landed by druggers and gillnetters. "There is no directed fishery for bluefish in New Bedford, the bluefish which is caught is incidental bycatch."

#### Chatham, Massachusetts

"Chatham is a seasonal resort community. It is a wealthy community and property values are very high. Sportfishing and commercial fishing are important to the community. However they do not seem to be the mainstays of the community's economy. Chatham's fishing community is divided between two ports, Chatham Harbor on the east coast of town, and Stage Harbor on the south side of town. Scup, fluke, sea bass, mackerel, butterfish, weakfish and bluefish are caught as miscellaneous fish by Chatham Harbor boats." Bluefish is of minor importance in terms of overall landed value in this port.

Chatham boats are all under 50 feet and are owner-operated. Most crew are paid by the share system, but others are paid by the day or are wage workers.

#### Newport/Other Washington County, Rhode Island

"Three ports make up the bulk of the landings in Rhode Island: Point Judith, Quonset Point, and Newport. Point Judith is generally a "wetfish" port, where the fish is most often landed on ice and packaged at port. Newport is similar. Quonset Point is strictly a large factory freezer vessel port. Newport traditionally landed groundfish and lobster, but in the early 1990s began targeting squid, mackerel, butterfish, scup and dogfish."

"Groundfishing boats, a few scallopers, gillnetters, and druggers make up the range of boats in Newport. While Newport's fish potters rely almost entirely on scup, they also catch a little tautog, small amounts of black sea bass, bluefish, and summer flounder, among other species"

"Newport's small gillnet fishery relies heavily on anglers, as well as its traditional cod, tautog, and bluefish catches. Newport's gillnetters also land the majority of spiny dogfish. They also land large amounts of

weakfish and small amounts of *Loligo* squid." Newport's floating trap fishery targets among others: scup, bluefish, summer flounder, Atlantic mackerel, black sea bass, and *Loligo* squid.

Bluefish is not a major species landed in Point Judith. Point Judith harbors some minor fisheries. Besides lobster, pot fisheries are heavily reliant on scup, and pots catch a small percentage of black sea bass, as well as tautog, conger eel, and small amounts of bluefish. Point Judith's small gillnet fishery depends heavily on angler, as well as cod, dogfish, tautog, and other species. Bluefish, Atlantic mackerel, summer flounder, black sea bass, weakfish, and butterfish in small quantities are landed in the gillnet fishery. Angler are caught predominantly by draggers, accounting for the bulk of the total landed value for the dragger fishery in 1992. Bluefish, butterfish, summer flounder, scup, black sea bass, squids, and weakfish are also landed by draggers.

Newport has several commercial fish packing and distributing firms, but is also heavily oriented to yachting and tourism. Few non-fishing jobs are available, however. Point Judith is almost exclusively a fishing town, though there is some summer tourism, mostly related to Block Island. The Point Judith coop employed some local labor as well, but is now closed.

Stonington, Connecticut

Species of importance in the area include lobster, quahog, summer flounder, winter flounder, and squid. "Bluefish are abundant and is caught primarily by handliners and draggers, but there is no market for it in Stonington." Menhaden, bluefish, black sea bass, alewife, and weakfish are important components of the drift gillnet fishery. The number of boats in Stonington is stable. Most fishers are of Portuguese descent. The share system is typically used. There are several fish dealers who sell to markets in Baltimore, Philadelphia, Boston, and New York, or directly to local fish markets.

Freeport, New York

According to NMFS weighout data (Tables 8 and 9), Freeport and neighboring Point Lookout (included in the Freeport port code) are almost entirely dependent on otter trawl landings (over 89% poundage, 87% value), and the major species are loligo squid and silver hake, with smaller amounts of scup, weakfish, bluefish, butterfish, summer flounder, other flounders, Atlantic mackerel. Gillnets are used for bluefish, angler, and other species, and there are small handline, pot, pound net and bay shellfisheries associated with these ports.

Table 8. Landings by Gear, Freeport, NY, 1998.

| GEAR TYPE, Freeport, NY     | Lbs. % | Value % |
|-----------------------------|--------|---------|
| Common seine, haul seine    | 0.3%   | 0.1%    |
| Gillnet, sink, other        | 7.0%   | 6.1%    |
| Handline, other             | 2.5%   | 3.8%    |
| Pot/trap, lobster, insh nk  | 0.6%   | 2.8%    |
| Pot/trap, lobster, offsh nk | 0.0%   | 0.0%    |
| Pots + traps, blue crab     | 0.0%   | 0.0%    |
| Pots + traps, conch         | 0.0%   | 0.0%    |
| Pots + traps, fish          | 0.1%   | 0.1%    |
| Pound net, fish             | 0.2%   | 0.2%    |



|                            |       |       |
|----------------------------|-------|-------|
| Rakes, other               | 0.2%  | 0.0%  |
| Tongs & grabs, clam        | 0.0%  | 0.0%  |
| Trawl, otter, bottom, fish | 89.3% | 86.8% |

Total landings, rounded 1998: 1,865,800 lbs  
Total value, rounded 1998: \$1,504,800 dollars  
Note: 0.0 = >0.0% but <0.06%

Table 9. Landings by Major Species, Freeport, NY, 1998.

| MAJOR SPECIES >2%    | LBS % | VALUE % |
|----------------------|-------|---------|
| Bluefish             | 4.6%  | 2.1%    |
| Butterfish           | 2.8%  | 2.6%    |
| Flounder, summer     | 2.8%  | 7.9%    |
| Flounder, yellowtail | 4.0%  | 2.3%    |
| Hake, silver         | 27.4% | 16.2%   |
| Mackerel, Atlantic   | 2.5%  | 0.8%    |
| Scup                 | 4.4%  | 8.8%    |
| Squid (loligo)       | 37.3% | 39.3%   |
| Weakfish, squeteague | 2.7%  | 2.8%    |
| Lobster              | 0.6%  | 2.8%    |
| Sea bass, black      | 0.8%  | 1.9%    |

Number of species: 62

Other species of MAFMC interest by percentage total value 1998: Tilefish (0.1), and *Illex* squid (0.0). surfclams are also landed here but are reported as "Other New York."

#### Greenport and Mattituck, New York

Although Greenport and Mattituck are very dissimilar ports, we combine landings information from them to protect confidentiality.

Otter trawl landings are by far the most important, over 95%, and the classic Mid-Atlantic complement of species is found, led by silver hake and loligo squid, but including butterfish, summer and winter flounder, scup, striped bass, angler, and other species. There is also pound net fishing, haul seining, gillnetting, handlining, pelagic longlining, lobster and conch pot fishing, and raking for clams and dredging for bay scallops. Tables 10 and 11 provide weighout data for Greenport combined with nearby Mattituck.

Over 90% of the weighout landings attributed to Mattituck came from otter trawl fishing, and the full complement of Mid-Atlantic species were major landings (=>2% value in 1998: bluefish (25%), butterfish (12%), summer flounder (14.5%), scup (4.4%), dogfish 3.1%), lobster and striped bass were also significant, among the 37 species landed. Total landings in 1998 were less than 275,000 pounds. But recall that "Other New York" includes lobster and other landings which probably came from places like Mattituck.

Table 10. Landings by Gear Type, Mattituck and Greenport, NY, 1998

| GEAR TYPE                  | LBS % | VALUE % |
|----------------------------|-------|---------|
| Common seine, haul seine   | 0.0%  | 0.0%    |
| Gillnet, sink              | 1.5%  | 1.4%    |
| Handline                   | 1.1%  | 2.9%    |
| Longline, pelagic          | 0.0%  | 0.1%    |
| Pots + traps, conch        | 0.0%  | 0.0%    |
| Pound net, fish            | 1.8%  | 3.0%    |
| Trawl, otter, bottom, fish | 95.6% | 92.5%   |

Total landings, rounded 1998: 7,831,400 lbs

Total value, rounded 1998: \$4,140,500 dollars

Note: Not including "Other New York" landings; here as elsewhere "0.0%" means more than 0 but less than 0.05%

Table 11. Landings by Major Species, Mattituck and Greenport, NY, 1998

| MAJOR SPECIES >2% | LBS % | VALUE % |
|-------------------|-------|---------|
| Bluefish          | 4.2%  | 3.1%    |
| Butterfish        | 1.6%  | 1.9%    |
| Flounder, summer  | 1.1%  | 5.1%    |
| Flounder, winter  | 2.9%  | 1.2%    |
| Hake, Red         | 2.3%  | 1.5%    |
| Hake, silver      | 63.3% | 46.1%   |
| Scup              | 0.8%  | 2.6%    |
| Squid (loligo)    | 21.6% | 27.2%   |
| Bass, striped     | 0.6%  | 3.0%    |

Number of species: 62

Other species of MAFMC interest by percentage value 1998: Atlantic Mackerel (0.1), Black Sea Bass (0.9), dogfish, other (0.1), Dogfish, Smooth (0.0), Tilefish (0.3), and Illex Squid (0.0).

#### Amagansett and Three Mile Harbor

NMFS weighout data from "Amagansett" show the profiles of three traditional, small-scale fisheries of the South Fork of eastern Long Island. But first, to clarify, the town of Amagansett has no dock facilities and thus is not a "port" in the traditional sense. Fish and shellfish are trucked to consignment houses in Amagansett from various locations in the area, including but not restricted to Three Mile Harbor, which is in the town of Springs. (Most fish landed here are sent to Fulton Fish Market). Both Amagansett and Springs are part of the township of East Hampton.

Beach seines, pound nets, and handlining were the major gear types identified for Amagansett weighout data in 1998. Beach seines are used for bluefish, eels, Atlantic silverside and other species, totaling 6% of the 1998 value. The greatest value (36% in 1998) came from pound nets or fish weirs. In 1998 41 species were landed in these fish weirs. The landings of pound nets provide an sample of the biodiversity of the inshore waters as well as the diversity of preferences in local and metropolitan markets. The species included: Bluefish (54%), summer flounder (16%), Loligo squid (6.5%), weakfish (6%), carp (4%), striped bass (3%), scup (2%) and white perch (1.6%). Less than 1% of the poundage were: winter flounder, butterfish, Spanish mackerel, tautog, lobster, black sea bass, Atlantic silverside, skates, dogfish, bonito, Atlantic mackerel, smooth dogfish, crevalle, American shad, albacore tuna, northern puffer, silver hake, sea robins, king mackerel, herring, conger eel, king whiting, oyster toadfish, conchs, periwinkles, menhaden, cunner, crab, tuna (general), blue runner, black drum, triggerfish, angler.

Another traditional fishery, handlining, is about the same in value as pound nets in Amagansett (34.5%). It is used primarily for scup, striped bass, and bluefish, but 28 other species were also caught handlining, ranging from small amounts of cod, butterfish, eels, king, Spanish and Atlantic mackerel, and white perch, to larger amounts of summer flounder and dogfish. One of the wholesalers in Amagansett does a significant business in live fish.

Fisheries Profile, Montauk, New York

Montauk, the largest fishing port in New York, is situated near the eastern tip of the South Fork of Long Island. Otter trawls and longlines are the principal gear-types, in terms of pounds landed and value (Table 12). Loligo squid and silver hake are the two most important finfish caught in 1998, but tilefish also stand out, and swordfish and tuna landings are important as well. Montauk is the leading tilefish port in the U.S., but this fishery has declined greatly. For the past two years (1998-1999) some of the Montauk-based tilefish boats have been unloading their catches in Rhode Island. Nonetheless, tilefish accounted for 21% of the value of landings in this port in 1998 (Table 13). The number of species landed at Montauk is staggering: 90. The methods used to harvest fish and shellfish are diverse, including pound nets or fish weirs, box traps, haul seines, and spears, along with the more usual pots, lines, and trawl nets.

Table 12. Landings by Gear Type, Montauk, NY, 1998

| GEAR TYPE                   | LBS % | VALUE % |
|-----------------------------|-------|---------|
| Box trap                    | 0.0%  | 0.0%    |
| Common seine, haul seine    | 0.0%  | 0.0%    |
| Gillnet, sink               | 1.2%  | 1.3%    |
| Handline, other             | 3.0%  | 6.6%    |
| Longline, bottom            | 11.4% | 20.9%   |
| Longline, pelagic           | 3.1%  | 8.7%    |
| Pot/trap, lobster, insh nk  | 0.4%  | 1.3%    |
| Pot/trap, lobster, offsh nk | 0.1%  | 0.4%    |
| Pots + traps, conch         | 0.0%  | 0.0%    |
| Pots + traps, fish          | 0.1%  | 0.3%    |
| Pound net, fish             | 0.6%  | 0.6%    |
| Spears                      | 0.0%  | 0.0%    |

|                            |       |       |
|----------------------------|-------|-------|
| Trawl, otter, bottom, fish | 80.1% | 59.9% |
|----------------------------|-------|-------|

Total landings, rounded 1998: 12,035,700 lbs

Total value, rounded 12,108,800 dollars; 0.0% = <0.06 % rounded

Table 13. Landings by Major Species, Montauk, NY, 1998

| MAJOR SPECIES >2% | LBS % | VALUE % |
|-------------------|-------|---------|
| Bass, striped     |       | 5.2%    |
| Bluefish          | 2.1%  | 0.8%    |
| Butterfish        | 3.2%  | 2.0%    |
| Dogfish, nk       | 2.4%  | 0.4%    |
| Flounder, summer  | 2.8%  | 6.9%    |
| Flounder, winter  | 3.8%  | 5.1%    |
| Hake, red         | 3.2%  | 1.1%    |
| Hake, silver      | 31.2% | 15.7%   |
| Scup              | 1.8%  | 3.6%    |
| Squid (loligo)    | 24.2% | 19.8%   |
| Swordfish         | 1.0%  | 3.4%    |
| Tilefish          | 11.5% | 21.2%   |

Number of species: 90

Other species of MAFMC interest by percentage 1998 value: Atlantic Mackerel (0.3), Black Sea Bass (1.3), Dogfish, NK (0.0), Smooth Dogfish (0.0), and Illex squid (0.0).

#### Shinnecock/Hampton Bays, New York

Shinnecock/Hampton Bays is second only to Montauk as a commercial fishing center in New York. The offshore fishing industry in this part of Long Island is concentrated to the west of Shinnecock Inlet, on a barrier island that is just to the south of Hampton Bays. "Shinnecock," as it is known, is part of the town of Southampton. There is a large county-owned dock that is run by the town, where most commercial boats tie-up. The pack-out facilities and their associated docks are on private land, including two private unloading docks and one belonging to the Shinnecock Fishermen's Cooperative. The rest of the land to the east and west of the inlet is a county park. The NMFS codes for this fishery are for Shinnecock and Hampton Bays. We have combined them for this analysis because both refer to the same place (bluefin tuna and other large pelagic landings are collected using the Shinnecock port code, the rest using Hampton Bays).

This is primarily a dragger fishing port, otter trawl landings making up 84% of the poundage and 74% of the value in 1998 (Tables 14 and 15). Silver hake (whiting) and Loligo squid made up over 70% of these landings; 66 other species were landed by draggers, including bluefish, butterfish, red hake, and summer flounder. Gillnets are second in importance, accounting for 12% of the value of landings in 1998. They too had diverse landings, totaling 39 species, led by bluefish (31% of lbs.), angler (28%), and skates (23%). Bottom longlines (7.3% of value) were used for tilefish; pelagic longlines for swordfish and tunas. There is

also a diverse assemblage of inshore techniques, including haul seines, pound nets, pots (for crab, fish, eel, conch, and both inshore and offshore lobster), fyke nets, and the shellfish techniques of shovels, rakes, and "by hand."

Table 14. Landings by Gear, Hampton Bays and Shinnecock, N.Y., 1998

| GEAR TYPE:                    | LBS. % | VALUE % |
|-------------------------------|--------|---------|
| Longline, Bottom              | 2.9    | 7.3     |
| Handline                      | 0.1    | 0.4     |
| Longline, Pelagic             | 0.3    | 1.1     |
| Otter Trawl, Bottom           | 84.3   | 74.2    |
| Seines, Common and Haul       | 0.1    | 0.1     |
| Gillnet, Sink                 | 10.8   | 11.8    |
| Pound Net, Fish               | 1.0    | 1.3     |
| Pots/Traps, Fish              | 0.1    | 0.1     |
| Pots/Traps, Eel               | 0.0    | 0.0     |
| Pots/Traps, Conch             | 0.0    | 0.0     |
| Pots/Traps, Lobster, Offshore | 0.0    | 0.0     |
| Pots/Traps, Lobster, Inshore  | 0.1    | 0.3     |
| Shovels                       | 0.0    | 0.1     |
| By Hand                       | 0.0    | 0.0     |
| Rakes                         | 0.0    | 0.0     |
| Pots/Traps, Crab              | 0.0    | 0.0     |
| Fyke Net, Fish                | 0.0    | 0.0     |
| Unknown                       | 0.4    | 3.3     |

Total Landings by Weight, 1998: 13,143,401 lbs.

Total Landings by Value, 1998: \$9,676,293

Table 15. Landings by Major Species, Shinnecock/Hampton Bays, NY, 1998

| MAJOR SPECIES (>2%) | LBS. % | VALUE % |
|---------------------|--------|---------|
| Angler              | 3.8    | 8.3     |
| Bluefish            | 5.2    | 3.0     |
| Winter Flounder     | 1.1    | 2.2     |
| Summer Flounder     | 2.1    | 6.8     |
| Yellowtail Flounder | 0.9    | 2.0     |
| Scup                | 1.5    | 3.4     |
| Weakfish            | 2.5    | 2.1     |
| Dogfish, NK         | 7.3    | 1.5     |

|              |      |      |
|--------------|------|------|
| Skates       | 3.2  | 1.4  |
| Tilefish     | 3.0  | 7.6  |
| Silver Hake  | 37.5 | 23.1 |
| Quahog       | 0.3  | 2.9  |
| Loligo Squid | 22.9 | 26.9 |

Total Number: 93

Other species of MAFMC interest, by percentage value, 1998: Butterfish (1.6), Atlantic Mackerel (0.3), Black Sea Bass (0.9), Smooth Dogfish (0.0), Spiny Dogfish (0.0), and Illex Squid (0.0).

### Brooklyn

Commercial fish landings in New York City's boroughs have declined markedly over the years. Today landings in Brooklyn were reported in 1998 as less than 30,000 pounds, from otter trawls (77%), sink gillnets (16%) and handlines. The principal species, out of 17 landed, were butterfish, bluefish, weakfish, and loligo squid. Sports fishing at Sheepshead Bay and other sites, have become more important than commercial fishing.

### Belford, New Jersey

The fishing port of Belford is on a tidal creek leading out to Raritan Bay and the New York Bays. Its fishery is oriented both to the bay and to the Atlantic Ocean, which is reached by going out around Sandy Hook, a few miles from Belford. Belford and neighboring Port Monmouth were once a large industrial fishing and processing center for menhaden, but the menhaden factory closed in 1982. Menhaden are still caught with small purse seine boats and pound nets, primarily for the bait market, and in 1998 they accounted for over 2/3rd of the landings in Belford (Table 16). Today Belford's fisheries are small-scale and owner-operated; most of the finfish are handled through a fishermen's cooperative, which sells wholesale but also runs a small retail store and restaurant. Lobsters are sold in other ways, including through a local lobster pound. Otter trawl finfishing is the most important activity, accounting for 50% of the landed value in 1998 (Table 16). It is a multispecies fishery: 42 species were landed in 1998. Major species caught by otter trawlers landing in Belford, by landed value, were summer flounder, Loligo squid, silver hake, winter flounder, spiny dogfish and skates. Lobster pot fishing is third only to purse seining and dragging; it accounted for 17% of landed value in 1998.

In recent years surfclam and ocean quahog vessels have been offloading at Belford, but in 1998 they accounted for less than 4% of the landed value (in contrast to 1992, when ocean quahogs accounted for over 30% of landed value). Crab dredging, in Raritan Bay, is of equal value. The last of New Jersey's pound nets are in Raritan and Sandy Hook Bays; they accounted for 3.9% of Belford's total landed value in 1998. Some of that was from menhaden but 27 other species were also landed from the pound nets, notably bluefish, weakfish, summer flounder, and butterfish; small amounts of tuna, skates, shad, tautog. Other fishing techniques used include crab and fish pots, handlining, and diving.

Table 16. Landings by Gear Type, Belford, NJ, 1998.

| GEAR TYPE, BELFORD, NJ | Lbs. % | Value % |
|------------------------|--------|---------|
| Diving Gear            | 0.0    | 0.0     |
| Dredge, SCOQ           | 2.7    | 3.8     |
| Dredge, Crab           | 2.3    | 6.1     |

|                               |      |      |
|-------------------------------|------|------|
| Hand Line                     | 0.0  | 0.1  |
| Pots/Traps, Lobster, Offshore | 2.0  | 17.1 |
| Pots/Traps, Blue Crab         | 0.0  | 0.0  |
| Pots/Traps, Fish              | 0.0  | 0.2  |
| Pound Nets                    | 3.8  | 3.9  |
| Purse Seine, Menhaden         | 65.1 | 18.6 |
| Trawl, Otter, Bottom, Fish    | 23.9 | 50.1 |
| Unknown                       | 0.0  | 0.1  |

Note: "0.0" means more than 0 but less than 0.05. The figures for landings from which these percentages are derived are not given because they are confidential.

#### Other Monmouth County, New Jersey Ports

Highlands (at the mouth of two large tidal rivers coming out into Sandy Hook Bay with access to the Atlantic Ocean) and Neptune (in combination with neighboring municipalities which surround the tidal basin known as Shark River) are primarily small lobstering ports, sequestered within summer resort communities. Data for these ports are confidential. Highlands is also the site of bay clam depuration plants, which serve baymen who clam under state permits in Raritan and Sandy Hook Bays and the Navesink River. A small amount of handlining for finfish and potting for rock crab supplements lobstering. Atlantic Highlands is a center for recreational charter and party boat fishing.

Crabbing constitutes most of the landings for the rest of Monmouth County. The winter dredge fishery for blue crabs in Raritan Bay and its tributaries is significant. Clamming is also important. It takes place in the Sandy Hook and Raritan Bays and tidal rivers and is largely dependent on a "depuration" process, located in Highlands, as well as some "relaying" of clams to cleaner waters in south Jersey. Crabbers and clambers, like those involved in other fisheries, live in and around Belford, Highlands, and various municipalities along the shore of Raritan Bay.

#### Point Pleasant, New Jersey

The commercial fisheries of Point Pleasant are third in New Jersey to those of the Cape May-Wildwood area and Atlantic City. The weighout data include some bayman fisheries (i.e. "by hand" and crab dredge gears), but this is primarily an ocean fishing port, with a long history involving ocean pound nets and fisheries focusing on the offshore 'canyons' of the region. The fishing port is actually Point Pleasant Beach, a borough within the larger town of Point Pleasant. Like so many ports of the Mid-Atlantic region, it is inlet-dependent. Ocean-going fishers must pass through the often dangerous Manasquan Inlet, a challenge shared with the recreational fishing community including the party and charter boat businesses of Point Pleasant and neighboring Brielle. This is a highly developed coastal region. Currently there is a wholesale finfish packing dock at Point Pleasant, a fishermen's cooperative. Another dock is primarily used for offloading surfclams and ocean quahogs although finfish may be handled there as well.

The fisheries are very diverse, the classic situation in the Mid-Atlantic. Two stand out in terms of volume and value: otter trawls and gillnetting, the latter particularly important for spiny dogfish as well as bluefish, weakfish, and other species (Table 17). But sea scallop dredging is very important, as are surfclamming/ocean quahogging and offshore lobstering. Landings by major species for Point Pleasant are confidential but one can generalize that the most valuable species, in 1998, was angler or monkfish, which

was partly incident to the scallop fishery but also caught by specialized gillnetters both local and migrating from other ports in the northeast and mid-Atlantic. Sea scallops were next in terms of exvessel value in 1998, followed by Loligo squid, a major focus of the local dragger fishery in the last decade, summer flounder, also a traditional fishery of the area but sharply cut back by regulations; lobster; spiny dogfish (like monkfish, caught by gillnetters as well as other fishers), and silver hake, or whiting. Whiting was one of the mainstays of this fishery from the 1970s through the 1980s; its availability and abundance have since declined. In terms of pounds landed, menhaden (purse seined) and surfclams and ocean quahogs were the leading species in 1998, having come to replace the traditional otter trawl finfish fishery in importance over the past decade. Table 17 gives landings by gear type.

Table 17. Landings by Gear Type, Point Pleasant, NJ, 1998.

| GEAR TYPE, POINT PLEASANT, NJ: | Lbs. % | Value % |
|--------------------------------|--------|---------|
| By Hand                        | 0.0    | 0.0     |
|                                | 0.0    | 0.0     |
| Dredge, Sea Scallop            | 1.2    | 10.4    |
| Dredge, SCOQ                   | 51.4   | 49.9    |
| Gillnet, Drift                 | 1.0    | 0.7     |
| Gillnet, Sink                  | 11.0   | 13.5    |
| Hand Line                      | 0.1    | 0.1     |
| Longline, Pelagic              | 0.1    | 0.2     |
| Pots/Traps, Lobster Offshore   | 0.6    | 3.5     |
| Pots/Traps, Fish               | 0.0    | 0.0     |
| Purse Seine, Menhaden          | 20.9   | 3.7     |
| Trawl, Otter, Bottom, Fish     | 13.6   | 17.7    |
| Troll Line                     | 0.0    | 0.0     |
| Troll Line, Tuna               | 0.0    | 0.0     |
| Unknown                        | 0.2    | 0.3     |

Total Landings, rounded, 1998: 31,916,900 lbs.

Total Value, rounded, 1998: \$16,715,400 dollars

#### Point Pleasant Beach, New Jersey

The town of Point Pleasant (pop. 18,177, 1990) is located at the mouth of the Manasquan Inlet at the northern border of Ocean County. The town's economy is geared toward the summer tourist and recreational business. However, it is more than a "beach town", and has a large resident population. It is close to a larger township, called Brick or Bricktown (pop. 66,473, 1990), and across the Manasquan River from Manasquan (5,369, 1990) and Brielle (4,406). The fisheries are concentrated in an area known as Point Pleasant Beach, along a sandy strip which includes restaurants, a fisherman's supply store, small marinas, charter and party boat docks, and two commercial fishing docks.

One of the Cape May seafood businesses has two fishing properties in Point Pleasant, one of which is now used for offloading and trucking surfclams and ocean quahogs. (Each of these docks had been used for finfish until about 10 years ago). From 6 to 10 boats land clams here, according to company personnel



interviewed in Cape May. There are 15 crew at the docks and about 50 on the boats. There is also a new (2000) seafood processing plant, initially shucking surfclams. One existed here two decades ago, part of the early surfclam industry.

A fishermen's cooperative owns two other properties, one for storing and working on gear and some dockage, the other including the coop's offices, gear storage, ice-making, packing house, and a retail store. The cooperative mostly depends on its fourteen or so members, who have older, wooden-hulled vessels, 45-65' in length. They are geared for bottom otter trawling in a mixed-species, diversified fishery. The vessels usually have a two or three man crew, including the captain, who are paid shares of the profits. They are all hired locally. Although there are families with several generations in the fisheries, in recent years crew members are not often related to the captain or owner. Some members of this cooperative and some crew members have been ethnic minorities (Spanish, Portuguese, Chinese, and others). A few women have crewed on these boats. The boats are all owner-operated. They tend to fish in areas of Hudson Canyon called "the Mudhole" or "the Gully." The Mudhole is closer and has a dredged channel, but poor landings, especially of silver hake ("whiting") have forced most to move north into the Gully, where silver hake seem to be more plentiful. The average trip to the Mudhole is one to three days, but for the Gully can last a week.

Most of the draggermen at the cooperative consider themselves loligo squid and whiting specialists, but different species are targeted at different times, depending on the conditions of the ocean, the market, and the preferences of the captain. Squid landings began to overtake silver hake landings in this fleet in 1992 and now account for over 50% of the landed value of Point Pleasant trawlers. At first it was a bycatch while silver hake fishing in the Gully. Now it is targeted by some of the captains. As one captain stated, "You can't help but target squid sometimes, there is so much out there." Squid is sold to local processors. The cooperative is at a disadvantage in marketing squid because members lack freezer boats or refrigerated sea water boats, and thus do not receive the same price that boats so equipped receive, particularly in Cape May.

Summer flounder has long been a mainstay of this fishery, especially in the Mudhole in September and October, as well as other times in New Jersey and New York waters. Because of sharp quota restrictions, it is now a derby-like fishery. It is marketed in the fresh fish markets of New York and Philadelphia, in local restaurants and fish stores, and in the coop's own retail store.

At one time a few trawlers targeted scup (also called porgies), partially because doing so took pressure off a supply-burdened whiting market. (There was also a significant offshore summer flounder fishery in the winter months, for a few boats). Today no vessels target scup but may encounter large schools in the winter. Marketing is similar. Spiny dogfish have emerged as a very important fishery for the draggers and even more so for a gillnet fleet, both local and visiting, which has grown in recent years. Gillnetters have used "runaround" nets for species such as bluefish, Spanish mackerel, little tuna, scup, and weakfish, although this gear did not appear in the 1998 NMFS data. They use drift and sink nets for dogfish, angler, bluefish, weakfish, and other species. Angler, or monkfish, are particularly important. In 1998 local fishermen using sink gillnets caught almost 17 million pounds of monkfish as well as over 8 million pounds of spiny dogfish.

#### Barnegat Light (Long Beach Island), New Jersey

The fishing port of Long Beach Island is mostly located in the small bayside municipality of Barnegat Light, on this long, densely-developed barrier island on the central New Jersey coast. The commercial fishery has been undergoing a transition from over 20 years of specializing in offshore, deep-water and distant-water longlining. That tradition remains in the importance of bottom and pelagic longline gear (18% of total landed value) and of species such as tilefish, swordfish, and tunas (including big eye, yellowtail, blackfin, and

skipjack in 1998) (Table 18). (Handlines are also used for big eye tuna as well as for bluefish and other species; troll lines for yellowfin tuna). However, the physical perils of the inlet has kept this a relatively small-boat longliner fleet, and natural and regulatory changes in the species sought have forced people to look for alternatives. An alternative developed over the past decade is sea scalloping and the attendant bycatch of angler. Another is for expansion of the species sought with bottom and pelagic longlines, including sharks and dogfish among others. In 1998 the pelagic longline gear of Long Beach Island caught fully 23 different species, and bottom gear caught 17 species.

Whether transitional adaptation or old stand-by, the gillnet fisheries of Long Beach Island are the most substantial, representing 76% of poundage and 45% of landed value in 1998 (Table 18). The number of species involved is equally impressive: 61 for the drift gillnets, including mackerel, dogfish, flounders, tunas, weakfish, shad, sharks; 23 for the sink gillnets. In contrast, otter trawl dragging is minor and only 10 species were landed. Spiny dogfish are a recent focus, representing over one-third of the total landings in 1998.

Table 18. Landings by Gear Type, Long Beach Island, NJ, 1998.

| GEAR TYPE:<br>LONG BEACH ISLAND, NJ | LBS. (%) | VALUE (%) |
|-------------------------------------|----------|-----------|
| Dredge, Sea Scallop                 | 5.7      | 28.6      |
| Gillnet, Drift                      | 64.0     | 34.9      |
| Gillnet, sink                       | 11.8     | 9.8       |
| Handline                            | 0.1      | 0.1       |
| Longline, Bottom                    | 7.0      | 6.1       |
| Longline, Pelagic                   | 11.2     | 19.9      |
| Rakes                               | 0.0      | 0.2       |
| Otter Trawl                         | 0.2      | 0.3       |
| Troll Line, Tuna                    | 0.0      | 0.0       |
| Unknown                             | 0.0      | 0.0       |

Total Landings, rounded, 1998: 10,032,800 lbs.

Total Value, rounded, 1998: \$10,194,400 dollars

Atlantic City and Other Atlantic County, N.J.

Atlantic City is better known for casino gambling and its boardwalk than for its status as a fishing port. The fishing port is on the backbay side of the city and is almost entirely given over to surfclam and ocean quahog dredge fishing (Table 19). Atlantic City has long been a favored port for this fishery because of ready access to dense beds of clams off the central coast of New Jersey. Ocean quahogging has moved to more northern ports, especially New Bedford, Massachusetts, in recent years; it represented only 11% of the value of Atlantic City's landings in 1998. Other fisheries in Atlantic City are minor. Gears include sink gillnets, and handlines, and bluefish, black sea bass, weakfish, jonah crab, lobster, and conch predominate.

Table 19. Landings by Gear Type, Atlantic City, NJ, 1998

| GEAR TYPE: ATLANTIC CITY, NJ | LBS. (%) | VALUE (%) |
|------------------------------|----------|-----------|
| Dredge, SCOQ                 | 99.9     | 99.7      |
| Gillnet, Sink                | 0.0      | 0.0       |

|                     |     |     |
|---------------------|-----|-----|
| Handline            | 0.0 | 0.0 |
| Pots & Traps, Conch | 0.0 | 0.0 |
| Pots & Traps, Fish  | 0.1 | 0.2 |

Total Landings, rounded, 1998: 37,338,500 lbs.

Total Value, rounded, 1998: \$17,867,000 dollars

Atlantic County, like the other coastal New Jersey counties, has numerous small-scale bay and estuary fisheries as well. By far the most important for this county is the hard clam (quahog) fishery (34% of the landings, 70% of the value for "other Atlantic" in 1998), using rakes, tongs, and "by hand" techniques such as treading. Some of this takes place through clam aquaculture. The other significant species is the blue crab, harvested with pots and dredges (50.5% landings, 25% value). Haul seines, fyke nets, gillnets, handlines, eel pots, and turtle traps are also used for white perch, menhaden, American shad, and many other bay and tidal river species.

#### Cape May, New Jersey

Cape May is New Jersey's largest commercial fishing port in terms of landings and value. When combined with neighboring Wildwood (the fishing port is often referred to as "Cape May/Wildwood"), its landings exceeded 93 million lbs., worth over \$29 million in 1998.

Draggers, or vessels using bottom otter trawls, account for 69% of Cape May's landings and 70% of its value (Table 20). Most are used for a wide variety of finfish species (56). Some are also used for scallops; Cape May has a long history of combined or alternating finfishing and scalloping. Squid is very important: In 1998 17% of Cape May's landed value came from *Illex* squid and another 22% from *Loligo* squid (Table 21). Much of the squid is processed locally as is Atlantic mackerel, caught with draggers and midwater pair trawls. Summer flounder has been a major species but regulations have severely reduced catches (4% landed value in 1998). Scup is another dragger-caught species of historic importance in Cape May; in 1998 it represented 6% of landed value. Cape May is also the home of one of the very few vessels allowed to use purse seines for bluefin tuna in U.S. waters; this vessel lands its catch in Gloucester, MA. The only purse seine landings in Cape May in 1998 were for menhaden, using smaller vessels. Fishing for large pelagics is also done with longlines and troll lines.

Although sea scallop management measures have reduced opportunities for many Cape May fishermen, scalloping remains important. In addition to scalloping with otter trawls, scallop dredges are used, accounting for 15% of the total value of Cape May's landings in 1998. Angler (monkfish) are caught with scallop dredges as well as gillnets, otter trawls, and scallop otter trawls (1.8% of landed value). Dogfish catches are now relatively small (0.3% of total landings in 1998).

Table 20. Landings by Gear Type, Cape May, NJ, 1998.

| GEAR TYPE: CAPE MAY, NJ | LBS. (%) | VALUE (%) |
|-------------------------|----------|-----------|
| Handline                | 0.0      | 0.0       |
| Longline, Pelagic       | 0.0      | 0.3       |
| Otter Trawl, Fish       | 68.9     | 61.9      |
| Otter Trawl, Scallop    | 0.5      | 7.7       |
| Troll Line, Tuna        | 0.0      | 0.0       |
| Gillnet, Sink           | 0.2      | 0.5       |
| Gillnet, Drift          | 0.1      | 0.1       |
| Purse Seine, Other      | 0.0      | 0.0       |
| Purse Seine, Menhaden   | 23.9     | 6.7       |

|                                |     |      |
|--------------------------------|-----|------|
| Dredge, Scallop                | 0.9 | 15.4 |
| Menhaden Trawl                 | 3.4 | 0.6  |
| Pots & Traps, fish             | 0.1 | 0.7  |
| Pots & Traps, Conch            | 0.1 | 0.4  |
| Pots & Traps, Lobster Offshore | 0.2 | 2.6  |
| Dredge, Crab                   | 0.1 | 0.3  |
| Dredge, SCOQ                   | 1.4 | 2.9  |
| Unknown                        | 0.0 | 0.0  |

Total Landings, rounded, 1998: 87,244,700 lbs.

Total Value, rounded, 1998: \$25,757,200 dollars

Table 21. Landings by Major Species, Cape May, NJ, 1998.

| MAJOR SPECIES: CAPE MAY, NJ | LBS. (%) | VALUE (%) |
|-----------------------------|----------|-----------|
| Atlantic Herring            | 2.9      | 1.0       |
| Summer Flounder             | 0.9      | 3.9       |
| Lobster                     | 0.2      | 2.5       |
| Atlantic Mackerel           | 20.9     | 8.2       |
| Menhaden                    | 24.1     | 6.8       |
| Sea Scallop                 | 1.1      | 21.9      |
| Scup                        | 1.7      | 6.1       |
| Squid, Illex                | 34.1     | 16.9      |
| Squid, Loligo               | 8.3      | 22.0      |
| surfclam                    | 1.4      | 2.9       |
| Black Sea Bass              | 0.4      | 2.2       |

Number of Species: 69

Other species of MAFMC interest, by percentage of total value, 1998: Bluefish (0.2), Butterfish (0.5), Smooth dogfish (0.0), Spiny dogfish (0.1), Tilefish (0.0).

#### Wildwood, New Jersey

The fishing port of Wildwood is connected to a very popular tourist beach community. Resident and migratory dragners and clam boats are found in Wildwood. The largest landings come from surfclams and ocean quahogs, both harvested offshore with hydraulic dredges. A processing factory is in Wildwood. The otter trawl fleet accounts for 7% of Wildwood's landings, bringing in summer flounder, Loligo squid, butterfish, Atlantic croaker, black sea bass, weakfish, and other species (Table 22). Wildwood also has a small pot fishery, including offshore lobster, conch, and fish pots (6% of value). The fish pots are used mainly for black sea bass. Gillnetting is done for weakfish, black sea bass, and other species. Wildwood also had some pelagic longline landings in 1998, notably swordfish and yellowfin tuna. Other species of Mid-Atlantic Fishery Management Council interest landed in 1998, in small quantities (less than 2% landed value) were bluefish, butterfish, Atlantic mackerel, scup, and dogfish.

Table 22. Landings by Gear Type, Wildwood, NJ, 1998.

| GEAR TYPE: WILDWOOD, NJ      | LBS. (%) | VALUE (%) |
|------------------------------|----------|-----------|
| Crab Dredge                  | 0.4      | 0.5       |
| surfclam/Ocean Quahog Dredge | 86.5     | 79.0      |
| Gillnet, Drift               | 1.9      | 0.8       |
| Gillnet, Sink                | 0.5      | 0.4       |
| Handline                     | 0.1      | 0.1       |
| Longline, Pelagic            | 0.9      | 3.9       |

|                                |     |     |
|--------------------------------|-----|-----|
| Pots & Traps, Offshore Lobster | 0.8 | 1.7 |
| Pots & Traps, Conch            | 0.5 | 2.0 |
| Pots & Traps, Fish             | 1.1 | 2.8 |
| Otter Trawl                    | 7.2 | 8.6 |
| Unknown                        | 0.0 | 0.1 |

Total Landings, rounded, 1998: 6,193,40  
Total Value, rounded, 1998: \$3,492,900 dollars

#### Other Cape May County

In the creeks and bays along the Atlantic coast of Cape May and around the cape to the Delaware Bay side are numerous small fisheries, coded as "other Cape May." These are the classic baymen or watermen fisheries, based on crustaceans and shellfish: blue crabs and hard clams dominate (66% and 23.5% of landed value, respectively). Horseshoe crabs are also harvested (12% of the 1998 poundage although only 1.6% of the value). There is a small gillnet fishery for species such as weakfish, American shad, and numerous other estuarine and anadromous species. Very small amounts of bluefish, butterfish, and summer flounder were landed in 1998 (Table 23). This fishery is very similar to and intertwined with the "Other Cumberland County" fishery discussed below.

Table 23. Landings by Gear Type, Other Cape May, 1998

| GEAR TYPE: OTHER CAPE MAY, NJ | LBS. (%) | VALUE (%) |
|-------------------------------|----------|-----------|
| By Hand                       | 17.9     | 23.6      |
| By Hand, Oyster               | 0.1      | 0.8       |
| Dredge, Crab                  | 1.1      | 0.7       |
| Gillnet, Drift                | 2.6      | 0.6       |
| Gillnet, sink                 | 0.0      | 0.0       |
| Handline                      | 0.5      | 0.5       |
| Longline, Pelagic             | 0.3      | 0.3       |
| Pots & Traps, Crab            | 74.8     | 65.3      |
| Pots & Traps, Eel             | 2.2      | 4.0       |
| Pots & Traps, Fish            | 0.0      | 0.0       |
| Rakes                         | 0.4      | 1.5       |

Total Landings, rounded, 1998: 1,190,800 lbs.  
Total Value, rounded, 1998: \$3,492,900 dollars

#### Other Cumberland County, NJ

The two big fisheries for this region, the center of New Jersey's Delaware Bay fisheries, are for oysters and blue crabs (Tables 24 and 25). 1998 was one of the few years in the past decade when oysters were harvested, due to problems with oyster diseases (there is no harvest in 2000 due to the disease 'dermo'). Oysters were taken with dredges, and represented 48% of the landed value. Blue crabs are caught with dredges and pots, and represented 46% of the value in 1998. Both horseshoe crabs and menhaden are also taken in large quantities (4.8% and 11.6% of poundage, respectively), and are the focus of controversy in this area due to their alleged roles for migratory birds and as bait for other fishes.

Table 24. Landings by Gear Type, Cumberland County, NJ, 1998

| Cumberland County Landings by Gear Type | Percent Lbs. | Percent Value |
|---|--------------|---------------|
| Handline                                | 0.9          | 0.6           |
| Gillnet, Sink                           | 2.6          | 0.9           |

|                       |      |      |
|-----------------------|------|------|
| Gillnet, Drift        | 5.3  | 1.4  |
| Pots/Traps, Eels      | 0.8  | 1.3  |
| By Hand               | 11.6 | 1.4  |
| Dredge, Oyster        | 15.8 | 48.0 |
| Dredge, Crab          | 2.4  | 1.5  |
| Pots/Traps, Blue Crab | 60.6 | 45.0 |

Total Landings, rounded, 1998: 4,444,900 lbs.

Total Value, rounded, 1998: \$5,573,300

Table 25. Landings by Major Species, Pounds and Value, Other Cumberland County, NJ, 1998

| Cumberland County, Major Species, 1998 | Percent Lbs. | Percent Value |
|--|--------------|---------------|
| Menhaden                               | 4.6          | 0.5           |
| Weakfish                               | 2.6          | 1.5           |
| Blue Crab                              | 62.9         | 46.4          |
| Horseshoe Crab                         | 11.6         | 1.4           |
| Oysters                                | 15.8         | 48            |

Total Species: 19, including MAFMC-managed Bluefish (0.0% value, 1998), Butterfish (0.0), and Summer Flounder (0.0).

### Delaware

The ports recognized as such by NMFS in Delaware are Lewes, Indian River, and Port Mahon in Sussex County and Bowers Beach and Mispillion in Kent County. Their commercial fisheries are almost entirely focused on blue crab, quahogs (hard clams), and horseshoe crabs. The only exception is Indian River, where there were also significant landings of black sea bass and tautog in 1998. This is the only port we visited. "Other Delaware" is a much larger category, including a wider variety of species. Accordingly, for this report we have combined all Delaware landings (Tables 26, 27, and 28). In 1998, Delaware commercial landings totaled almost 8 million pounds, of which 72% were blue crabs, 23% were horseshoe crabs and 6% weakfish. Other important species were striped bass, American shad, black sea bass, and quahogs.

The gear types used by Delaware fishermen are predominately those of "baymen" or "watermen" working the estuary, bay, and tributaries of the Delaware Bay and River, bordering New Jersey. They include:

- "by hand" (18% of lbs., 3% of value): harvesting horseshoe crabs as they come up onto the beaches to reproduce
- haul seines (<0.2% of value; used upriver for perch, gizzard shad, catfish, and similar freshwater and brackish water species; formerly of importance for shad and sturgeon as well)
- crab dredges (5.7% of value)
- fyke nets for fish and for turtles (mostly for snapper turtles; < 0.1% value)
- gillnets: both drift (4.4% of value) and stake (7.8% of value). Both types are used for weakfish (squeteague) and a large number of other estuarine and upriver species; stake nets are favored for American shad
- handlines (1.9%), mostly for weakfish
- Pots/traps: for lobsters (0.1%); this is a very minor and marginal fishery; this far south, only the offshore fishers have real luck with lobsters
- Pots/traps: for blue crabs (67.6%): the major fishery of Delaware. Much takes place in the Delaware Bay.
- Pots/traps: for conch (1.6%); for fish (3.6%). For fish traps, the most important species is black sea bass; another is the less well marketed "oyster catcher;"

-- Rakes: these, like the "tongs and grabs," are now used for quahogs, or hard clams (*Mercenaria mercenaria*); in times past they were also used for oysters.

Recreational fishing predominates in Delaware. A survey has not been done in many years, but the Sea Grant marine advisory agent estimated about 80 recreational marinas in the state. He said that probably 30 to 35 of the ones that are in the coastal bays are community marinas, i.e., open only to residents.

Table 26. Landings by County, Delaware, 1998

| PORT NAME        | COUNTY        | LANDED POUNDS | PERCENT POUNDS | VALUE     | PERCENT VALUE |
|------------------|---------------|---------------|----------------|-----------|---------------|
| OTHER KENT       | KENT          |               |                |           |               |
| BOWERS BEACH     | KENT          |               |                |           |               |
| MISPILLION       | KENT          |               |                |           |               |
|                  | KENT          | 2564104       | 32.9%          | 1,843,156 | 33%           |
| OTHER NEW CASTLE | NEW CASTLE    | 1577376       | 20.3%          | 1,466,011 | 26.2%         |
| OTHER DELAWARE   | NOT-SPECIFIED | 1900412       | 24.5%          | 1,137,546 | 20.3%         |
| PORT MAHON       | SUSSEX        |               |                |           |               |
| INDIAN RIVER     | SUSSEX        |               |                |           |               |
| OTHER SUSSEX     | SUSSEX        |               |                |           |               |
| LEWES            | SUSSEX        |               |                |           |               |
|                  | SUSSEX        | 1726646       | 22.1%          | 1145340   | 20.5%         |
| Total            |               | 7,768,538     | 100.00%        | 5,592,053 | 100.00%       |

Note: because landings for several ports are confidential, due to the small number of participants involved, we provide data at the county level only.

Table 27. Landings by Gear Type, 1998, Delaware

| GEAR TYPE: DELAWARE          | Lbs. % | Value % |
|------------------------------|--------|---------|
| Common Haul Seine            | 0.6    | 0.2     |
| Dredge, Crab                 | 10.0   | 5.7     |
| Fyke Net, Fish               | 0.0    | 0.0     |
| Fyke Net, Turtle             | 0.2    | 0.1     |
| Gillnet, Drift               | 6.1    | 4.4     |
| Gillnet, Stake               | 8.1    | 7.8     |
| Hand line                    | 2.0    | 1.9     |
| Pots/Traps, Lobster, Inshore | 0.0    | 0.1     |
| Pots/Traps, Blue Crabs       | 51.6   | 67.6    |
| Pots/Traps, Conch            | 0.6    | 1.6     |
| Pots/Traps, Fish             | 1.9    | 3.6     |
| Rakes, Other                 | 0.9    | 3.8     |
| By hand                      | 18.0   | 2.9     |
| Tongs & Grabs, Clam          | 0.0    | 0.1     |

Total Landings, rounded 1998: 7,768,500 lbs.  
 Total Value, rounded 1998: \$5,592,000 dollars

Table 28. Major Species, Delaware, 1998

| MAJOR SPECIES: DELAWARE | Lbs (%) | Value (%) |
|-------------------------|---------|-----------|
| Bass, Striped           | 4.4     | 4.4       |
| Crab, Blue              | 71.8    | 71.5      |
| Crab, Horseshoe         | 23.0    | 3.8       |
| Quahog                  | 3.9     | 3.9       |
| Shad, American          | 2.8     | 1.0       |
| Weakfish                | 6.0     | 6.0       |

Total Species Landed: 40

Other species of Mid-Atlantic Council responsibility (by percentage total value): Black Sea Bass (confidential), Bluefish (0.2%), Butterfish (0.0%), Summer Flounder (0.5%), Atlantic Mackerel (0.0%), Scup (0.0%), Dogfish (0.1).

Ocean City/West Ocean City, Maryland

Ocean City, on the Atlantic Coast, is the only major port in Maryland engaged in the inshore and EEZ ocean fisheries. It accounts for 18.1% of the pounds landed and only 9.5% of the value landed in 1998.

The major commercial fishing gears used for landings in Ocean City in 1998 (Table 29) were:  
 --gillnetting, heavily dependent on angler and spiny dogfish, but engaged in a very diversified fishery;  
 --surfclam and ocean quahogging, with small bycatches of angler and scallops;  
 --bottom dragging with otter trawls, a highly diversified fishery, with strong foci on summer flounder and loligo squid, but also landing 48 other species.

In terms of value, other gear types also emerge as important, namely fish traps and pelagic longlining. Traps are also used for lobster and conch.

Table 29. Landings by Gear Type, Ocean City, MD 1998.

| GEAR TYPE:<br>OCEAN CITY, MD | Lbs. % | Value % |
|------------------------------|--------|---------|
| By hand                      | 0.0    | 0.0     |
| Dredge, SCOQ                 | 56.3   | 55.8    |
| Gillnet, sink                | 28.1   | 13.7    |
| Handline                     | 0.0    | 0.0     |
| Harpoon                      | 0.0    | 0.0     |
| Longline, pelagic            | 2.1    | 11.1    |
| Pots, Lobster Offshore       | 0.1    | 0.7     |
| Pots/Traps, Conch            | 0.9    | 1.4     |
| Pots/Traps, Fish             | 2.9    | 7.4     |
| Otter Trawl, Bottom, Fish    | 9.5    | 9.9     |
| Unknown                      | 0.0    | 0       |

Total Landings, rounded, 1998: 11,073,123 lbs. (of state total)

Total Value, rounded, 1998: \$6,356,802 ( of state total)

The major species caught commercially in Ocean City (Table 30), ranked by 1998 landed value, are:

- surfclams and ocean quahogs
- black sea bass caught mostly with fish traps but also gillnets and draggers;
- angler, caught primarily with sink gillnets but also by the draggers and the clam boats;
- spiny dogfish, caught primarily by the gillnet fleet and also by draggers.



--summer flounder, mostly a dragger fishery  
 --swordfish, among the species caught with pelagic longlines from this port (tunas are also caught, and big eye and yellowfin tuna each represented over 2% of the total landed value in 1998).

Other species of significance (using the criterion of at least 2% of poundage or value) are:

- Atlantic croaker and Atlantic mackerel, each caught by draggers and gillnetters
- striped bass, also caught by draggers and gillnetters
- lobster, an offshore pot fishery.

Table 30. Major Species, Landed, Ocean City, MD, 1998.

| Major Species:<br>Ocean City, MD | Lbs (%) | Value (%) |
|----------------------------------|---------|-----------|
| Dogfish, Spiny                   | 21.6    | 5.6       |
| Angler                           | 3.8     | 6.0       |
| Clam, Surf                       | **      | **        |
| Quahog, Ocean                    | **      | **        |
| Sea Bass, Black                  | 2.8     | 7.1       |
| Flounder, Summer                 | 1.6     | 5.0       |
| Swordfish                        | 0.7     | 4.5       |
| Tuna, Big Eye                    | 0.5     | 2.7       |
| Tuna, Yellowfin                  | 0.5     | 2.3       |

Total Species Landed: 69

Note: \*\* indicates confidential data because fewer than 3 federally permitted dealers involved.  
 Other species landed of MAFMC relevance (by % value): Bluefish (0.3%), Butterfish (\*\*), Atlantic Mackerel (0.5%), Scup (\*\*), Tilefish (\*\*), Loligo Squid (0.8%), Illex Squid (\*\*).

Chesapeake Bay, Maryland and Virginia

Virtually all of the other fishing activity in Maryland centers on the Chesapeake Bay and its tributaries. It is based in numerous small and dispersed landing areas, and focuses on the classic bay fisheries with blue crabs and oysters taking the lead (Table 31). This is the home of the Chesapeake Bay "watermen." For all ports in Maryland excluding Ocean City, blue crabs represented 71.5% of the value and oysters 12.6% of the value. The only other sizeable fishery in 1998 was for striped bass (5.9% of the value), thanks to the recovery of that species after a long moratorium. True to the tradition of watermen and baymen in the Mid-Atlantic, the diversity of species caught is extremely high: 57 species, ranging from terrapin and snapper turtles, crappies, carp, bullheads, and alewives, to name a few of the brackish water and anadromous species, to soft clams, horseshoe crabs, eels, lobsters, sturgeons, sunfishes, and sharks.

Table 31 Major Species, Other Maryland Ports, 1998

| MAJOR SPECIES (>2%):<br>MARYLAND OTHER THAN<br>OCEAN CITY | Lbs (%) | Value (%) |
|---|---------|-----------|
| Bass, Striped   | 5.6     | 5.9       |
| Crabs, Blue   | 61.6    | 71.5      |
| Croaker, Atlantic   | 2.4     | 0.7       |
| Menhaden  | 8.9     | 0.7       |
| Oysters   | 4.9     | 12.6      |
| Gizzard Shad  | 3.5     | 0.9       |
| White Perch   | 2.9     | 1.5       |
| Soft Clam   | 0.4     | 2.1       |

|         |     |     |
|---------|-----|-----|
| Catfish | 4.7 | 1.6 |
|---------|-----|-----|

Total Species Landed: 57  
Total Landings, 1998: 50,094,300 lbs.  
Total Value, 1998: \$60,832,500

Species Relevant to MAFMC according to value in 1998: Bluefish (0.1%), Butterfish (0.0%), Summer Flounder (0.2%), Atlantic Mackerel (0.0%), Scup (0.0%), Black Sea Bass (0.0%), Smooth Dogfish (0.0%), Spiny Dogfish (0.0%).

The NMFS weighout data for the Maryland ports beyond Ocean City did not include much information on gear types; 94% of the value and over 85% of the poundage in 1998 was attributed to "unknown" gear types. Accordingly, we do not include information on gear types for Other Maryland ports. However, it is well known that crab pots, trot lines, oyster tongs and rakes, some oyster dredges, and fish pound nets are important gears, as well as fyke nets, seines, and gillnets.

The field portion of this study did not explore the many waterman communities of Maryland and Virginia because very small quantities are caught of the species of MAFMC concern. To verify this and learn more about the Chesapeake Bay fisheries of Maryland, we visited Crisfield and Cambridge, MD and interviewed Larry Simns, director of the Maryland Watermen's Association. About 6,000 watermen are represented by the Maryland Waterman's Association and about 3,500 of them actively use the organization's services.

According to Simns, Crisfield, Deal Island and Hooper's Island are most likely the places where significant catches of ocean species--trout [weakfish], flounder, croakers and possibly sea bass--are landed. (However, NMFS landings data also show that Chesapeake Bay watermen might bring in significant catches of ocean species to Smith Creek, Island Creek, Herring Creek, Flood Creek, Breton Bay and St. Patrick's Creek). He said that flounder and trout are not caught north of Tilghmans and added that ocean species are brought in on the Virginia side of the Potomac as well. A fish house in Coburn also deals in ocean products. Another informant at a packing house in Cambridge, MD, said that, in his opinion, the best place to go would be Crisfield, given its location on the bay at the southwestern-most corner of Maryland, and he suggested the two fish houses that researchers visited.

Virginia Beach/ Lynhaven, Virginia

Most of the commercial fishing activity in Virginia Beach occurs in the Lynhaven section, along Long Creek, which empties into Lynhaven Bay and eventually Chesapeake Bay. Two active federally permitted dealers in this port also operate as packing houses for two out-of-town dealers. In the past, there also was significant activity at Rudee Inlet on the Atlantic side of the city, but now there are only 3 or 4 commercial boats that work out of there.

The commercial fishery at Virginia Beach/Lynhaven is inlet-dependent and pressured by competition for waterfront from tourist-related development and recreational boaters and fishers. The major gear type used as reported to the NMFS is the sink gillnet, used to catch a large number of species including bluefish, striped bass, Atlantic croaker, summer flounder, shad, dogfish, weakfish and spot (Table 32). Drift and stake gillnets are also used, the latter for spiny dogfish and bluefish among other species. This is also a center of pot fishing, for blue crabs, eels, conchs (whelks) and fish. The fish catches were mainly black sea bass and tautog. Handlines accounted for 9% of the landed value in 1998, mostly from black sea bass and summer flounder catches, but also striped bass, tautog, tilefish, tunas, and others. Pound nets accounted for 3.3% of the value in 1998; species included striped bass, bluefish, butterfish, Atlantic croaker, summer flounder, Spanish mackerel, spot, and weakfish.

Table 32. Landings by Gear Type, Virginia Beach/Lynhaven, 1998

| GEAR TYPE: VIRGINIA<br>BEACH/LYNHAVEN | LBS. (%) | VALUE (%) |
|---------------------------------------|----------|-----------|
| By Hand                               | 0.0      | 0.0       |
| Common Seine, Haul Seine              | 0.7      | 0.7       |
| Dredge, conch                         | 0.3      | 0.9       |
| Dredge, Crab                          | 0.8      | 1.0       |
| Gillnet, Drift                        | 1.3      | 1.0       |
| Gillnet, Sink                         | 70.1     | 43.3      |
| Gillnet, Stake                        | 0.2      | 0.1       |
| Handline                              | 2.0      | 9.2       |
| Pots & Traps, Blue Crab               | 12.9     | 18.3      |
| Pots & Traps, Conch                   | 3.7      | 14.1      |
| Pots & Traps, Eel                     | 0.1      | 0.2       |
| Pots & Traps, Fish                    | 2.8      | 7.8       |
| Pound Net                             | 5.1      | 3.3       |
| Tongs & Grabs, Clam, Patent           | 0.0      | 0.0       |

Total Landings, rounded, 1998: 7,812,000 lbs.

Total Value, rounded, 1998: \$4,272,800 dollars

Note: "0.0" means some activity but less than .06%

By species blue crab represented the highest value (19%). Next was black sea bass, which comprised 16% of 1998 landed value, mostly from handlining and fish pots (Table 33). Gillnetting for dogfish is another very important fishery. Atlantic croaker and striped bass are significant catches from the gillnet, handline, and pound net fisheries, as is spot. Channeled whelk, caught in conch pots, made up 11% of value. The total number of species, though, is as always in this region very large: 65.

Table 33. Landings by Major Species, Virginia Beach/Lynhaven, 1998

| MAJOR SPECIES:<br>VIRGINIA BEACH/LYNHAVEN | LBS. (%) | VALUE (%) |
|---|----------|-----------|
| Striped Bass                              | 4.4      | 11.0      |
| Blue Crab                                 | 13.7     | 19.1      |
| Atlantic Croaker                          | **       | **        |
| Spiny Dogfish                             | **       | **        |
| Black Sea Bass                            | 4.2      | 15.6      |
| Spot                                      | 14.1     | 8.8       |
| Channeled Whelk                           | 2.8      | 11.2      |
| Conch                                     | 1.4      | 5.3       |
| Other Fish, Industrial                    | 2.2      | 0.3       |

Number of Species: 65

Note: \*\* indicates confidential data due to small number of businesses involved.

Other species of MAFMC interest by percentage value, 1998: Bluefish (0.7), Butterfish (0.7), Summer Flounder (0.3), Atlantic Mackerel (\*\*), Scup (\*\*), Dogfish, Other (0.3), Dogfish, Smooth (\*\*), Tilefish (\*\*), Loligo Squid (\*\*).

#### Newport News, Virginia

Sea scalloping is the principal fishery of Newport News, accounting for 72% of landed value in 1998. Scallopers use both dredges and bottom otter trawls (Table 34). Another fishery is finfish dragging (8.2% of value, 24.5% of landings) for a large variety of species. Summer flounder, angler, and black sea bass are landed in significant quantities (Table 35). Small scale inshore and bay fisheries are part of the waterman

complex. They include clamming (hard clams or quahogs) and oystering using dredges, patent tongs, tongs and rakes; drift and sink gillnetting; pot fishing and dredging for crabs (blue crabs were 28% of landings, 7% of value) and oysters; pot fishing for conch and eels and seining.

Table 34. Landings by Gear Type, Newport News, VA, 1998

| GEAR TYPES, NEWPORT NEWS     | LBS. (%) | VALUE (%) |
|------------------------------|----------|-----------|
| Common Seine, Haul Seine     | 0.0      | 0.0       |
| Dredge, Clam                 | 0.0      | 0.0       |
| Dredge, Crab                 | 1.4      | 0.4       |
| Dredge, Oyster               | 0.0      | 0.0       |
| Dredge, Sea Scallop          | 32.9     | 59.7      |
| Gillnet, Drift               | 0.0      | 0.0       |
| Gillnet, Sink                | 1.0      | 0.3       |
| Handline                     | 0.0      | 0.0       |
| Pots/Traps, Blue Crab        | 26.4     | 7.1       |
| Pots/Traps, Conch            | 0.0      | 0.0       |
| Pots/Traps, Eel              | 0.1      | 0.0       |
| Tongs/Grabs, Oyster          | 0.5      | 0.6       |
| Tongs/Grabs, Clam            | 2.4      | 6.0       |
| Otter Trawl, Bottom, Fish    | 26.4     | 10.3      |
| Otter Trawl, Bottom, Other   | 0.0      | 0.0       |
| Otter Trawl, Bottom, Scallop | 8.7      | 15.5      |

Total Landings, rounded, 1998: 5,742,500 lbs.  
 Total Value, rounded, 1998: \$15,945,700 dollars

Table 35. Landings by Major Species, Newport News, VA, 1998

| MAJOR SPECIES: NEWPORT NEWS, VA | LBS. (%) | VALUE (%) |
|---------------------------------|----------|-----------|
| Crab, Blue                      | 27.7     | 7.3       |
| Flounder, Summer                | 19.8     | 8.6       |
| Quahog                          | 2.4      | 6.1       |
| Scallop, Sea                    | 34.4     | 72.1      |
| Sea Bass, Black                 | 2.4      | 0.9       |
| Angler                          | 7.0      | 3.0       |

Number of Species: 59

Other species of MAFMC interest, by percentage value 1998: Bluefish (0.2), Butterfish (0.0), Scup (0.0), Smooth Dogfish (0.0), Tilefish (0.0), Loligo Squid (0.4).

#### Hampton and Seaford, Virginia

For purposes of discussing fishery landings and preserving confidentiality, we have combined weighout data for Hampton (within the Metropolitan Statistical Area depicted above) and Seaford (within York County, census and employment data for which are offered below). Gear-type data (Table 36) show that sea-scalloping with dredges is the single-most important fishery by value; otter trawl dragging for finfish is highest for poundage. Some draggers are also used for scalloping. Gillnetting, crab potting and dredging, seining, and tonging for clams are other techniques used in these two ports (Seaford is almost entirely devoted to scalloping, but scalloping is also important in Hampton).

Like Newport News, Hampton and Seaford are important sea scalloping ports near the mouth of

Chesapeake Bay. Scallops accounted for 69% of landed value in 1998. In Hampton, a significant portion of the scallops are caught with otter trawls rather than scallop dredges. The sea scallop fleet of Seaford relies entirely on dredges and accounts for virtually all of the landings and landed value there. Besides scallops these dredge-equipped vessels caught large amounts of angler as well as a small amount of summer flounder.

Finfish dragging is also important in Hampton. Species diversity is extremely high. The otter trawl fleet of Hampton takes *Illex* and *Loligo* squid, black sea bass (a substantial amount is also caught with handlines); Atlantic mackerel; Atlantic croaker (a large portion was caught by haul seines as well as pound nets and sink gillnets); and angler (although most was landed by scallop dredges and scallop otter trawls). A small amount of pelagic longlining is also done from Hampton, for black tip, mako shortfin and thresher sharks and tuna (big eye, yellowfin, albacore)

The inshore and bay fisheries of Hampton include the pound net and seine fisheries for Atlantic croaker, gillnetting and handlining, blue crabs, (caught with dredges, pots, and scrapes) and hard clams or quahogs (harvested with patent tongs and crabs). We have combined the weighout data for Hampton and Seaford to preserve the confidentiality of data for fisheries with few businesses involved. Species diversity in the landings at Hampton and Seaford is extremely high, 79 in 1998 (Table 37). Fourteen had either poundage or value at or above 2% in 1998, led by sea scallops, summer flounder, *Illex* squid, Atlantic croaker, blue crab, and angler.

Table 36. Landings by Gear Type, Hampton and Seaford, VA, 1998.

| GEAR TYPE: HAMPTON & SEAFORD | LBS (%) | VALUE (%) |
|------------------------------|---------|-----------|
| Common Seine, Haul Seine     | 4.6     | 0.7       |
| Dredge, Crab                 | 1.6     | 0.8       |
| Dredge, Scallop, Sea         | 16.6    | 57.2      |
| Gillnet, Drift               | 0.7     | 0.2       |
| Gillnet, Sink                | 8.2     | 2.1       |
| Handline                     | 0.3     | 0.2       |
| Longline, Pelagic            | 0.1     | 0.1       |
| Pots & Traps, Blue Crab      | 9.2     | 3.9       |
| Pots & Traps, conch          | 0.0     | 0.0       |
| Pots & Traps, Eel            | 0.0     | 0.0       |
| Pots & Traps, fish           | 0.0     | 0.0       |
| Scrapes                      | 0.0     | 0.0       |
| Tongs & Grabs, Clam, Patent  | 0.7     | 3.4       |
| Otter Trawl, Bottom, Fish    | 53.5    | 16.5      |
| Otter Trawl, Bottom, Scallop | 4.4     | 14.7      |
| Otter Trawl, Bottom, Shrimp  | 0.0     | 0.0       |
| Pound Nets                   | 0.0     | 0.0       |

Total Landings, rounded, 1998: 9,089,500 lbs.

Total Value, rounded, 1998: \$13,311,000 dollars

Table 37. Major Species Landed, Hampton and Seaford, VA, 1998.

| MAJOR SPECIES: HAMPTON & SEAFORD | LBS (%) | VALUE (%) |
|----------------------------------|---------|-----------|
| Angler                           | 3.6     | 3.1       |
| Crab, Blue                       | 10.8    | 4.7       |
| Croaker, Atlantic                | 13.2    | 2.1       |
| Flounder, Summer                 | 11.1    | 9.4       |

|                        |      |      |
|------------------------|------|------|
| Mackerel, Atlantic     | **   | **   |
| Scallop, Sea           | 17.3 | 68.8 |
| Sea Bass, Black        | 2.9  | 2.6  |
| Squid, Illex           | **   | **   |
| Squid, Loligo          | 3.2  | 0.9  |
| Other Fish, Industrial | 2.1  | 0.1  |
| Striped Bass           | 4.8  | 1.1  |
| Herring, NK            | **   | **   |
| Herring, Atlantic      | **   | **   |
| Quahog                 | 1.3  | 4.2  |

Number of Species: 79

Note: \*\* indicates confidential data due to small number of businesses involved.

Other species of MAFMC interest, by percentage value, 1998: Bluefish (0.4), Butterfish (0.1), Scup (0.1), Spiny Dogfish (0.0), Tilefish (0.0).

#### Other York County, Virginia

York County is on the southwestern side of the York River, not far from Hampton and from the mouth of the Chesapeake Bay, giving ready access to the ocean as well as the bay and its tributary rivers. Seaford is the major fishing port; its landings are discussed above, together with Hampton's. There are other waterman fisheries out of York County communities as well. The following fisheries information pertains to them.

York County (in which Seaford is located) is the site of a waterman fishery, over 5 million pounds landed in 1998, valued at over \$3 million. Crab pots accounted for 69% of that value and oyster and clam tongs and grabs another 12%. Other fisheries include gillnets for striped bass, Atlantic croaker and other species; seining (including striped bass and croaker); dredging and scraping for clams and crabs, and some oystering and handlining. Very small amounts of bluefish, butterfish, summer flounder, scup, black sea bass, and smooth and 'other' dogfish were landed and recorded in NMFS weighout data in 1998.

#### Northampton County, Virginia

Northampton County is at the southernmost tip of the Delmarva peninsula. Among its fishing ports are Oyster, inside the barrier islands of the Atlantic coast, and Cape Charles, at the entrance to the Chesapeake Bay, but most of the landings come from smaller sites coded as "Other Northampton" in NMFS weighout data. The fisheries are inshore and estuarine, dominated by blue crabs, Atlantic croaker, hard clams, and horseshoe crabs (Table 38). Weakfish/squeteague and striped bass are among the 45 other species landed commercially in this area of Virginia.

Reflecting the importance of blue crabs, the most important single gear-type is the blue crab pot (Table 39). Pots are also used for conch, eel, and fish (the 1998 catches of the fish pots were Atlantic croaker and northern puffer, the latter a most unusual specialty). Dredges are used for hard clams, conch, horseshoe crabs, and blue crabs. Scrapes are used for crabs and eels; clams are harvested with patent tongs and "by hand."

Pound nets are also important, both for crab and for fish. The fish pound nets catch Atlantic croakers, striped bass, summer flounder, weakfish and others, totaling 32 species. Otter trawl and "unknown" constitute the next largest gear types, totaling 8% of value; both were almost entirely horseshoe crab harvests in 1998. Gillnets are used for a large variety of species; drift gillnets for 30 species, including striped bass, Atlantic croaker, and spot; sink gillnets for 25 species, including American shad and weakfish. The NMFS dealer weighout data used for landings do not completely reflect the active, inshore

fishery of Virginia, which is recorded by the State of Virginia. On the other hand, they do indicate the variety of techniques and fisheries.

Table 38. Landings by Gear Type, Northampton County, VA, 1998

| GEAR TYPE:<br>NORTHAMPTON CO., VA | LBS (%) | VALUE (%) |
|-----------------------------------|---------|-----------|
| By Hand                           | 0.3     | 2.3       |
| By Hand, Oyster                   | 0.0     | 0.0       |
| Common, Haul Seine                | 0.0     | 0.0       |
| Dredge, Clam                      | 0.3     | 3.4       |
| Dredge, Conch                     | 0.1     | 0.3       |
| Dredge, Crab                      | 6.4     | 7.9       |
| Dredge, Other                     | 0.3     | 0.1       |
| Gillnet, Drift                    | 6.1     | 4.9       |
| Gillnet, Sink                     | 4.7     | 4.4       |
| Gillnet, Stake                    | 0.1     | 0.1       |
| Handline                          | 0.2     | 0.4       |
| Pots & Traps, Blue Crab           | 28.7    | 33.6      |
| Pots & Traps, Conch               | 0.4     | 1.6       |
| Pots & Traps, Eel                 | 0.0     | 0.0       |
| Pots & Traps, Fish                | 0.1     | 0.2       |
| Pound Net, Crabs                  | 0.2     | 0.6       |
| Pound Net, Fish                   | 24.0    | 14.7      |
| Scrapes                           | 0.0     | 0.1       |
| Tongs & Grabs, Clam, Patent       | 0.0     | 0.3       |
| Otter Trawl, Bottom, Fish         | 16.7    | 13.9      |
| "Unknown" (Horseshoe Crab)        | 11.4    | 11.1      |

Total Landings, rounded, 1998: 8,468,400 lbs.

Total Value, rounded, 1998: \$5,001,400 dollars

Note: "0.0" indicates some activity but less than 0.06%

Table 39. Landings by Major Species, Northampton County, VA, 1998

| MAJOR SPECIES:<br>NORTHAMPTON CO., VA | LBS. (%) | VALUE (%) |
|---------------------------------------|----------|-----------|
| Bass, Striped                         | 1.3      | 3.1       |
| Crab, Blue                            | 34.9     | 41.2      |
| Crab, Horseshoe                       | 28.2     | 25.2      |
| Croaker, Atlantic                     | 21.4     | 13.1      |
| Quahog                                | 0.5      | 2.9       |
| Spot                                  | 2.4      | 1.4       |
| Conch                                 | 0.8      | 2.9       |
| Clams, Bloodarc                       | 0.2      | 2.9       |
| Weakfish                              | 5.1      | 2.5       |

Number of Species: 49

Other species of MAFMC interest, by percentage value 1998: Bluefish (0.6), Butterfish (0.1).

The three main commercial ports in Northampton County are Cape Charles, Oyster, and Willis Wharf. Descriptions of these ports, courtesy of Jim Jenretto of Cape Charles (personal communication Feb. 6, 2000), are supplemented by field observations of Oyster.

Accomack County and Chincoteague, Virginia

The visiting otter trawl fishery accounts for almost half of Chincoteague's 1998 landed value; summer flounder predominates in this fishery and is the leading species for landed value (39%). Like other Mid-Atlantic otter trawl fleets, this one is highly diverse, landing 19 species in 1998, led by summer flounder, black sea bass, and Loligo squid. There is a small drift gillnet fishery for striped bass, Atlantic croaker and other species and a large sink gillnet fishery (27% of Chincoteague's value), mainly for angler, but also spiny dogfish, Atlantic mackerel, and other species. Angler was almost as valuable as fluke in 1998. Some handlining and longlining for tunas and sharks takes place, and in 1998 16% of the value came from fish pots, mainly black sea bass. Less than 5% of Chincoteague's fishing activity, in terms of value, came from clamming, crabbing and other estuarine and bay fisheries, which otherwise predominate in the Virginia and Maryland region.

Table 40 shows 1998 landings and value, broken down by percentage for gear type and major species, combining Chincoteague's landings with those of the many small waterman fisheries of Accomack County, as well as the port of Wachapreague. Seventy-two species were landed in 1998, primarily blue crabs. Crabs are caught with dredges, pots, scrapes, and trotlines. There is also oystering and hard-clamming. Angler and summer flounder, mainly from Chincoteague's gillnet and otter trawl fisheries, account for 2.2% and 3.8% of the county's total value. Striped bass, Atlantic croaker, and conch are other important species.

The major gear types are crab pots (52.2% of value) and conch and fish pots (4.9%); crab scrapes and dredges. Also important are gillnets (19.8% of value); otter trawls; and "by hand" referring to treading, hand rakes, and other techniques used to harvest hard clams, oysters and horseshoe crabs.

Table 40. Landings by Gear Type, Accomack County, VA, 1998

| GEAR TYPE: CHINCOTEAGUE & OTHER ACCOMACK CO, VA | LBS. % | VALUE % |
|---|--------|---------|
| By Hand   | 0.5    | 2.4     |
| By Hand, Oyster                                 | 0.0    | 0.0     |
| Dredge, clam                                    | 0.1    | 0.5     |
| Gillnet, Drift                                  | 15.0   | 7.9     |
| Gillnet, Sink                                   | 19.5   | 11.8    |
| Gillnet, Stake                                  | 0.1    | 0.1     |
| Handline  | 0.0    | 0.1     |
| Longline Pelagic                                | 0.0    | 0.0     |
| Pots & Traps, Blue Crab                         | 45.9   | 52.2    |
| Pots & Traps, Conch                             | 1.5    | 3.1     |
| Pots & Traps, Fish                              | 1.2    | 1.8     |
| Rakes, Other                                    | 0.0    | 0.1     |
| Trawl, Otter, Bottom, Fish                      | 3.3    | 4.4     |
| Cast Nets                                       | 0.1    | 0.1     |
| Seines  | 0.7    | 0.3     |
| Dredge, Conch                                   | 1.9    | 1.5     |
| Dredge, Crab                                    | 4.4    | 4.3     |
| Dredge, Oyster                                  | 0.1    | 0.3     |
| Pots & Traps, Eel                               | 0.0    | 0.0     |
| Pound Net, Crab                                 | 0.1    | 0.3     |
| Pound Net, Fish                                 | 3.2    | 0.8     |
| Scrapes   | 2.1    | 7.3     |
| Tongs & Grabs, Patent                           | 0.1    | 0.7     |
| Trot Line                                       | 0.1    | 0.1     |



Total Landings, rounded, 1998: 11,077,100 lbs.  
 Total Value, rounded, 1998: \$8,485,000 dollars

Table 40. Landings by Major Species, Accomack County, VA, 1998

| MAJOR SPECIES: ACCOMACK CO, VA | LBS. (%) | VALUE(%) |
|--------------------------------|----------|----------|
| Crab, Blue                     | 52.2     | 63.9     |
| Flounder, Summer               | 2.4      | 3.8      |
| Angler                         | **       | **       |
| Bass, Striped                  | 1.5      | 2.7      |
| Croaker, Atlantic              | **       | **       |
| Dogfish, Spiny                 | **       | **       |
| Quahog                         | 0.6      | 3.4      |
| Horseshoe Crab                 | 2.5      | 1.5      |
| Conch                          | 1.6      | 3.3      |
| Menhaden                       | 2.8      | 0.3      |
| Spot                           | 8.2      | 4.1      |

Number of Species: 72

Note: \*\* indicates confidential data due to the small number of businesses involved.

Other Species of MAFMC interest, by percentage value, 1998: Bluefish (0.5), Butterfish (0.1), Atlantic Mackerel (0.1), Scup (0.0), Black Sea Bass (1.7), Tilefish (\*\*), Loligo Squid (\*\*).

Carteret County, North Carolina (includes fishing centers of Morehead City, Beaufort, Bettie, Harker's Island, Davis, Stacy, Sea Level, Atlantic, Cedar Island)

Carteret County has the largest fishery in terms of poundage and second largest in terms of value in North Carolina (Table 41). Total 1998 landings were over 80 million lbs, but value was little more than 21 million lbs., largely due to the low value of species such as menhaden and thread herring caught by purse seining. Other important fisheries were crab potting, shrimp trawling, fluke trawling, hard-clamming, and the use of pound nets, sink gillnets, longlines, and other gears for a large variety of finfishes (the total number of species landed was 69) (Tables 41 and 42).

Table 41. Landings by Gear Type, Carteret County, North Carolina, 1998

| GEAR TYPE               | LBS. % | VALUE % |
|-------------------------|--------|---------|
| Beach seine             | 0.0%   | 0.0%    |
| By hand                 | 0.1%   | 2.0%    |
| Cast net                | 0.1%   | 0.0%    |
| Channel net             | 0.1%   | 0.5%    |
| Clam dredge (hydraulic) | 0.0%   | 0.7%    |
| Clam trawl, kicking     | 0.1%   | 2.2%    |
| Common seine            | 0.0%   | 0.0%    |
| Crab pot                | 6.0%   | 13.4%   |
| Crab trawl              | 0.6%   | 1.4%    |
| Fish pot                | 0.0%   | 0.2%    |
| Flounder trawl          | 2.4%   | 9.1%    |
| Flynet                  | 0.6%   | 0.7%    |
| Gigs                    | 0.0%   | 0.1%    |
| Gillnet (drift)         | 0.1%   | 0.1%    |
| Gillnet (runaround)     | 0.5%   | 1.1%    |
| Gillnet set (float)     | 0.4%   | 1.1%    |

|                         |       |       |
|-------------------------|-------|-------|
| Gillnet set (sink)      | 3.7%  | 5.4%  |
| Haul seine              | 1.7%  | 2.9%  |
| Longline bottom         | 0.0%  | 0.1%  |
| Longline surface        | 0.1%  | 0.9%  |
| Other (including conf.) | 78.7% | 22.8% |
| Oyster dredge           | 0.0%  | 0.1%  |
| Peeler pot              | 0.0%  | 0.1%  |
| Pound net               | 1.0%  | 5.5%  |
| Purse seine             | 0.0%  | 0.0%  |
| Rakes bull              | 0.0%  | 0.5%  |
| Rakes hand              | 0.2%  | 3.8%  |
| Rod-n-reel              | 0.8%  | 5.0%  |
| Scallop dredge (bay)    | 0.1%  | 1.1%  |
| Scallop dredge (sea)    | 0.0%  | 0.0%  |
| Scallop scoop           | 0.0%  | 0.0%  |
| Scallop trawl           | 0.0%  | 0.0%  |
| Shrimp trawl            | 2.4%  | 16.7% |
| Skimmer trawl           | 0.1%  | 1.1%  |
| Swipe net               | 0.0%  | 0.0%  |
| Tongs, hand             | 0.0%  | 0.8%  |
| Trolling                | 0.1%  | 0.4%  |

Total landings, rounded, 1998: 80,417,400 lbs.

Total value, rounded, 1998: 21,332,100 dollars

Table 42. Landings by Major Species, Carteret County, NC, 1998

| MAJOR SPECIES >2%         | LBS. % | VALUE % |
|---------------------------|--------|---------|
| Unclassified shrimp       | 1.9%   | 16.7%   |
| Crabs, blue, hard         | 7.1%   | 15.4%   |
| Croaker, Atlantic         | 2.7%   | 3.0%    |
| Flounders, fluke          | 2.0%   | 14.0%   |
| Other (including conf.)   | 78.7%  | 22.8%   |
| Spot                      | 1.5%   | 2.4%    |
| Weakfish (seatrout, grey) | 1.6%   | 2.8%    |
| Clam, hard (meats)        | 0.4%   | 9.2%    |
| Groupers                  | 0.2%   | 1.9%    |

Number of species: 69

Both estuarine and offshore fisheries are found in Carteret County, reflected, for example, in the fact that gear-types included both sea scallop dredges and bay scallop dredges. Table 43 shows the high diversity of the fisheries of Carteret County by listing the species landed per each gear-type. This table also gives some idea of the large variety of fishing technologies used in North Carolina.

Table 43. Fishing Gears and Species Landed, Carteret County, NC, 1998. (\* = major part of catch)

Seines, Cast Nets, Pound Nets, Etc.

*Beach seines:* Bluefish, kingfishes (sea mullet), mullets\*, pompano, spotted sea trout, Atlantic spadefish, spot.

*Common Seines:* spot.

*Haul Seines:* Bluefish, butterfish, cobia, hard blue crab, Atlantic croaker, Atlantic cutlassfish, black drum, red drum, flounders (fluke), harvestfish, hickory shad, kingfishes (sea mullet)\*, Spanish mackerel,

Atlantic menhaden\*, mullets, pigfish, pompano, spotted sea trout, sheepshead, Atlantic spadefish, spot\*, swellfishes (puffers), weakfish.\*

*Swipe nets:* Bluefish, black drum, red drum, kingfishes (sea mullet), mullets\*, spotted seatrout\*, sheepshead, swellfishes (puffers), weakfish.

*Purse Seines:* Thread herring, Atlantic menhaden.

*Cast nets:* Shrimp, Spanish mackerel, Atlantic menhaden\*, mullets, unclassified fish.

*Channel nets:* mullet, harvestfish, blue hard crab, shrimp.\*

*Pound Nets:* Bluefish, butterfish\*, carp, catfishes, cobia, hard blue crabs, Atlantic croaker, Atlantic cutlassfish, black drum, red drum, flounders (fluke)\*, harvestfish, hickory shad, jacks, kingfishes (sea mullet), Spanish mackerel, Atlantic menhaden\*, mullets, white perch, pigfish, pompano, spotted seatrout, sheepshead, skippers, Atlantic spadefish, spot, striped bass, swellfishes (puffers), unclassified (industrial/bait), unclassified, weakfish, whelks/conchs.

#### Pots

*Crab pots:* blue crabs, stone crabs.

*Peeler pots:* blue crabs (hard, peeler\*, soft).

*Fish pots:* Amberjacks, bluefish, Atlantic croaker, dolphinfish, groupers, grunts, hakes, hogfish, octopus, pigfish, porgies, sea basses\*, snappers, tilefish, triggerfish, unclassified fish.

#### gillnets

*Drift Gillnet:* Bluefish\*, butterfish, Atlantic croaker, black drum, red drum, flounders (fluke), harvestfish, kingfishes (sea mullet), king mackerel, Spanish mackerel, Atlantic menhaden, mullets\*, pigfish, pompano, spotted seatrout, sharks, sharks (dogfish), sheepshead, Atlantic spadefish, spot, unclassified, weakfish.

*Run-Around Gillnet:* Bluefish, bonito, butterfish, cobia, Atlantic croaker, black drum, red drum, flounders (fluke), harvestfish, hickory shad, kingfishes (sea mullet), Spanish mackerel, Atlantic menhaden, mullets\*, white perch, pigfish, pompano, spotted sea trout\*, sharks (dogfish), sheepshead, spot, unclassified, weakfish.

*Set Gillnet (Float):* Bluefish \*, butterfish, carp, catfishes, hard blue crab, stone crabs, Atlantic croaker, black drum, red drum\*, flounders (fluke)\*, harvestfish, hickory shad, kingfishes (sea mullet), Spanish mackerel, Atlantic menhaden, mullets\*, pigfish, pompano, spotted sea trout, American shad, sharks, sheepshead, skippers, Atlantic spadefish, spot\*, striped bass, swellfishes (puffers), unclassified, weakfish, whelks/conchs.

*Set Gillnet (Sink):* Amberjacks, anglerfish, bluefish\*, bonito, butterfish, catfishes, cobia, blue hard crabs, stone crabs, Atlantic croaker\*, black drum, red drum, flounders (fluke), harvestfish, hickory shad, kingfishes (sea mullet), king mackerel, Spanish mackerel, Atlantic menhaden, mullets\*, octopus, white perch, pigfish, pompano, porgies, sea basses, spotted seatrout, American shad, sharks, sharks (dogfish)\*, sheepshead, skippers, Atlantic spadefish, spot\*, striped bass, tuna, unclassified, weakfish\*.

#### Hook and Line Techniques:

*Longline–Bottom:* Dolphinfish, groupers, sea basses, sharks\*, swordfish\*, tuna, wahoo.

*Longline–Surface:* Cobia, dolphinfish, groupers, king mackerel, sharks\*, swordfish\*, triggerfish, tuna\*, wahoo.

*Rod-n-Reel:* Amberjacks\*, bluefish, bonito, cobia, Atlantic croaker, Atlantic cutlassfish, dolphinfish, black drum, red drum, flounders (fluke), groupers\*, grunts, hakes, hogfish, jacks, kingfishes (sea mullet), king mackerel\*, Spanish mackerel, octopus, yellow perch, pigfish, pompano, porgies\*, scup, sea basses\*, spotted seatrout, sharks, snappers\*, Atlantic spadefish, spot, swellfishes (puffers), tilefish, triggerfish\*, tuna, unclassified, wahoo, weakfish.

*Trolling:* Amberjacks, bluefish, bonito, cobia, dolphinfish, flounders (fluke), groupers, grunts, jacks, king mackerel\*, Spanish mackerel, porgies, sea basses, sharks, skippers, snappers, swordfish, tilefish, triggerfish, tuna, unclassified, wahoo, weakfish.

#### Trawls/Drag Nets

*Shrimp Trawl:* Rock shrimp, shrimp\*, bluefish, butterfish, cobia, hard blue crabs\*, peeler blue crabs, soft blue crabs, Atlantic croaker, Atlantic cutlassfish, black drum, flounders (fluke), harvestfish, kingfishes (sea mullet), king mackerel, Spanish mackerel, pigfish, pompano, spotted seatrout, sheepshead, Atlantic spadefish, spot, squid, swellfishes (puffers), triggerfish, unclassified, weakfish, whelks/conchs.

*Skimmer Trawl:* Shrimp\*, hard blue crabs, peeler blue crabs, flounders (fluke), harvestfish, kingfishes (sea mullet)\*, king mackerel, Spanish mackerel, pigfish, pompano, spotted seatrout, sheepshead, Atlantic spadefish, spot\*, squid, swellfishes (puffers), triggerfish, unclassified, weakfish, whelks/conchs.

*Flounder trawl:* Anglerfish, bluefish, butterfish, Atlantic croaker\*, black drum, flounders (fluke)\*, flounders (other), harvestfish, kingfishes (sea mullet), porgies, sea basses, sharks, sheepshead, spot, squid, striped bass, swellfishes (puffers), unclassified fish, weakfish, whelks/conchs.

*Crab trawls:* blue crabs\*, shrimp, anglerfish, bluefish, catfish, Atlantic croaker, black drum, red drum, flounders (fluke), kingfishes (sea mullet), spot, swellfishes (puffers), unclassified fish, unclassified shellfish, weakfish, whelks/conchs

*Flynet:* Anglerfish, bluefish, butterfish, Atlantic croaker\*, flounders (fluke), thread herring, kingfishes (sea mullet), sea basses, spot, squid, striped bass\*, swellfishes (puffers), unclassified fish, weakfish\*.

Shellfish Rakes, Dredges, and by Hand

*By Hand:* hard clam\*, blue hard crab, stone crab, fluke, oysters\*, bay scallop, unclassified shellfish.

*Hand tongs:* Oysters.\*

*Scallop Dredge--Bay:* Bay scallops\*, whelks/conchs

*Scallop Dredge--Sea:* Anglerfish, sea scallops\*, sea basses

*Scallop Scoop:* Bay scallops\*

*Scallop Trawl:* Sea scallops\*

*Bull rakes:* hard clam\*, unclassified, whelks/conchs

*Hand rakes:* hard clam\*, flounders (fluke), kingfishes (sea mullet), oyster, bay scallop, sheepshead, spot, unclassified, whelks/conchs

*Oyster dredge:* oysters

Other

*Gigs (fish spears):* bluefish, hard clam, stone crabs, Atlantic croaker, black drum, red drum, flounders (fluke)\*, mullets, spotted sea trout, sheepshead, spot.

Hyde County, North Carolina

Hyde County (pop. 5,411 in 1990) although small in population (reportedly there is only one traffic light in the county) is the third largest fishing county of North Carolina, with total landings over 16 million lbs. and value over 10 million dollars in 1998 (Tables 44, 45). Fishing centers include Swan Quarter, Engelhard and Ocracoke. Blue crabs and fluke are the two most important species in terms of value; dogfish, and Atlantic croaker are also significant, and 56 other species are caught. Gears used are the full array of estuarine and inshore techniques, particularly crab pots and trawls, sink and float set gillnets, shrimp trawls, pound nets, and flounder trawls.

Table 44. Landings by Gear Type, Hyde County, NC, 1998

| GEAR TYPE           | LBS. % | VALUE % |
|---------------------|--------|---------|
| By hand             | 0.0%   | 0.0%    |
| Cast net            | 0.0%   | 0.0%    |
| Crab pot            | 63.0%  | 58.4%   |
| Crab trawl          | 4.4%   | 3.8%    |
| Fish pot            | 0.0%   | 0.0%    |
| Flounders trawl     | 1.9%   | 5.0%    |
| Fly net             | 0.3%   | 0.6%    |
| Gillnet (runaround) | 0.4%   | 0.3%    |
| Gillnet set (float) | 2.2%   | 2.9%    |

|                         |       |       |
|-------------------------|-------|-------|
| Gillnet set (sink)      | 17.8% | 12.5% |
| Haul seine              | 0.0%  | 0.0%  |
| Longline bottom         | 0.0%  | 0.0%  |
| Longline shark          | 0.0%  | 0.0%  |
| Other (including conf.) | 5.7%  | 3.2%  |
| Oyster dredge           | 0.1%  | 0.9%  |
| Peeler pot              | 0.0%  | 0.0%  |
| Pound net               | 1.5%  | 3.6%  |
| Rakes bull              | 0.0%  | 0.0%  |
| Rakes hand              | 0.0%  | 0.0%  |
| Rod-n-reel              | 0.0%  | 0.0%  |
| Shrimp trawl            | 2.5%  | 8.5%  |
| Swipe net               | 0.0%  | 0.0%  |
| Tongs, hand             | 0.0%  | 0.0%  |
| Trolling                | 0.2%  | 0.4%  |

Total landings, rounded, 1998: 16,079,800 lbs.

Total value, rounded, 1998: 10,921,600 dollars

Table 45. Landings by Major Species, Hyde County, NC, 1998

| MAJOR SPECIES >2%       | LBS. % | VALUE % |
|-------------------------|--------|---------|
| Unclassified shrimp     | 2.3%   | 8.2%    |
| Crabs, blue, hard       | 66.2%  | 58.5%   |
| Croaker, Atlantic       | 8.3%   | 4.1%    |
| Flounder, fluke         | 5.9%   | 16.0%   |
| Other (including conf.) | 5.7%   | 3.2%    |
| Sharks, dogfish         | 3.8%   | 0.8%    |

Number of species: 62

#### Dare County, North Carolina

Dare County (pop. 22,746, 1990) saw over 36.6 million pounds and 23.5 million dollars from fish and shellfish (and turtle) landings in 1998, the second highest county in the state in terms of pounds and first in terms of dollars (Tables 46 and 47). Fishing centers include Wanchese, Hatteras, and Mann's Harbor. Fluke (15%) was second to crabs (40%) in terms of value, but a much wider range of products were significant than in other North Carolina counties, because of the importance of ocean as well as estuarine fisheries. These included bluefish, dogfish, squid, weakfish, anglerfish, king mackerel, sharks, and tuna. The fisheries range from estuarine fisheries (crab pots, pound nets, turtle pots, fyke nets, etc.) to offshore longlining.

Table 46. Landings by Gear Type, Dare County, NC, 1998

| GEAR TYPE      | LBS. % | VALUE % |
|----------------|--------|---------|
| Beach seine    | 1.5%   | 1.3%    |
| By hand        | 0.0%   | 0.0%    |
| Cast net       | 0.1%   | 0.0%    |
| Crab pot       | 30.6%  | 33.0%   |
| Crab trawl     | 0.6%   | 0.5%    |
| Eel pot        | 0.0%   | 0.1%    |
| Fish pot       | 0.1%   | 0.2%    |
| Flounder trawl | 3.3%   | 7.5%    |
| Flynet         | 13.2%  | 7.7%    |
| Fyke net       | 0.0%   | 0.0%    |

|                         |       |       |
|-------------------------|-------|-------|
| Gigs                    | 0.0%  | 0.0%  |
| Gillnet (runaround)     | 1.0%  | 1.0%  |
| Gillnet set (float)     | 0.7%  | 0.8%  |
| Gillnet set (sink)      | 36.4% | 22.5% |
| Haul seine              | 0.7%  | 0.5%  |
| Longline bottom         | 0.0%  | 0.0%  |
| Longline shark          | 1.5%  | 0.8%  |
| Longline surface        | 2.7%  | 5.8%  |
| Other (including conf.) | 0.6%  | 0.4%  |
| Oyster dredge           | 0.0%  | 0.0%  |
| Peeler pot              | 1.1%  | 5.6%  |
| Pound net               | 2.1%  | 3.4%  |
| Rakes bull              | 0.0%  | 0.0%  |
| Rakes hand              | 0.0%  | 0.0%  |
| Rod-n-reel              | 0.6%  | 1.4%  |
| Shrimp trawl            | 0.4%  | 1.2%  |
| Trolling                | 2.8%  | 6.1%  |
| Turtle pot              | 0.0%  | 0.0%  |

Total landings, rounded, 1998: 36,625,800 lbs.

Total value, rounded, 1998: 23,511,500 dollars

Table 47. Landings by Major Species, Dare County, NC, 1998

| MAJOR SPECIES >2%         | LBS. % | VALUE % |
|---------------------------|--------|---------|
| Anglerfish (goosefish)    | 1.8%   | 1.9%    |
| Bluefish                  | 6.4%   | 2.6%    |
| Crabs, blue, hard         | 30.1%  | 27.8%   |
| Croaker, Atlantic         | 18.9%  | 9.4%    |
| Flounders, fluke          | 5.2%   | 15.0%   |
| Mackerel, king            | 2.0%   | 4.7%    |
| Sharks                    | 2.7%   | 1.4%    |
| Sharks, dogfish           | 10.9%  | 2.3%    |
| Squid                     | 2.4%   | 2.0%    |
| Tuna                      | 2.6%   | 5.2%    |
| Weakfish (seatrout, grey) | 4.7%   | 3.9%    |
| Crabs, blue peeler        | 0.7%   | 2.2%    |
| Crabs, blue, soft         | 1.6%   | 9.2%    |

Number of species: 69

Wanchese, North Carolina (adapted from Wilson and McCay 1998)

A central fact about fishing in Wanchese is the large number of commercially important species caught. Many respondents interviewed in 1998 emphasized how they have to be versatile to survive, particularly because they face quick changes in water temperatures and other conditions affecting fish availability. They suggest that Wanchese is much more of a mixed fishery than in the north where people can fish the same species year round. Because of the weather, summer is the time that the tunas and swordfish are accessible to the medium sized boats that can both gillnet and longline, and late summer is a slow time for everything else. A captain of one of these medium size boats, however, said that he would prefer to stick with shark fishing year round because of the danger of going for tuna and swordfish farther off shore. They gillnet for dogfish, bluefish, Spanish mackerel, trout, and croakers. The latter two are important in the winter and Spanish mackerel is important in the spring and fall. They bottom fish for bass and grouper. There are a number of gillnet boats that switch over to charter fishing in the summer. Large trawl boats fish for squid in

the summer and a smorgasbord of weakfish, croaker, and flounder in the winter. Squid requires them to travel north. There are now less than fifteen of these trawl boats that stay at Wanchese.

The combination of this shifting multispecies fishery and management leads to a complaint voiced by nearly every Wanchese fisher and fish dealer talked to in 1998. Wanchese fishers are used to jumping from species to species, but management causes everyone to jump at the same time. As one respondent put it "this may be good for a specific species at a specific time but it is not good for the whole system." The price of the fish dives when fishers have to shift their effort all to the same species. Some marginal fishers get driven out when these shifts happen. A respondent associated this observation with the fact that there used to be 7-8 Black fishers, and now there are only two. This effect is especially felt when the fishing is good. Another respondent, a fish dealer, said "We had a tremendous amount of fish this winter, one of the busiest winters in a long time. The price of fish was cheaper all winter because everyone was fishing on the same thing. [My] personal trawlers scalloped and floundered. When floundering closed, we had to flynet, fishing for the same fish as gillnetters in small boats. We caught a lot, but got nothing for it. I have 350,000 lbs of croakers left, that were caught in March, frozen."

The closeness of the kinship and other historical networks in the community allows for flexible cooperation that matches the flexibility of the fishery. For example, one fish house provides freight for all the houses on a flexible, contingency basis. Another house has two tractor trailers and if that house has less than 10,000 lbs one day they take their freight on the first house's trucks. Another uses this service when he has under 5,000 lbs, because he has one small truck. The house that provides the freight service used to have seven trucks, however, now they have four.

#### Other North Carolina Counties

Halifax County, up the Roanoke River, had a small beach seine fishery in 1998, which caught mostly spot but also species such as bluefish, butterfish, Atlantic croaker, red drum, fluke, harvestfish, kingfishes, Spanish mackerel, Atlantic menhaden, mullets, pompano, spotted seatrout, sharks, sheepshead, weakfish. In 1990 no one declared fishing as an occupation in the census.

Columbus County, between Brunswick and Bladen Counties and on the Cape Fear River, had a small fishery, mainly oysters but also small amounts of spot, shad, fluke, bluefish, and crabs. It was valued at less than \$70,000 in 1998. Techniques include crab pots, gillnets, gigs, and "by hand." The 1990 census showed no fishers as occupational types.

#### Other North Carolina Locations

This section further describes the general characteristics of fishing activities in North Carolina. The descriptive information that follows is excerpted and paraphrased from a report prepared by Griffith (1996) and is based on visits to fishing centers around the state, surveys, and in depth-interviews.

The information presented in this section is based on the following visited locations: Swan Quarter, Englehard, Rose Bay, Germantown, and Ocracoke in Hyde County; Belhaven and Aurora in Beaufort County; Hatteras, Wanchese, and Alligator River in Dare County; Atlantic, Stacey, Beaufort, and Salter Path in Carteret County; Vandamere and Paradise in Pamlico County; Sneads Ferry, and Hampstead in Oslow County; and Varnumtown in Brunswick County.

The following are the seven most notable general characteristics of fishing activities in North Carolina according to Griffith (1996).

"First, most obviously, the busiest fishing season for almost all sites visited begins in the spring and lasts through summer, with December through February being relatively quiet in most locations. Exceptions to this are the fisheries of the Outer Banks, which tend to be net-based and to target winter species. Second,

despite the fact that we find a number of extremely large vessels in the state, crews on most vessels tend to be small (<45'). Most crews consist of between one and three fishermen and many interviewed fishermen fish alone. The menhaden fishery, of course, is an exception to this (Garrite-Blake 1995). Third, relatively few sites we visited specialize in only one species, one type of gear, or one type of vessel. Crab pots and shrimp or otter trawls rank high among the principal gears used in the state, but others tend to be found in use alongside these either by the same fishermen or by others using the same docking and other facilities. Fourth, few full-time, owner-operator North Carolina fishermen rely on a single species or single gear for their livelihood, and many operate from more than one vessel; indeed, this diversity and flexibility constitutes one of the central defining characteristics of a full-time fishermen in North Carolina. Small crew sizes, especially those based on family and community relations, are adaptive under these conditions, where shifting among fishing gears and locations does not depend on mobilizing large numbers of crewmen. Fifth, this diversity and flexibility has some implications for managing the fisheries of the state. Although fishermen tend to be defined by the *primary* species they target and gear they use to capture those species, such as shrimpers using otter trawls or crabbers using crab pots, North Carolina fishermen become more alike one another, often, in the *secondary* species they target and, in particular, the gears they use for those species. Sixth, North Carolina fisheries are highly localized. Those sites with access to both inland and off-shore waters, such as fishermen based in Wanchese or the Outer Banks or Carteret County, have more options available to them to switch among fisheries and even between recreational and commercial sectors (such as operating as charter boat fishermen) than fishermen based along the Pamlico River or Albemarle Sound. Some fishermen, recognizing the advantages to these different locations, dock boats at more than one location or utilize more than one launching facility. However, several fishermen we interviewed had little or no idea about the character of fisheries fewer than fifty to sixty miles away. Seventh, regional differences occur among the fisheries as we move from North to South, yet are more pronounced as we move from East to West. For example, those fishermen who fish in the Albemarle Sound are more like fishermen of the Pamlico River than they are like those who operate out of Wanchese. Urban and rural distinctions also figure into these differences, fishing strategies of around the Nags Head/Manteo are more similar to Morehead City and Wilmington fishing strategies than they are toward those of Eastern Dare further down the Outer Banks. Finally, with the exception of crab processing plants, most shore sites are staffed by relatively few people on land; most of the work of off-loading, icing, and other handling of the catch is done by fishermen."

Regarding the present aspects of the fishery in the area, it was found that "North Carolina's principal fisheries have changed considerably through time, yet certain historical continuities thread through the fishing lifestyles we find on the coast from prehistoric and colonial times to the present." Some families in the Tidewater area (Hyde County) still depend on combining commercial crabbing, eeling, gillnet fishing, trapping, hunting, and hiring out as guides to hunters and sportfishermen. Individuals around the upper reaches of the Albemarle Sound still string together seasonal work in the herring fishery, hunting, logging, and from time to time, farming. "Two of the earliest fisheries in North Carolina provided an organizational template for fisheries that continue, in altered form, today. The early herring fisheries on the Chowan River and the Albemarle Sound were highly capitalized fisheries in which harvesting and processing were as tightly integrated as today's menhaden fishery."

Due to the lack of a license for sampling purposes, saltwater recreational fishing in North Carolina is hard to track and monitor. In order to assess recreational and other non-commercial (e.g. subsistence) fishermen, a structured interview with 178 individuals in these fisheries was conducted in order to address this lack of information. Interviewed fishermen were overwhelmingly white males (95%) between 21 to 79 years of age (average of 48 years). Twenty-five percent were between 20 to 41 years of age, 25% were between 40 to 48 years of age, 25% were between 47 to 59 years of age, and the remaining 25% were over 59 years of age. The majority (89%) were North Carolina residents; only 7% had not finished high school, and over 60% had some training or education after high school. About 77% were married at the time of the interview, with 11% never having married and the remainder either divorced/separated (7%) or widowed (4%). About 42% lived in households with more than two children, and only 13% were retired. Influenced by the sampling methodology, 41% of the interviewed fishermen fish most frequently from manmade structure, 34% from



private boats, 19% from the beach or bank, and the remainder from other places such as charter boats or a combination of the previous fishing modes. About 79% of those interviewed primarily fish in state waters (rivers, sounds, or less than 3 miles from shore), with 13% fishing more than 3 miles from shore, and the majority (83%) rarely fishing in freshwater. "Anglers interviewed fish from one to 330 days per year. Average fishing effort is around 42 days/year, which would be 80% of the weekend, yet this varies widely within the sample. When they do fish, although slightly more than a third of the population has no target species (35%), the most commonly sought species include: King mackerel, flounder, trout, spot, bluefish, and Spanish mackerel. They catch these species, of course, primarily with hook and line...around one third eat 100% of their catch and 3% eat none of their catch. Around three-fourths give their catch away (usually half what they catch), and under 10% sell their catch. Boat ownership is relatively common among those interviewed, with 58.4% reporting that they owned boats."

Regarding fishermen carrying passengers for hire, "charter boat captains occupy a position between recreational and commercial fishermen and, in fact, often move between winter commercial fishing and running charter during the summer. A few we interviewed for this study come from long family traditions of fishing, both commercially and as recreational boat captains, and maintain strong social links with commercial fishing centers in the state. Of course, nearly all of their business as charter boat operators occurs during the summer months and most of their clients are tourists, but charter boat captains reported fishing heavily into the fall and beginning in the late spring."

South Atlantic Region

The following descriptive information of the socioeconomic characteristics of fishing communities in the South Atlantic Region that follows is excerpted from SAFMC (1999). It is important to mention that while this section does not describe the relative importance of bluefish to each port, the relative contribution of bluefish to the total landed exvessel value of all finfish and shellfish is the South Atlantic Region (as in the rest of the Atlantic coast) is minor, with 0.00% in South Carolina and Georgia, 0.12% in Florida, and 1.03% in North Carolina (Table 4).

The South Atlantic Council used data from the National Oceanic and Atmospheric Administrations publication *Fisheries of the United States* (1996) and the United States Census and Bureau of Economic Research, which include economic information for many areas of the U.S. Among the various statistics listed are commercial landings of major U.S. ports. These ports could be considered to be substantially dependent upon fishing. Table 48 lists the major ports for the South Atlantic in 1996 and 1995 for quantity and value of landings. Some ports are listed as individual communities while others are a combination of several communities over a limited geographical range. This characterization may be useful to further delineate fishing communities in each state.

Table 48. Quantity, Value and Rank of Commercial Landings for South Atlantic Ports among Major U.S. Ports. Source: Fisheries of the United States, 1996.

| Port                           | 1995<br>Quantity* | 1995<br>Rank | 1995<br>Value* | 1995<br>Rank | 1996<br>Quantity* | 1996<br>Rank | 1996<br>Value* | 1996<br>Rank |
|--------------------------------|-------------------|--------------|----------------|--------------|-------------------|--------------|----------------|--------------|
| Key West                       | 23.4              | 32           | 66.7           | 5            | 23.7              | 37           | 62.8           | 4            |
| Beaufort-Morehead City,<br>NC  | 87.0              | 16           | 35.0           | 15           | 75.4              | 18           | 20.3           | 34           |
| Wanchese-Stumpy Point,<br>NC   | 39.0              | 25           | 25.0           | 24           | 43.4              | 24           | 24.6           | 27           |
| Charleston-Mt. Pleasant,<br>SC | 11                | 58           | 19             | 32           | ---               | --           | ---            | --           |
| Cape Canaveral, FL             | 10.1              | --           | 16.9           | 35           | 21.2              | 43           | 17.7           | 42           |
| Darien-Bellville, GA           | ---               | --           | 11.0           | 50           | ---               | --           | ---            | --           |
| Beaufort, SC                   | ---               | --           | 11.0           | 51           | ---               | --           | ---            | --           |
| Englehard-Swanquarter,         | 11.0              | 58           | ---            | --           | 15.0              | 50           | ---            | --           |

|                         |     |    |      |    |      |    |      |    |
|-------------------------|-----|----|------|----|------|----|------|----|
| NC                      |     |    |      |    |      |    |      |    |
| Oriental-Vandamere, NC  | 9.0 | -- | 10.0 | -- | 14.0 | 53 | 13.3 | 50 |
| Belhaven-Washington, NC | --- | -- | 6.0  | -- | ---  | -- | 11.5 | 58 |

\*Value and quantity are in millions of dollars and pounds, respectively.

### North Carolina

The 1990 Census of Population and Housing provides the following information for North Carolina regarding individuals who reported their occupation as fisher in Table 49. This data will likely include those individuals who commercially fish fresh water areas and others who are not impacted by fisheries management of marine fisheries at the council level. This information does provide data for comparison and could help set parameters for a measure of dependency upon fishing. It is not recommended that these figures be used to determine dependency upon fishing, however. The 1990 Census classifies year-round full-time workers as all persons 16 years old and over who usually worked 35 hours or more per week for 50 to 52 weeks in 1989.

Table 49. Number of Fishers and Mean Annual Income for North Carolina in 1990. Source: U.S. Bureau of the Census.

|                         | Year Round/Full Time | Other  | Total  |
|-------------------------|----------------------|--------|--------|
| Number of fishers       |                      |        |        |
| Male                    | 989                  | 1,271  | 2,260  |
| Female                  | 47                   | 105    | 152    |
| Total                   | 1,036                | 1,376  | 2,412  |
| Mean Annual Income (\$) |                      |        |        |
| Male                    | 16,315               | 13,069 | 14,489 |
| Female                  | 11,518               | 4,489  | 6,662  |
| Total                   | 16,097               | 12,414 | 13,996 |

The 1990 Census also provides the following information for North Carolina regarding individuals who reported their occupation as captain of a fishing vessel in Table 50. It is interesting to note that there were no females listed as captain of fishing vessels. This concurs with the much of the research on the occupation of fishing which finds very few women in this role. Although women often play an important role in the fishing operation, they are rarely in the position of captain of fishing vessels.

Table 50. Number of Captains of Fishing Vessels and other officers and Mean Annual Income for North Carolina in 1990. Source: U.S. Bureau of the Census.

|                         | Year Round/Full Time | Other  | Total  |
|-------------------------|----------------------|--------|--------|
| Number of Captains      |                      |        |        |
| Male                    | 102                  | 141    | 243    |
| Female                  | 0                    | 0      | 0      |
| Total                   | 102                  | 141    | 243    |
| Mean Annual Income (\$) |                      |        |        |
| Male                    | 26,917               | 33,640 | 30,818 |
| Female                  | 0                    | 0      | 0      |
| Total                   | 26,917               | 33,640 | 30,818 |

Johnson and Orbach (1996) have divided North Carolina into six areas for their research on effort management of North Carolina commercial fisheries. Those areas were determined to be distinct with regard to species/gear combinations in addition to sociological, ecological and environmental differences. The areas defined are as follows:

- ◆ Albemarle Area - Currituck, Camden, Pasquotank, Perquimans, Chowan, Bertie, Washington, and Tyrrell Counties.
- ◆ Dare County
- ◆ Southern Area - Brunswick, Pender, New Hanover, and Onslow Counties
- ◆ Pamlico Area - Craven, Pamlico, Beaufort, and Hyde Counties.
- ◆ Carteret County
- ◆ Inland Counties.

Albemarle Area

The Albemarle area includes the following counties: Currituck, Camden, Pasquotank, Perquimans, Chowan, Bertie, Washington and Tyrrell. The personal income due to fishing for each county in the Albemarle Area is presented in Table 51. Johnson and Orbach (1997) found that commercial fishermen in this area had two primary gear types, pots and gillnets. They also concluded that fishermen here move in and out of gillnetting on an annual basis.

Table 51. Population and Economic Information for Counties included in the Albemarle Area. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| Albemarle Area |   |         |         |         |
|----------------|---|---------|---------|---------|
| County         |   | 1993    | 1994    | 1995    |
| Bertie         | Population                                | 20,631  | 20,665  | 20,745  |
|                | Personal Income (Thousands of \$)         | 291,226 | 303,292 | 328,227 |
|                | Per Capita Pers Income (\$)               | 14,116  | 14,677  | 15,822  |
|                | Personal Income Fishing (Thousands of \$) | 71      | 75      | 84      |
| Camden         | Population                                | 6,211   | 6,370   | 6,399   |
|                | Personal Income (Thousands of \$)         | 92,875  | 100,012 | 105,636 |
|                | Per Capita Pers Income (\$)               | 14,953  | 15,700  | 16,508  |
|                | Personal Income Fishing (Thousands of \$) | 0       | 0       | 0       |
| Chowan         | Population                                | 13,815  | 13,909  | 13,958  |
|                | Personal Income (Thousands of \$)         | 226,563 | 234,453 | 247,428 |
|                | Per Capita Pers Income (\$)               | 16,400  | 16,856  | 17,727  |
|                | Personal Income Fishing (Thousands of \$) | 128     | 134     | 151     |
| Currituck      | Population                                | 15,215  | 15,831  | 16,285  |
|                | Personal Income (Thousands of \$)         | 251,885 | 269,871 | 291,055 |
|                | Per Capita Pers Income (\$)               | 16,555  | 17,047  | 17,873  |
|                | Personal Income Fishing (Thousands of \$) | 358     | 376     | 423     |
| Pasquotank     | Population                                | 33,220  | 33,488  | 33,759  |
|                | Personal Income (Thousands of \$)         | 510,623 | 534,860 | 574,433 |
|                | Per Capita Pers Income (\$)               | 15,371  | 15,972  | 17,016  |
|                | Personal Income Fishing (Thousands of \$) | ----    | ----    | ----    |
| Perquimans     | Population                                | 10,644  | 10,692  | 10,737  |
|                | Personal Income (Thousands of \$)         | 148,365 | 162,627 | 160,912 |
|                | Per Capita Pers Income (\$)               | 13,939  | 15,210  | 14,987  |
|                | Personal Income Fishing (Thousands of \$) | ----    | 0       | ----    |
| Tyrrell        | Population                                | 3,918   | 3,875   | 3,846   |
|                | Personal Income (Thousands of \$)         | 56,056  | 58,138  | 52,738  |
|                | Per Capita Pers Income (\$)               | 14,307  | 15,003  | 13,712  |
|                | Personal Income Fishing (Thousands of \$) | 476     | 500     | 562     |
| Washington     | Population                                | 14,136  | 14,276  | 14,138  |
|                | Personal Income (Thousands of \$)         | 220,429 | 229,038 | 238,124 |
|                | Per Capita Pers Income (\$)               | 15,593  | 16,044  | 16,843  |
|                | Personal Income Fishing (Thousands of \$) | 225     | 236     | 266     |

Using multidimensional scaling, Johnson and Orbach were able to examine the spatial relationship of various types of fishing in each area. For the Albemarle Area, crab potting was the most central fishery. In other words most fishermen in the area do some crab potting. Referring to cliques, they found that for this area fishermen who peeler pot, eel pot, crab pot and gillnet flounder differ from those that long haul. Fishermen that long haul will crab pot and gillnet flounder but do not engage in peeler pots or eel pots.

In examining the categories which would include fishermen for the Albemarle Area (Table 52) there seems to be no trend regarding either those in Farm/Fish/Forest occupations or the Agriculture, Fishing, Mining Industries. There are both increases and decreases in the number of those within each categories from 1970 to 1990 which varies by county.

Table 52. Number within Farm/Fish/Forest Occupation and Agriculture, Fishing, Mining Industry for North Carolina Coastal Counties included in the Albemarle Area for 1970, 1980, and 1990 Census. Source: MARFIN Sociodemographic Database.

| County            | Occupation/Industry  | 1970 | 1980 | 1990 |
|-------------------|----------------------|------|------|------|
| Bertie County     | Farm/Fish/Forest     | 923  | 1035 | 839  |
|                   | Agri.,Fishing,Mining | 1050 | 1038 | 884  |
| Camden County     | Farm/Fish/Forest     | 203  | 220  | 114  |
|                   | Agri.,Fishing,Mining | 220  | 181  | 137  |
| Chatham County    | Farm/Fish/Forest     | 740  | 904  | 832  |
|                   | Agri.,Fishing,Mining | 927  | 934  | 1286 |
| Currituck County  | Farm/Fish/Forest     | 194  | 247  | 316  |
|                   | Agri.,Fishing,Mining | 215  | 296  | 309  |
| Pasquotank County | Farm/Fish/Forest     | 444  | 491  | 469  |
|                   | Agri.,Fishing,Mining | 552  | 478  | 508  |
| Perquimans County | Farm/Fish/Forest     | 417  | 513  | 299  |
|                   | Agri.,Fishing,Mining | 445  | 524  | 316  |
| Tyrrell County    | Farm/Fish/Forest     | 197  | 249  | 208  |
|                   | Agri.,Fishing,Mining | 225  | 273  | 233  |
| Washington County | Farm/Fish/Forest     | 408  | 511  | 551  |
|                   | Agri.,Fishing,Mining | 462  | 557  | 526  |

Dare County, NC

Within Dare county the following communities have been described through recent research of the snapper grouper fishery and might be considered fishing communities: Manns Harbor, Manteo, Wanchese, Hatteras, Stumpy Point (Iverson 1997). Johnson and Orbach (1997) found that commercial fishermen in this area had two primary gear types, pots and gillnets. In their analysis of fishery networks for the Dare County Area they again found crab pots to be central. Another interesting difference revealed was that fishermen who shrimp trawl in this area will gillnet for sharks but do not engage in crab potting.

Dare County shows a higher personal income from fishing over the three years listed (Table 53) than most other coastal counties in North Carolina.

Table 53. Population and Economic Information for Counties included in the Dare County Area. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| Dare County Area |                                   |         |         |         |
|------------------|-----------------------------------|---------|---------|---------|
| County           |                                   | 1993    | 1994    | 1995    |
| Dare             |                                   |         |         |         |
|                  | Population                        | 24,300  | 25,106  | 26,074  |
|                  | Personal Income (Thousands of \$) | 429,564 | 465,011 | 502,474 |
|                  | Per Capita Pers Income (\$)       | 17,678  | 18,522  | 19,271  |

|  |   |       |       |       |
|--|---|-------|-------|-------|
|  | Personal Income Fishing (Thousands of \$) | 5,426 | 5,688 | 6,392 |
|--|---|-------|-------|-------|

Dare County (Table 54) shows a general increase in the number of individuals in the listed occupations and industries over the twenty years from 1970 to 1990.

Table 54. Number within Farm/Fish/Forest Occupation and Agriculture, Fishing, Mining Industry for Dare County for 1970, 1980, and 1990 Census. Source: MARFIN Sociodemographic Database.

| County      | Occupation/Industry  | 1970 | 1980 | 1990 |
|-------------|----------------------|------|------|------|
| Dare County | Farm/Fish/Forest     | 11   | 376  | 637  |
|             | Agri.,Fishing,Mining | 181  | 446  | 655  |

Most of the snapper grouper permit holders in the Dare County Area work out of Hatteras and only a small portion of their annual commercial fishing activity is devoted to targeting snapper grouper species. Black sea bass, snowy grouper, and blueline tilefish are the most frequently targeted species by commercial snapper grouper fishermen from this area. Surface longlining for tuna and swordfish is apparently the most productive and profitable style of commercial fishing in the area, and the small towns of Manteo and Wanchese serve as refuge for a large number of both local and non-local longlining boats (Iverson 1997).

#### Southern Area, NC

The Southern Area includes the following counties and communities (in parenthesis): Brunswick (Southport). Pender, New Hanover, Onslow (Sneads Ferry). The personal income from fishing for each county in the Southern Area is presented in Table 55. Johnson and Orbach (1997) found that commercial fishermen in this area had four primary gear types: hook-and-line, gillnet, hand harvest of shellfish, and trawling. Pot fishing was classified as secondary gear but they report that increasing usage over time could possibly make it a primary gear. It is interesting to note that they also reported that pot fishing showed an increase in all five areas over time. The Southern Area showed much more complexity in annual rounds of fishing than the Albemarle Area or Dare County Area with shrimp trawling, hand clamming and crab potting all central to the network (Johnson and Orbach 1997).

Table 55. Population and Economic Information for Counties included in the Southern Area. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| Southern Area |   |           |           |           |
|---------------|---|-----------|-----------|-----------|
| County        |   | 1993      | 1994      | 1995      |
| Brunswick     | Population                                | 56,350    | 58,386    | 60,697    |
|               | Personal Income (Thousands of \$)         | 878,453   | 941,247   | 1,024,954 |
|               | Per Capita Pers Income (\$)               | 15,589    | 16,121    | 16,886    |
|               | Personal Income Fishing (Thousands of \$) | 1,595     | 1,674     | 1,885     |
| Pender        | Population                                | 32,554    | 33,894    | 33,759    |
|               | Personal Income (Thousands of \$)         | 510,623   | 534,860   | 574,433   |
|               | Per Capita Pers Income (\$)               | 15,681    | 16,341    | 17,253    |
|               | Personal Income Fishing (Thousands of \$) | ----      | ----      | ----      |
| New Hanover   | Population                                | 131,091   | 135,317   | 139,906   |
|               | Personal Income (Thousands of \$)         | 2,620,539 | 2,800,024 | 3,036,665 |
|               | Per Capita Pers Income (\$)               | 19,990    | 20,692    | 21,705    |
|               | Personal Income Fishing (Thousands of \$) | ----      | ----      | 693       |

|        |   |           |           |           |
|--------|---|-----------|-----------|-----------|
| Onslow |   |           |           |           |
|        | Population                                | 145,638   | 144,951   | 144,259   |
|        | Personal Income (Thousands of \$)         | 1,962,312 | 2,030,075 | 2,149,074 |
|        | Per Capita Pers Income (\$)               | 13,474    | 14,005    | 14,897    |
|        | Personal Income Fishing (Thousands of \$) | 667       | 700       | 787       |

Counties included in the Southern Area (Table 56) show a general increase in numbers of individuals within the selected occupations and industries, with the exception of Pender County which shows a decline from 1970-1990.

Table 56. Number within Farm/Fish/Forest Occupation and Agriculture, Fishing, Mining Industry for North Carolina Coastal Counties included in the Southern Area for 1970, 1980, and 1990 Census. Source: MARFIN Sociodemographic Database.

| County             | Occupation/Industry  | 1970 | 1980 | 1990 |
|--------------------|----------------------|------|------|------|
| Brunswick County   | Farm/Fish/Forest     | 370  | 668  | 1028 |
|                    | Agri.,Fishing,Mining | 505  | 645  | 971  |
| Pender County      | Farm/Fish/Forest     | 772  | 562  | 627  |
|                    | Agri.,Fishing,Mining | 892  | 669  | 690  |
| New Hanover County | Farm/Fish/Forest     | 289  | 550  | 782  |
|                    | Agri.,Fishing,Mining | 564  | 615  | 984  |
| Onslow County      | Farm/Fish/Forest     | 754  | 869  | 996  |
|                    | Agri.,Fishing,Mining | 906  | 800  | 987  |

For the Southern Area, the small community of Sneads Ferry, is unique in that the majority of the commercial reef fishermen fish with sea bass pots. According to the 1993 federal permit list for the South Atlantic region, there were 58 permit holders who indicated that sea bass pots were their primary gear type. Of those, 13 permit holders worked out of Sneads Ferry (Iverson 1997). Overall, 72% of fishermen using sea bass pots as their primary gear work out of home ports in North Carolina.

#### Pamlico Area, NC

The Pamlico area includes these counties and communities (in parenthesis): Craven, Pamlico (Vandamere, Oriental), Beaufort (Belhaven, Washington), Hyde (Ocracoke, Swanquarter, Englehard). The personal income due to fishing for each county in the Pamlico Area is presented in Table 57. Johnson and Orbach (1997) found that commercial fishermen in this area had three primary gear types, pots, gillnets, and trawls. In terms of annual fishing rounds the Pamlico Area is the simplest to understand where two strategies are employed: gillnetting and crab potting or trawling and crab potting. They go on to note that this simple strategy may signify few choices for fishermen in this area in the case of environmental or regulatory change (Johnson and Orbach 1997). Possible fishing communities within the Pamlico Area might be: Vandamere and Oriental.

Table 57. Population and Economic Information for Counties included in the Pamlico Area. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| Pamlico Area |   |           |           |           |
|--------------|---|-----------|-----------|-----------|
| County       |   | 1993      | 1994      | 1995      |
| Craven       |   |           |           |           |
|              | Population                                | 83,595    | 83,851    | 85,163    |
|              | Personal Income (Thousands of \$)         | 1,450,296 | 1,508,353 | 1,626,657 |
|              | Per Capita Pers Income (\$)               | 17,349    | 17,988    | 19,101    |
|              | Personal Income Fishing (Thousands of \$) | 386       | 405       | ---       |
| Pamlico      |   |           |           |           |
|              | Population                                | 11,772    | 11,948    | 12,064    |

|          |   |         |         |         |
|----------|---|---------|---------|---------|
|          | Personal Income (Thousands of \$)         | 179,384 | 186,131 | 199,576 |
|          | Per Capita Pers Income (\$)               | 15,238  | 15,578  | 16,543  |
|          | Personal Income Fishing (Thousands of \$) | 2,714   | 2,851   | 3,211   |
| Beaufort | Population                                | 43,446  | 43,815  | 43,998  |
|          | Personal Income (Thousands of \$)         | 674,788 | 711,961 | 756,048 |
|          | Per Capita Pers Income (\$)               | 15,532  | 16,249  | 17,184  |
|          | Personal Income Fishing (Thousands of \$) | 1,339   | 1,406   | 1,580   |
| Hyde     | Population                                | 5,374   | 5,339   | 5,362   |
|          | Personal Income (Thousands of \$)         | 80,982  | 90,101  | 80,300  |
|          | Per Capita Pers Income (\$)               | 15,069  | 16,876  | 14,976  |
|          | Personal Income Fishing (Thousands of \$) | 1,860   | 1,973   | 2,215   |

Pamlico county had the highest personal income from fishing for the Pamlico Area from 1993 to 1995 with a steady increase over those three years (Table 57). Hyde county followed with Beaufort next; both showing an increase over time. For most counties in the Pamlico Area (Table 58) the general trend seems to be an increase from 1970 to 1980 and then a decrease from 1980 to 1990 within these occupation and industry categories. Beaufort County shows an overall decrease from 1970-1990.

Table 58. Number within Farm/Fish/Forest Occupation and Agriculture, Fishing, Mining Industry for North Carolina Coastal Counties included in the Pamlico Area for 1970, 1980, and 1990 Census. Source: MARFIN Sociodemographic Database.

| County          | Occupation/Industry  | 1970 | 1980 | 1990 |
|-----------------|----------------------|------|------|------|
| Craven County   | Farm/Fish/Forest     | 873  | 1136 | 832  |
|                 | Agri.,Fishing,Mining | 1129 | 1222 | 860  |
| Pamlico County  | Farm/Fish/Forest     | 245  | 498  | 442  |
|                 | Agri.,Fishing,Mining | 502  | 662  | 477  |
| Beaufort County | Farm/Fish/Forest     | 1452 | 1393 | 1024 |
|                 | Agri.,Fishing,Mining | 2169 | 2123 | 1190 |
| Hyde County     | Farm/Fish/Forest     | 295  | 509  | 454  |
|                 | Agri.,Fishing,Mining | 442  | 579  | 511  |

#### Carteret County, NC

In the Carteret County Area Johnson and Orbach (1997) found that commercial fishermen had three primary gear types, gillnets, trawls and hand harvest of shell fish. In terms of annual fishing rounds the Carteret County Area did not show the clear gear stratification found in other areas. Shrimp trawling is the most central fishery, but pound netting, crab potting, and mechanized clamming also occur with shrimp trawling. (Johnson and Orbach 1997). Possible fishing communities within the Carteret County Area: Morehead City and Beaufort.

Among North Carolina's coastal counties, Carteret county was second to Dare county (Table 59) in terms of personal income from fishing. In addition, Carteret County (Table 60) shows an marked increase from 1970 to 1980, then a decrease from 1980 to 1990, within the occupations of Farm/Fish/Forest and an overall increase in the number of Agriculture, Fishing and Mining industries.

Table 59. Population and Economic Information for Counties included in the Carteret County Area. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| Carteret County Area |  |      |      |      |
|----------------------|--|------|------|------|
| County               |  | 1993 | 1994 | 1995 |
|                      |  |      |      |      |

|          |   |         |         |           |
|----------|---|---------|---------|-----------|
| Carteret |   |         |         |           |
|          | Population                                | 55,747  | 56,381  | 57,690    |
|          | Personal Income (Thousands of \$)         | 935,032 | 985,484 | 1,076,753 |
|          | Per Capita Pers Income (\$)               | 16,773  | 17,479  | 18,664    |
|          | Personal Income Fishing (Thousands of \$) | 2,783   | 2,871   | 3,207     |

Table 60. Number within Farm/Fish/Forest Occupation and Agriculture, Fishing, Mining Industry for Carteret County (the Carteret County Area) for 1970, 1980, and 1990 Census. Source: MARFIN Sociodemographic Database.

| County          | Occupation/Industry  | 1970 | 1980 | 1990 |
|-----------------|----------------------|------|------|------|
| Carteret County | Farm/Fish/Forest     | 225  | 1200 | 1158 |
|                 | Agri.,Fishing,Mining | 731  | 1234 | 1260 |

In a recent report on the importance of commercial fishing in Carteret county, Diaby (1997) found that Carteret county ranked first in poundage (96,652,314 lb) and second in dockside value (\$20,618,486) in terms of commercial landings for North Carolina coastal counties. Finfish represented 91% of total landings and 46% of total ex-vessel value. The most important species of finfish were: menhaden, flounder, croaker, weakfish and spot. Shellfish and crustaceans accounted for only 9% of all commercial landings but, represented over half of the value of landings during the period from 1974-1994.

Employment by the commercial fishing industry, both full and part time for Carteret county was estimated to be 3,232 people for 1994 (Diaby 1997). This number varies from those reported in the census data and emphasizes the problems in comparing these types of data. Since 1981 there have been about 105 to 140 licensed seafood dealers in Carteret county. The value of processed seafood peaked for the county in 1981 when scallops accounted for almost half of the value with a total value of \$19,737,126. Since that time there has been a general decline in total value of processed seafood attributable to a decline in scallop landings. Menhaden was the most important single processed product over a fifteen year period from 1980 to 1994 (Diaby 1997).

In estimating the economic impact of Carteret county commercial harvesting sector Diaby (1997) estimated \$27 million in sales of goods and services and \$11.66 million in value added. Total employment from commercial harvesting activities was estimated to be 3,371.

Sales of goods and services for the wholesaling and processing sector were estimated at \$19 million, with \$11 million in value added. There were an estimated 1,563 full and part time jobs created earning \$6.55 million in wages (Diaby 1997).

Overall, the activities of the commercial fishing industry created \$46 million in sales of goods and services and \$24 million in value added. There were 4,934 full and part time jobs which earned \$14 million in wages (Diaby 1997).

The recreational fishery spent approximately \$70 million on fishing trips in Carteret county with \$25.23 million in employ compensation and \$47.61 in value added. There were 1,821 full and part time jobs associated with the recreational fishing industry in Carteret County.

The total impact of the coastal fishing industry on the economy of Carteret County was estimated to be \$120.74 million with \$71.32 million in value added. The total number of full and part time jobs was estimated at 6,755 with earnings of \$38.94 (Diaby 1997).

The Morehead City/Beaufort area is located approximately 50 miles south of Ocracoke in Carteret County. This area is known for its sportfishing activity including several major tournaments each year. There is a small population of full time commercial reef fishermen in Morehead, however the majority of fishermen



holding commercial permits are primarily part timers. Many of these fishermen divide their time between charter fishing during the peak tourist season (April through September) and commercial fishing in the winter months. Full time fishermen in this area reported fishing approximately 50 miles straight offshore and fishing from Hatteras to as far south as the South Carolina/Georgia line. Trip lengths vary with the size of the vessel, but the average trip length is 7 days and the larger boats carried up to 3 crew members (Iverson 1997).

The king mackerel fishery in North Carolina has grown steadily since 1980 and has leveled with catches repeatedly around one million pounds in recent years. From 1986 to 1990 the number of permits for Atlantic group king mackerel issued in North Carolina ranged from a low of 325 in 1987/88 to a high of 533 in 1989/90. Again, the majority of those permits were granted to hook and line fishermen. Present data indicates there were 448 commercial vessels permitted for king and Spanish mackerel in North Carolina (Vondruska 1997).

### South Carolina

The 1990 Census of Population and Housing provides the following information for South Carolina regarding individuals who reported their occupation as fisher in Table 61. A total of 401 individuals claimed fisher as their occupational title with less than half indicating it was a year round full time employment. There were few females who indicated such and they had a far lower mean annual income than males in this occupation.

Table 61. Number of Fishers and Mean Annual Income for South Carolina Fishers in 1990. Source: U.S. Bureau of the Census.

|                         | Year Round/Full Time | Other  | Total  |
|-------------------------|----------------------|--------|--------|
| Number of fishers       |                      |        |        |
| Male                    | 188                  | 193    | 381    |
| Female                  | 6                    | 14     | 20     |
| Total                   | 194                  | 207    | 401    |
| Mean Annual Income (\$) |                      |        |        |
| Male                    | 28,842               | 14,489 | 18,946 |
| Female                  | 750                  | 5,000  | 2,403  |
| Total                   | 23,710               | 14,269 | 18,390 |

There were a total of 69 individuals who indicated their occupation as captain of a fishing vessel in the 1990 census of population and housing, and 7 of them were female according to Table 62. Again, females had a much lower mean annual income when compared to males.

Table 62. Number of Captains of Fishing Vessels and other officers and Mean Annual Income for South Carolina in 1990. Source: U.S. Bureau of the Census.

|                         | Year Round/Full Time | Other  | Total  |
|-------------------------|----------------------|--------|--------|
| Number of Captains      |                      |        |        |
| Male                    | 17                   | 45     | 62     |
| Female                  | 7                    | 0      | 7      |
| Total                   | 24                   | 45     | 69     |
| Mean Annual Income (\$) |                      |        |        |
| Male                    | 18,765               | 15,022 | 16,048 |
| Female                  | 9,000                | 0      | 9,000  |
| Total                   | 15,917               | 15,022 | 15,333 |

### Horry County, South Carolina

The following descriptions for fishing communities in South Carolina are notes from Kim Iverson of South Carolina Department of Natural Resources. Kim has spent many months interviewing both commercial and recreational fishermen in South Carolina and other parts of the South Atlantic region as part of several research projects. Although the research was not intended to identify fishing communities, her notes represent the best available information on fishing communities for South Carolina.

Little River has a long history of fishing activity, both commercial and recreationally. The headboat operations date back to the 1940's. As of 1996, there were headboats operating in Little River. There are approximately 4 vessels that actively run charters and also commercial fish. Several full time snapper/grouper vessels operate out of the area. Little River also hosts an annual Blue Crab Festival each spring (Kim Iverson, SCDNR pers. comm., 1998).

Murrells Inlet has a large fleet of charter and headboats, with one marina hosting one of the Governor's Cup Billfishing Tournaments. There are several smaller fishing tournaments held in the area. There are fish houses in the community that deal primarily with finfish. There are no shrimp dealers. This area is also noted for it's large number of seafood restaurants that target the tourist market from Myrtle Beach (Kim Iverson, SCDNR pers. comm., 1998).

Major fishing tournaments held in Murrells Inlet are: March of Dimes Annual Flounder Tournament - Voyagers View Marina. Registration was by angler with approximately 200 anglers participating. Local tournament with many family participants. Primarily smaller boats < 25' participating. Tournament date May 17; and the Marlin Quay Governor's Cup Billfish Tournament - Marlin Quay Marina. The last in the series of SC Gov Cup. Total of 31 boats registered. July 23-26 (Kim Iverson, SCDNR pers. comm., 1998).

Major tournaments in North Myrtle Beach: Dock Holidays Governor's Cup Billfish Tournament - Dock Holiday's Marina. The first tournament in a series of 6 for the SC Governor's Cup. April 30 - May 3. Total of 25 boats entered; Frantic Atlantic King Mackerel Tournaments - North Myrtle Beach - Blue Marlin Yacht & Fishing Club. A two tournament series consisting of the Spring and Fall Classics. Total purse of \$250,000 for the series. Total of 392 paid boat entries with an average of 4.09 anglers per boat. Tournament dates May 9-11, September 26-28; Evinrude Outboard King Mackerel Tournament - Oct. 11-12, Weigh-in stations at Dock Holidays Marina, Marlin Quay Marina and Georgetown Landing. 147 boats were registered; Yamaha Contender King Mackerel Classic - Weigh in stations at Dock Holidays Marina, Marlin Quay Marina and Georgetown Landing. 125 boats registered; Fall Pier King Tournament - September 19-21 (Kim Iverson, SCDNR pers. comm., 1998).

One of the largest concentration of snapper grouper vessels is located in Murrells Inlet, SC. Most of the reef fishermen in this area are full time commercial fishermen and consider bandit reels to be the most effective way of catching snapper grouper. There is a wide variety of snapper grouper species off of Murrells Inlet, with gag grouper, scamp grouper and vermilion snapper being highly targeted. The average trip length is 5 days with some of the larger boats (>40 ft.) fishing up to 10 days. A few smaller bandit boats may stay out for 2-3- days. The Gulf Stream is approximately 62 miles offshore from Murrells Inlet. Most bandit boats fish between the 20-50 fathom line, concentrating on the 25 fathom curve. Winter weather dictates that fishermen fish shallow, in waters 60-90' deep. Several fishermen switch to sea bass trapping during the winter months (Iverson 1997).

Horry County has shown a small increase in personal income from fishing that follows the general increase in personal income overall (Table 63).

Table 63. Population and Economic Information for Horry County, South Carolina. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| County |   | 1993      | 1994      | 1995      |
|--------|---|-----------|-----------|-----------|
| Horry  |   |           |           |           |
|        | Population                                | 148,385   | 152,435   | 157,834   |
|        | Personal Income (Thousands of \$)         | 2,543,793 | 2,744,260 | 3,013,059 |
|        | Per Capita Pers Income (\$)               | 17,143    | 18,177    | 19,220    |
|        | Personal Income Fishing (Thousands of \$) | 81        | 129       | 169       |

Vessels in Murrells Inlet will fish an area from Frying Pan Shoals off southern NC, south to Savannah. The average boat has two crew members. It is interesting to note that fishermen stated a crew of 3 plus the captain was ideal for this area, but decreasing catches and increased costs have made it necessary to cut back on crew members (Iverson 1997).

#### Georgetown County, South Carolina

The community of Georgetown has shrimp dealers who also deal in finfish and shellfish. Georgetown is host to the one of the SC Governor's Cup Billfish Tournaments along with several other smaller fishing tournaments. There are no headboats operating from the area and charter activity is limited. Georgetown is known for it's historic waterfront district (Kim Iverson, SCDNR pers. comm., 1998).

Major fishing tournaments in Georgetown County: Georgetown Landing Governor's Cup Billfishing Tournament - May 21-24, Georgetown Landing Marina. The oldest of the series tournaments with 45 boats participating.

Georgetown County shows an increasing personal income from fishing like Horry County in but, personal income from fishing tends to be a larger percentage of overall personal income than in Horry County (Table 64).

Table 64. Population and Economic Information for Georgetown County, South Carolina. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| County     |   | 1993    | 1994    | 1995    |
|------------|---|---------|---------|---------|
| Georgetown |   |         |         |         |
|            | Population                                | 49,371  | 49,966  | 50,835  |
|            | Personal Income (Thousands of \$)         | 822,317 | 885,024 | 946,898 |
|            | Per Capita Pers Income (\$)               | 16,656  | 17,713  | 18,627  |
|            | Personal Income Fishing (Thousands of \$) | 246     | 388     | 399     |

#### Charleston County, South Carolina

McClellanville is a small community with a long history of commercial shrimping. McClellanville has a large shrimp fleet. At any given time (dependent upon the season) there can be as many as 20 shrimp boats at the docks. Shrimp wholesale dealers are also present within the community. McClellanville hosts an annual Blessing of the Fleet Festival each spring. Shem Creek (Mt. Pleasant) hosts a mixture of commercial and recreational fishing activity along with a number of seafood restaurants, a retail seafood market and a waterfront hotel. There are also headboats operating out of Shem Creek along with charter operations. There is a large permanent shrimp fleet and many shrimp boats visit seasonally. At any give time there are an average of 30 shrimp boats along the creek. Shrimp dealers along the creek also buy and sell finfish from the trawlers. There are several offshore fishing boats including longline and snapper/groupier boats. Several shellfishermen and crabbers do business along the creek. Each spring, Mt. Pleasant hosts an Annual Blessing of the Fleet for the shrimp boats.

In Folly Beach there is a concentration of commercial fishing vessels and several fish houses who handle offshore finfish, shellfish, shrimp and crabs. Rockville is a historical small community located at the south

end of Wadmalaw Island. There are commercial dealers who handle shrimp, inshore fish, offshore finfish and some shellfish. On Edisto Island there are several commercial seafood dealers. There are approximately 10 shrimp boats that operate there, fluctuating with the season. The dealers handle primarily shrimp and inshore species along with shellfish and blue crabs. There is also a large "harvest" of horseshoe crabs. These crabs are "bled" for their blood that is used in cancer research and returned to the water. Edisto Island is also host to the annual SC Governor's Cup Billfish Tournament. Charter activity here is limited. Bennett's Point is a small community south of Edisto with shrimping operations in the community. There are 10-15 small boat shrimpers that live in Walterboro and fish out of Bennett's Point (Kim Iverson, SCDNR pers. comm., 1998).

Charleston County (Table 65) has a higher personal income from fishing than the previous two counties, but has a much larger overall dollar value for personal income overall.

Table 65. Population and Economic Information for Charleston County, South Carolina. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| County     |   | 1993      | 1994      | 1995      |
|------------|---|-----------|-----------|-----------|
| Charleston | Population                                | 297,888   | 287,139   | 281,068   |
|            | Personal Income (Thousands of \$)         | 5,653,489 | 5,879,506 | 6,083,636 |
|            | Per Capita Pers Income (\$)               | 18979     | 20476     | 21645     |
|            | Personal Income Fishing (Thousands of \$) | 3188      | 3809      | ----      |

Major fishing tournaments in the Charleston County area: SCSSA (South Carolina Saltwater Sportfishing Assoc.) Early Bird - Ashley Marina. Approximately 25 registered boats. April 19. Multi-species tournament; James Island King Mackerel Tournament - James Island Yacht Club, May 24; Wild Dunes Governor's Cup Billfish - June 11-14. Total of 46 registered boats; Bohicket Invitational Governor's Cup Billfish - June 25-28. Total of 48 registered boats. Bohicket Marina on John's Island; Lowcountry Angler's Inshore Tournament - June 28. Multi-species tournament held at the East Cooper Outboard Motor Club on Gold Bug Island in Mt. Pleasant. Registration by angler, with approximately 200 anglers registered; SCSSA Sailfish XV - Ashley Marina in Charleston. Club sponsored tournament with approximately 25 boats registered. Sailfish, tuna, dolphin & wahoo. August 8-10; Fishing For Miracles King Mackerel Tournament - Ripley's Light Marina. Large King tournament with over 200 boats entered. August 14-16; Alison Oswald, Sr. Memorial Tournament - James Island Yacht Club. Local tournament with approximately 75 boats participating. Multi-species. Aug. 23; Edisto Marina Governor's Cup Billfish Tournament - July 16-19. One of the oldest and largest of the Billfish Series. 46 Boats registered. Edisto Island (Kim Iverson, SCDNR pers. comm., 1998).

Beaufort County, South Carolina

In Frogmore there are 8 commercial dealers which are home to over 50 shrimpers. This does not include the many individuals with shrimp boats in their back yards. The dealers primarily handle shrimp but others may also handle crabs and shellfish. There is a large blue crab industry on nearby Lady's Island. There are several commercial seafood dealers in the Port Royal area with over 30 shrimp boats. There are also commercial crabbers, shad fishermen and offshore finfishermen here. There are a small number of charter vessels operating out of this area also. Hilton Head Island primarily caters to the tourist trade. There are several headboats operating on Hilton Head. These boats make half-day trips and night trips for shark fishing. There are four major marinas that offer charter fishing. Commercially, Hilton Head had 4 seafood dealers and approximately 12-15 shrimp boats (Kim Iverson, SCDNR pers. comm., 1998).

Data on personal income from fishing in Table 66 for Beaufort County may have been excluded due to confidentiality issues.

Table 66. Population and Economic Information for Beaufort County, South Carolina. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| County   |   | 1993      | 1994      | 1995      |
|----------|---|-----------|-----------|-----------|
| Beaufort |   |           |           |           |
|          | Population                                | 94,375    | 97,293    | 100,017   |
|          | Personal Income (Thousands of \$)         | 2,057,250 | 2,194,774 | 2,373,921 |
|          | Per Capita Pers Income (\$)               | 21,799    | 22,558    | 23,774    |
|          | Personal Income Fishing (Thousands of \$) | ----      | ----      | ----      |

Major fishing tournaments in Beaufort County: 42<sup>nd</sup> Annual Beaufort County Water Festival Fishing Tournament - June 28. Held in conjunction with the annual Beaufort Water Festival; Hilton Head Kingfish Classic - Schillings Marina, Hilton Head Island. July 10-12. Registration by angler with a total of 49 registered; Dottie Dunbar Women's Tournament - Palmetto Bay Marina, Hilton Head. Women's only multi-species inshore tournament. Total of 49 anglers registered. October 4 (Kim Iverson, SCDNR pers. comm., 1998).

Possible fishing communities in South Carolina: Charleston, Mt. Pleasant, Hilton Head, Port Royal, Frogmore (St. Helena), Bennett's Point, Edisto Beach, Rockville, Folly Beach, Shem Creek, McClellanville, Georgetown Waterfront, Murrell's Inlet, Little River (most of these locations are designated ports of landing)

Counties in South Carolina have seen a general increase in these occupations and industries over the past three decades (Table 67), with the exception of Horry County which has seen a slight decreasing trend.

Table 67. Number within Farm/Fish/Forest Occupation and Agriculture, Fishing, Mining Industry for South Carolina Coastal Counties for 1970, 1980, and 1990 Census. Source: MARFIN Sociodemographic Database.

| County            | Occupation/Industry  | 1970 | 1980 | 1990 |
|-------------------|----------------------|------|------|------|
| Horry County      | Farm/Fish/Forest     | 2627 | 2542 | 2310 |
|                   | Agri.,Fishing,Mining | 2843 | 2653 | 2110 |
| Georgetown County | Farm/Fish/Forest     | 403  | 558  | 597  |
|                   | Agri.,Fishing,Mining | 552  | 856  | 690  |
| Charleston County | Farm/Fish/Forest     | 810  | 1697 | 2056 |
|                   | Agri.,Fishing,Mining | 1256 | 1938 | 2316 |
| Beaufort County   | Farm/Fish/Forest     | 436  | 938  | 966  |
|                   | Agri.,Fishing,Mining | 698  | 1087 | 1111 |
| Colleton County   | Farm/Fish/Forest     | 532  | 614  | 730  |
|                   | Agri.,Fishing,Mining | 787  | 705  | 782  |

For the Charleston, South Carolina MSA (Metropolitan Statistical Area) (Table 68) there are 113 individuals who indicated fishing as their year round occupation. Another 102 individuals indicated that it is a part time or seasonal occupation for them. This represents over half of those individuals in South Carolina who indicated the occupation as fishing from Table 61. The Charleston, SC MSA includes Berkely, Charleston and Dorchester counties.

Table 68. Number of Individuals in Occupation of Fishing By Work Status and Gender for the Charleston, SC MSA in 1989. Source: 1990 Census Of Population And Housing.

|        | Year Round Full Time | Other | Total |
|--------|----------------------|-------|-------|
| Male   | 102                  | 102   | 204   |
| Female | 11                   | 0     | 11    |
| Total  | 113                  | 102   | 215   |

Georgia

The 1990 Census of Population and Housing provides the following information for Georgia regarding individuals who reported their occupation as fisher in Table 69. A total of 536 individuals claimed fisher as their occupational title with less than half indicating it was a year round full time employment. There were few females who indicated such and they had a far lower mean annual income than males who indicated it was a full time occupation. However, females who indicated it was other than full time had a much higher mean income than any other category. This may be due to a low sample size, however.

Table 69. Number of Fishers and Mean Annual Income for Georgia in 1990. Source: U.S. Bureau of the Census.

|                         | Year Round/Full Time | Other  | Total  |
|-------------------------|----------------------|--------|--------|
| Number of fishers       |                      |        |        |
| Male                    | 222                  | 295    | 518    |
| Female                  | 11                   | 7      | 18     |
| Total                   | 234                  | 302    | 536    |
| Mean Annual Income (\$) |                      |        |        |
| Male                    | 19,139               | 11,082 | 15,058 |
| Female                  | 8,600                | 25,000 | 20,080 |
| Total                   | 18,813               | 12,024 | 15,308 |

In their 1975 report, Nix et. al., found a total of 32 commercial docks in six Georgia coastal counties. Those docks and shrimp trawlers were distributed as follows: Camden Co. - 5 docks and 33 trawlers; Glynn Co. - 5 docks and 74 trawlers; McIntosh Co. - 12 docks and 111 trawlers; Liberty Co. - 1 dock and 18 trawlers; Bryan Co. - 1 dock and 2 trawlers; and finally Chatham Co. - 8 docks and 69 trawlers. This information is outdated and certainly does not represent the current status and location of shrimp trawlers in Georgia. However, the report does represent the kinds of information that can be extremely helpful in identifying fishing communities.

The coast of Georgia contains a small concentration of full-time reef fishermen that fish primarily with bandit reels. Their fishing patterns are similar to those found in SC with vessels fishing from northern Florida north to the SC/NC line (Iverson 1997).

Possible fishing communities in Georgia: Savannah, Brunswick, St. Marys, Jekyll Island, and Darien (Tables 70-76).

Table 70. Number of Captains of Fishing Vessels and other officers and Mean Annual Income for Georgia in 1990. Source: U.S. Bureau of the Census.

|                         | Year Round/Full Time | Other | Total  |
|-------------------------|----------------------|-------|--------|
| Number of Captains      |                      |       |        |
| Male                    | 17                   | 21    | 38     |
| Female                  | 0                    | 0     | 0      |
| Total                   | 17                   | 21    | 38     |
| Mean Annual Income (\$) |                      |       |        |
| Male                    | 25,706               | 1,976 | 12,592 |
| Female                  | 0                    | 0     | 0      |
| Total                   | 25,706               | 1,976 | 12,592 |

Table 71. Population and Economic Information for Chatham County, Georgia. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| County  | 1993                                  | 1994      | 1995      |           |
|---------|---------------------------------------|-----------|-----------|-----------|
| Chatham | Population (number of persons)        | 224,050   | 225,779   | 226,554   |
|         | Personal income (thousands of dollar) | 4,569,113 | 4,810,530 | 5,087,638 |

|  |   |        |        |        |
|--|---|--------|--------|--------|
|  | Per capita personal income (dollars)      | 20,393 | 21,306 | 22,457 |
|  | Personal Income Fishing (Thousands of \$) | 650    | (D)    | 25     |

Table 72. Population and Economic Information for Bryan County, Georgia. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| County |   | 1993    | 1994    | 1995    |
|--------|---|---------|---------|---------|
| Bryan  |   |         |         |         |
|        | Population                                | 18,827  | 20,008  | 21,212  |
|        | Personal Income (Thousands of \$)         | 274,738 | 307,258 | 342,128 |
|        | Per Capita Pers Income (\$)               | 14,593  | 15,357  | 16,129  |
|        | Personal Income Fishing (Thousands of \$) | 251     | 359     | ----    |

Table 73. Population and Economic Information for Liberty County, Georgia. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| County  |   | 1993    | 1994    | 1995    |
|---------|---|---------|---------|---------|
| Liberty |   |         |         |         |
|         | Population                                | 56,625  | 58,827  | 58,571  |
|         | Personal Income (Thousands of \$)         | 636,042 | 669,454 | 709,468 |
|         | Per Capita Pers Income (\$)               | 11,233  | 11,380  | 12,113  |
|         | Personal Income Fishing (Thousands of \$) | ----    | 90      | 97      |

Table 74. Population and Economic Information for McIntosh County, Georgia. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| County   |   | 1993    | 1994    | 1995    |
|----------|---|---------|---------|---------|
| McIntosh |   |         |         |         |
|          | Population                                | 8,985   | 9,153   | 9,372   |
|          | Personal Income (Thousands of \$)         | 110,187 | 116,171 | 125,645 |
|          | Per Capita Pers Income (\$)               | 12,263  | 12,692  | 13,406  |
|          | Personal Income Fishing (Thousands of \$) | 3,619   | 4,486   | ----    |

Table 75. Population and Economic Information for Glynn County, Georgia. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| County |   | 1993      | 1994      | 1995      |
|--------|---|-----------|-----------|-----------|
| Glynn  |   |           |           |           |
|        | Population                                | 64,759    | 64,956    | 65,450    |
|        | Personal Income (Thousands of \$)         | 1,322,745 | 1,400,544 | 1,505,337 |
|        | Per Capita Pers Income (\$)               | 20,426    | 21,558    | 23,000    |
|        | Personal Income Fishing (Thousands of \$) | 328       | 343       | 351       |

Table 76. Population and Economic Information for Camden County, Georgia. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| County |   | 1993    | 1994    | 1995    |
|--------|---|---------|---------|---------|
| Camden |   |         |         |         |
|        | Population                                | 39,712  | 41,262  | 40,819  |
|        | Personal Income (Thousands of \$)         | 502,639 | 542,385 | 556,622 |
|        | Per Capita Pers Income (\$)               | 12,657  | 13,145  | 13,636  |
|        | Personal Income Fishing (Thousands of \$) | 1,889   | 2,431   | 2,484   |

Georgia coastal counties have seen a general increase in these occupations and industries with the exception of Liberty County which has shown a decrease from 1970-1990 (Table 77).

Table 77. Number within Farm/Fish/Forest Occupation and Agriculture, Fishing, Mining Industry for Georgia Coastal Counties for 1970, 1980, and 1990 Census. Source: MARFIN Sociodemographic Database.

| County          | Occupation/Industry  | 1970 | 1980 | 1990 |
|-----------------|----------------------|------|------|------|
| Bryan County    | Agri.,Fishing,Mining | 161  | 100  | 200  |
|                 | Farm/Fish/Forest     | 121  | 135  | 136  |
| Chatham County  | Agri.,Fishing,Mining | 558  | 686  | 1103 |
|                 | Farm/Fish/Forest     | 228  | 704  | 1062 |
| Liberty County  | Agri.,Fishing,Mining | 332  | 146  | 152  |
|                 | Farm/Fish/Forest     | 242  | 205  | 157  |
| McIntosh County | Agri.,Fishing,Mining | 233  | 266  | 169  |
|                 | Farm/Fish/Forest     | 27   | 260  | 193  |
| Glynn County    | Agri.,Fishing,Mining | 261  | 482  | 593  |
|                 | Farm/Fish/Forest     | 84   | 581  | 712  |
| Camden County   | Agri.,Fishing,Mining | 209  | 126  | 176  |
|                 | Farm/Fish/Forest     | 106  | 110  | 205  |

### Florida

Florida's eastern coastline is made up largely of metropolitan counties. This is primarily due to the increases in population for Florida's coastal counties over the past 50 years. Florida's coastline has become a very popular retirement destination and tourist attraction. Because they are largely metropolitan, fishing communities here may be subsumed into these larger metropolitan areas and difficult to identify. Data presented from the most recent Census will also show that in relation to the larger economy, fishing will contribute very little at the county level for most coastal counties. Over the years, with the demographic changes following the immigration of retirees and tourists and the subsequent economic transition, few fishing communities will have survived as distinct communities.

The data presented in Table 78 shows Florida as having almost 6,000 individuals claiming fisher as their occupation in the 1990 census; 381 of those individuals were female. Mean annual income is highest for those reporting fishing as a full time occupation with women reporting a lower mean annual income in all categories.

Table 78. Number of Fishers and Mean Annual Income for Florida in 1990. Source: U.S. Bureau of the Census.

|                         | Year Round/Full Time | Other  | Total  |
|-------------------------|----------------------|--------|--------|
| Number of fishers       |                      |        |        |
| Male                    | 2,698                | 2,844  | 5,544  |
| Female                  | 111                  | 270    | 381    |
| Total                   | 2,809                | 3,116  | 5,925  |
| Mean Annual Income (\$) |                      |        |        |
| Male                    | 23,288               | 11,794 | 17,388 |
| Female                  | 17,285               | 11,511 | 13,193 |
| Total                   | 23,051               | 11,770 | 17,118 |

There were over 1,100 individuals from Florida who reported their occupation as captain of a fishing vessel during the 1990 census, with 51 of them being female (Table 79). Again, mean annual income was highest for full time workers and females reported lower mean annual income for both full time and other work.

Table 79. Number of Captains of Fishing Vessels and other officers and Mean Annual Income for Florida in 1990 Source: U.S. Bureau of the Census.



|                         | Year Round/Full Time | Other  | Total  |
|-------------------------|----------------------|--------|--------|
| Number of Captains      |                      |        |        |
| Male                    | 430                  | 633    | 1,063  |
| Female                  | 26                   | 25     | 51     |
| Total                   | 456                  | 658    | 1,114  |
| Mean Annual Income (\$) |                      |        |        |
| Male                    | 25,993               | 21,274 | 23,183 |
| Female                  | 8,487                | 15,420 | 11,885 |
| Total                   | 24,995               | 21,052 | 22,666 |

Nassau County (Table 80) showed an increase in personal income from fishing over the time period from 1993 to 1995 which reflects the general increase in population and personal income overall for the county.

Table 80. Population and Economic Information for Nassau County, Florida. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| County |   | 1993    | 1994      | 1995      |
|--------|---|---------|-----------|-----------|
| Nassau |   |         |           |           |
|        | Population                                | 48,355  | 49,565    | 50,717    |
|        | Personal Income (Thousands of \$)         | 954,342 | 1,003,920 | 1,089,793 |
|        | Per Capita Pers Income (\$)               | 19,736  | 20,255    | 21,488    |
|        | Personal Income Fishing (Thousands of \$) | 1,540   | 1,918     | 2,068     |

Duval County (Table 81) shows slow growth in population over the three years listed, but does show growth in personal income from fishing from 1993 to 1994. There was a slight decrease in personal income from fishing reported from 1994 to 1995.

Table 81. Population and Economic Information for Duval County, Florida. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| County |   | 1993       | 1994       | 1995       |
|--------|---|------------|------------|------------|
| Duval  |   |            |            |            |
|        | Population                                | 701,267    | 703,152    | 705,014    |
|        | Personal Income (Thousands of \$)         | 14,111,822 | 14,724,897 | 15,748,121 |
|        | Per Capita Pers Income (\$)               | 20,123     | 20,941     | 22,337     |
|        | Personal Income Fishing (Thousands of \$) | 2,272      | 3,658      | 3,335      |

St. John's County (Table 82) had some growth in personal income from fishing from 1993 to 1994 but no data were available for 1995 to indicate whether that trend continued.

Table 82. Population and Economic Information for St. John's County, Florida. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| County    |   | 1993      | 1994      | 1995      |
|-----------|---|-----------|-----------|-----------|
| St. Johns |   |           |           |           |
|           | Population                                | 94,480    | 98,377    | 101,966   |
|           | Personal Income (Thousands of \$)         | 2,394,764 | 2,612,557 | 2,869,300 |
|           | Per Capita Pers Income (\$)               | 25,347    | 26,557    | 28,140    |
|           | Personal Income Fishing (Thousands of \$) | 432       | 502       | ----      |

According to Table 83, Flagler County had no individuals reporting personal income from fishing for the time period 1993 to 1995. Volusia County also has no personal income from fishing listed in Table 84, because of confidentiality issues.

Table 83. Population and Economic Information for Flagler County, Florida. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| County  |   | 1993    | 1994    | 1995    |
|---------|---|---------|---------|---------|
| Flagler |   |         |         |         |
|         | Population                                | 35,868  | 37,894  | 40,260  |
|         | Personal Income (Thousands of \$)         | 571,528 | 631,959 | 692,269 |
|         | Per Capita Pers Income (\$)               | 15,934  | 16,677  | 17,195  |
|         | Personal Income Fishing (Thousands of \$) | 0       | 0       | 0       |

Table 84. Population and Economic Information for Volusia County, Florida. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| County  |   | 1993      | 1994      | 1995      |
|---------|---|-----------|-----------|-----------|
| Volusia |   |           |           |           |
|         | Population                                | 397,372   | 405,515   | 410,115   |
|         | Personal Income (Thousands of \$)         | 6,845,402 | 7,235,060 | 7,772,063 |
|         | Per Capita Pers Income (\$)               | 17,227    | 17,842    | 18,951    |
|         | Personal Income Fishing (Thousands of \$) | ----      | ----      | ----      |

Indian River County saw an increase in personal income from fishing from 1993 to 1994 according to Table 85, but saw a decrease from 1994 to 1995. St. Lucie County (Table 86) may have had a similar trend although data from 1993 are missing and the trend is not clear.

Table 85. Population and Economic Information for Indian River County, Florida. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| County       |   | 1993      | 1994      | 1995      |
|--------------|---|-----------|-----------|-----------|
| Indian River |   |           |           |           |
|              | Population                                | 94,184    | 95,374    | 96,263    |
|              | Personal Income (Thousands of \$)         | 2,686,514 | 2,827,427 | 3,065,533 |
|              | Per Capita Pers Income (\$)               | 28,524    | 29,646    | 31,845    |
|              | Personal Income Fishing (Thousands of \$) | 1,340     | 1,826     | 1,707     |

Table 86. Population and Economic Information for St. Lucie County, Florida. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| County    |   | 1993      | 1994      | 1995      |
|-----------|---|-----------|-----------|-----------|
| St. Lucie |   |           |           |           |
|           | Population                                | 165,120   | 169,284   | 171,914   |
|           | Personal Income (Thousands of \$)         | 2,719,602 | 2,840,752 | 3,051,018 |
|           | Per Capita Pers Income (\$)               | 16,470    | 16,781    | 17,747    |
|           | Personal Income Fishing (Thousands of \$) | ----      | 1,855     | 1,303     |

The trend in personal income from fishing for Broward County is not clear as data from 1995 are missing from Table 87 because of confidentiality. Brevard County (Table 88) shows a decrease in personal income from fishing during 1994 to 1995, but overall shows a much larger percentage of personal income coming from fishing than most counties previous.

Table 87. Population and Economic Information for Broward County, Florida. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| County  |            | 1993      | 1994      | 1995      |
|---------|------------|-----------|-----------|-----------|
| Broward |            |           |           |           |
|         | Population | 1,353,279 | 1,358,585 | 1,412,942 |

|  |   |            |            |            |
|--|---|------------|------------|------------|
|  | Personal Income (Thousands of \$)         | 32,716,045 | 34,273,950 | 37,007,667 |
|  | Per Capita Pers Income (\$)               | 24,175     | 24,736     | 26,192     |
|  | Personal Income Fishing (Thousands of \$) | 658        | 816        | ----       |

Table 88. Population and Economic Information for Brevard County, Florida. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| County  |   | 1993      | 1994      | 1995      |
|---------|---|-----------|-----------|-----------|
| Brevard |   |           |           |           |
|         | Population                                | 435,546   | 443,337   | 450,238   |
|         | Personal Income (Thousands of \$)         | 8,564,204 | 8,938,218 | 9,341,030 |
|         | Per Capita Pers Income (\$)               | 19,663    | 20,161    | 20,747    |
|         | Personal Income Fishing (Thousands of \$) | 3,600     | 4,690     | 3,797     |

Martin County has one of the highest per capita incomes reported over the three year period according to Table 89. There was also a significant increase in personal income from fishing from 1993 to 1994 which decreased in 1995. Palm Beach County, with an even higher per capita income, showed an increase in personal income from fishing from 1993 to 1994 with no data available for 1995 (Table 90).

Table 89. Population and Economic Information for Martin County, Florida. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| County |   | 1993      | 1994      | 1995      |
|--------|---|-----------|-----------|-----------|
| Martin |   |           |           |           |
|        | Population                                | 107,238   | 109,194   | 110,495   |
|        | Personal Income (Thousands of \$)         | 3,406,064 | 3,521,665 | 3,815,294 |
|        | Per Capita Pers Income (\$)               | 31,762    | 32,251    | 34,529    |
|        | Personal Income Fishing (Thousands of \$) | 270       | 1,658     | 819       |

Table 90. Population and Economic Information for Palm Beach County, Florida. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| County     |   | 1993       | 1994       | 1995       |
|------------|---|------------|------------|------------|
| Palm Beach |   |            |            |            |
|            | Population                                | 933,644    | 957,522    | 976,358    |
|            | Personal Income (Thousands of \$)         | 30,994,531 | 32,423,719 | 35,204,121 |
|            | Per Capita Pers Income (\$)               | 33,197     | 33,862     | 36,057     |
|            | Personal Income Fishing (Thousands of \$) | 1,464      | 1,902      | ----       |

Dade County shows a steady growth in personal income from fishing for the time period listed in Table 91. Monroe County shows, by far, the highest personal income from fishing for any Florida county and most likely any county in the South Atlantic according to Table 92.

Table 91. Population and Economic Information for Dade County, Florida. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| County |   | 1993       | 1994       | 1995       |
|--------|---|------------|------------|------------|
| Dade   |   |            |            |            |
|        | Population                                | 1,985,373  | 2,011,571  | 2,046,078  |
|        | Personal Income (Thousands of \$)         | 39,110,301 | 40,344,476 | 43,087,320 |
|        | Per Capita Pers Income (\$)               | 19,699     | 20,056     | 21,058     |
|        | Personal Income Fishing (Thousands of \$) | 1,247      | 1,479      | 1,897      |

Table 92. Population and Economic Information for Monroe County, Florida. Source: Bureau of Economic Analysis, U.S. Dept. of Commerce.

| County |   | 1993      | 1994      | 1995      |
|--------|---|-----------|-----------|-----------|
| Monroe |   |           |           |           |
|        | Population                                | 81,737    | 81,461    | 81,152    |
|        | Personal Income (Thousands of \$)         | 1,982,209 | 2,054,326 | 2,208,152 |
|        | Per Capita Pers Income (\$)               | 24,251    | 25,219    | 27,210    |
|        | Personal Income Fishing (Thousands of \$) | 13,506    | 15,558    | 16,723    |

Recently, data were compiled from the last three census and placed into a user friendly interface through a MARFIN grant by the Louisiana Population Data Center, Louisiana State University (Tolbert, *et al.* 1998). Those data provide a time series of information from the last three census with the ability to compare several variables at the state, county, and place level. Census places are incorporated and Census designated places of 2,500 or more persons. The tables presented below incorporate the data included in the MARFIN Sociodemographic Database for the coastal counties outlined above with a focus on the occupational classification of Farm/Fish/Forest and the industry classification of Agriculture, Fishing, and Mining. These classifications are inclusive of those within the occupation and industry of fishing, but not exclusive of others, therefore it is difficult to know the exact number of individuals who have indicated their occupation or business is fishing. We can only assume that whatever trend appears over the time corresponds to the occupation of fishing as well as the others.

Data covering MSAs (Metropolitan Statistical Areas) are provided because it includes a more detailed occupational breakdown, but unfortunately geographic boundaries expand as most MSAs encompass more than one county. In some cases, MSAs were not used because the area covered did not correspond with the coastal areas within the South Atlantic region. As mentioned earlier, these data are what is currently available. Further analysis is constrained by variety of issues relating to data computability and availability at each place level of analysis. As mentioned before more research on fishing communities will be required before a more complete definition and identification can be accomplished.

Examining census data at the level of Metropolitan Statistical Area reveals greater detail for occupation, but the scale changes as MSAs often times encompass more than one county. Metropolitan area (MA) is a large population nucleus, together with adjacent communities that have a high degree of economic and social integration with that nucleus. Metropolitan Areas must contain either a place with a minimum population of 50,000 or a Census Bureau-defined urbanized area and a total MA population of at least 100,000. An MA comprises one or more central counties and also may include one or more outlying counties that have close economic and social relationships with the central county. Metropolitan Statistical Areas are relatively freestanding MA's and are not closely associated with other MA's. These areas typically are surrounded by nonmetropolitan counties.

When you look at the occupations of farming, fishing and forestry for Florida coastal counties in Table 93, over the past 20 years there is, in general, a steady increase in the number of individuals within these occupations and industries.

Table 93. Number within Farm/Fish/Forest Occupation and Agriculture, Fishing, Mining Industry for East Florida Coastal Counties from 1970, 1980, and 1990 Census. Source: MARFIN Sociodemographic Database.

| County          | Occupation/Industry  | 1970 | 1980 | 1990 |
|-----------------|----------------------|------|------|------|
| Nassau County   | Farm/Fish/Forest     | 371  | 427  | 559  |
|                 | Agri.,Fishing,Mining | 501  | 462  | 606  |
| Duval County    | Farm/Fish/Forest     | 1237 | 2782 | 3729 |
|                 | Agri.,Fishing,Mining | 2536 | 2959 | 4324 |
| St.Johns County | Farm/Fish/Forest     | 794  | 813  | 1002 |
|                 | Agri.,Fishing,Mining | 1012 | 883  | 976  |
| Flagler County  | Farm/Fish/Forest     | 145  | 314  | 408  |

|                     |                      |      |       |       |
|---------------------|----------------------|------|-------|-------|
|                     | Agri.,Fishing,Mining | 186  | 298   | 403   |
| Volusia County      | Farm/Fish/Forest     | 1308 | 3150  | 4917  |
|                     | Agri.,Fishing,Mining | 2511 | 3407  | 5606  |
| Indian River County | Farm/Fish/Forest     | 991  | 1907  | 2042  |
|                     | Agri.,Fishing,Mining | 1454 | 2361  | 2217  |
| St. Lucie County    | Farm/Fish/Forest     | 2602 | 2710  | 3147  |
|                     | Agri.,Fishing,Mining | 3253 | 3252  | 3342  |
| Broward County      | Farm/Fish/Forest     | 1982 | 7358  | 9425  |
|                     | Agri.,Fishing,Mining | 5354 | 7756  | 10317 |
| Brevard County      | Farm/Fish/Forest     | 764  | 1772  | 3369  |
|                     | Agri.,Fishing,Mining | 1394 | 2279  | 3585  |
| Martin County       | Farm/Fish/Forest     | 964  | 1838  | 1983  |
|                     | Agri.,Fishing,Mining | 1268 | 2032  | 2086  |
| Palm Beach County   | Farm/Fish/Forest     | 6552 | 9676  | 13261 |
|                     | Agri.,Fishing,Mining | 9791 | 11780 | 15155 |
| Dade County         | Farm/Fish/Forest     | 4804 | 11257 | 14894 |
|                     | Agri.,Fishing,Mining | 9682 | 13708 | 16926 |
| Monroe County       | Farm/Fish/Forest     | 163  | 1769  | 1729  |
|                     | Agri.,Fishing,Mining | 920  | 1932  | 1860  |

Table 94 includes only those individuals who reported their occupation as fishing for the following MSAs within Florida.

Table 94. Number of Individuals in Occupation of Fishing By Work Status and Gender for Florida MSA in 1989. Source: 1990 Census Of Population And Housing.

|                 |        | Year Round<br>Full Time | Other | Total |
|-----------------|--------|-------------------------|-------|-------|
| Jacksonville    | Male   | 151                     | 210   | 361   |
|                 | Female | 15                      | 49    | 64    |
|                 | Total  | 166                     | 259   | 425   |
| West Palm Beach |        | Year Round<br>Full Time | Other | Total |
|                 | Male   | 94                      | 47    | 141   |
|                 | Female | 0                       | 0     | 0     |
|                 | Total  | 94                      | 47    | 141   |
| Miami           |        | Year Round<br>Full Time | Other | Total |
|                 | Male   | 254                     | 254   | 508   |
|                 | Female | 0                       | 30    | 0     |
|                 | Total  | 254                     | 284   | 538   |

Concentrations of reef fishermen can be found in the communities of Mayport, Port Orange and New Smyrna, north of Cape Canaveral. Bandit reels are the primary gear used for reef fishing in these areas, although a few bottom longline vessels are present. In northern Florida, bandit fishermen report trips lasting 5-6 days and fish 30-50 miles offshore. They average between 2 to 3 crew members depending on vessel size and gear. Vessels from the Mayport area reported fishing from the Georgia line south to the Daytona area. The larger longline vessels are required by regulations to fish past the 50 fathom line and reported trip lengths of up to 10 days, fishing as far as 100 miles from shore. These bottom long line vessels fish for deep water species such as tilefish in water 600 - 900' deep (Iverson 1997).

McKenna (1994) identified the number of fishermen in Florida reporting landings of king mackerel (based on Saltwater Products Licenses) from 1987 to 1993 as varying from 1,500 to 2,222. From 1986 to 1990 the number of commercial permits for Atlantic migratory group king mackerel ranged from a high of 888 in

1989/90 fishing season to low of 785 in the 1987/88 fishing year. The percentage of those permits which were hook and line fishermen for those years ranged from 89% in 86/87 to 78% in 1990. There were 1,654 vessels permitted for commercial king mackerel and Spanish mackerel in Florida for the 1993-94 fishing year. The number of permitted vessels was divided with 846 and 808 allocated to the East and West coasts respectively. How many of those vessels landed king mackerel is unknown at this time. Catch per unit of effort data seems fairly consistent for the southeastern region of the Atlantic group king mackerel with an average CPUE of between 200-300 lb/trip (McKenna 1994). Most of the commercial landings of Atlantic group king mackerel are made by hook and line fishermen. In addition, because most landings of Atlantic group king mackerel are in Florida and the most information that exists is on the Florida fishery, the following description will focus primarily on the Florida fishery unless noted otherwise.

There were approximately 203 full and part time vessels in the hook and line mackerel fleet in 1980. Vessel size ranged from 22-44 feet in length. Today, the Florida South Atlantic troll fishery is composed of about 100 full-time and 100 part-time operations, about 150 of them are dependent upon king mackerel. Full-time fishermen operate primarily out of Jupiter, Port Salerno, Fort Pierce, Sebastian, and Rivera Beach. Normally, there is one fisherman to a boat. Part-time fishermen operate mostly out of Palm Beach, frequently two or three fishermen per boat. Approximately 40% of the full time trollers switch to bottom fishing for various reef fish after the Gulf king mackerel season. The remainder of these full time trollers tie up their boats when the Gulf king mackerel season ends. Some engage in various non-fishing jobs, while the majority reportedly wait for the opening of the Atlantic king mackerel season (GMFMC & SAFMC 1994).

During the peak season about 75 to 100 troll vessels and 16 to 20 net vessels target king mackerel in the Keys. Net vessels usually start fishing late December, although some of these vessels troll for mackerel before net fishing becomes more practicable. Most king mackerel fishermen in the Keys target other species such as stone crab, spiny lobster, and reef fish throughout the year.

There were approximately 89 large gillnet vessels in Florida including full and part time in 1980. The vessels ranged in size from 30-65 feet. These vessels fished Spanish and king mackerel during the winter, but also targeted lobster, swordfish and bait fish during other times of the year. Vessels over 40 feet usually employed a power roller to haul nets. The large gillnet fleet was primarily located from Florida's central east coast in Ft. Pierce, throughout the Florida Keys to the central west coast as far north as Cortez. There were also a few large boats in the Panhandle area of Port St. Joseph (Centaur Associates 1981).

Approximately 87% of captains in the large gillnet fleet at that time depended entirely upon fishing for their income. Net fishermen, then as they do today, have the options of participating in the Spanish mackerel fishery, trolling for king mackerel, and fishing with nets or hook and line for Atlantic group king mackerel after March (Centaur Associates 1981).

Today, there are twelve large net boats located in the Keys that may fish Atlantic group king mackerel occasionally. These vessels have a capacity of up to 40,000 pounds per trip and have had large catches of king mackerel in the past. There does not seem to be a small gillnet boat sector for Atlantic king mackerel. In Monroe County there are 16 to 20 large net boats currently participating in the king mackerel fishery, some with capacity to land up to 50,000 pounds. There are another 6 to 12 small net boats in south-west Florida ready to enter the fishery when the opportunity arises. These vessels are 30 to 40 feet in length with capacities of 5,000 to 10,000 pounds.

There has been a general decline in net catches along the Florida east coast. This may be attributed to regulations like the prohibition of drift nets and purse seines, but also stems from the recent net ban in Florida state waters.

McKenna (1994) identified over 200 dealers in Florida who had handled king mackerel since 1987. In 1992 there were 240 who reported landings of king mackerel. Most of those dealers purchased king mackerel ten

or fewer times per season and handled less than 5,000 pounds. There were over twenty dealers who handled 100,000 pounds or more during the 1992 season (McKenna 1994) .

Possible fishing communities in Florida: Mayport, Port Orange, New Smyrna, Sebastian, Port Salerno, Rivera Beach, Ft. Pierce, Jupiter, West Palm Beach, Boyton Beaches, The Keys -- Upper Keys: Key Largo, Tavernier; Middle Keys - Islamorada, Marathon; Lower Keys; and Key West.

The proper management of the bluefish stock through implementation of the management measures described in this specification package will be beneficial to the commercial and recreational fishing communities of the Atlantic Coast. By preventing overfishing and allowing stock rebuilding, benefits to the fishing communities will be realized through increased bluefish abundance and subsequent harvests. Although overall there is little port reliance on bluefish commercially, it can be expected that the proposed regulatory measures will have a positive long-term impact on the communities and local economies of these ports. The proposed measures will reduce the chance that the bluefish fishery will be overfished. This will provide positive benefits to the ports and communities who depend in part on bluefish for employment and income.

#### 4.4 1990 Survey of Charter and Party Boats

The charter and party boat industry is an important component of the fishery in several states of the management unit for these species. Table 5 indicate the contribution by mode of recreational landings of bluefish. To provide additional information on this segment of the industry, the Council conducted a survey of charter and party boat owners in the summer of 1990 with the purpose of acquiring information in support of management efforts for the bluefish fishery. A mailing list was compiled from the NMFS vessel permit files that included all vessels which indicated they were involved in party and charter activities (permit Category 2). The list included 402 vessels.

Some of the results obtained from this survey may not accurately describe current fishing trends (e.g., interest and demand, desirability, etc.). For example, since this survey was conducted, bluefish landings have generally declined, reflecting a drop in availability, abundance, and/or angler interest. In addition, party/charter boats may be targeting other species that are relatively more abundant than scup (e.g., striped bass).

Consultation with Council members yielded concerns that a number of vessels did not hold federal permits, and would not be included in the survey. Representatives from New Jersey, New York, and Virginia supplied the Council with lists supplementing the NMFS permit files, and an additional 190 questionnaires were mailed.

A total of 592 surveys were sent out to 13 east coast states (Table 95). Massachusetts, New Jersey, New York, and Virginia were most heavily represented, accounting for 80% of survey mailings.

Table 95. Charter and party boat survey distribution and returns, 1990.

| State | Number Sent | Usable Returns | Non-usable Returns |
|-------|-------------|----------------|--------------------|
| ME    | 24          | 5              | 1                  |
| NH    | 21          | 5              | -                  |
| MA    | 80          | 17             | 9                  |
| RI    | 15          | 7              | 2                  |
| CT    | 17          | 4              | 2                  |
| NY    | 92          | 24             | 3                  |
| NJ    | 159         | 51             | 6                  |
| PA    | 16          | 7              | 1                  |
| DE    | 14          | 3              | -                  |

|       |     |     |    |
|-------|-----|-----|----|
| MD    | 4   | 2   | -  |
| VA    | 143 | 44  | 5  |
| NC    | 1   | 1   | -  |
| FL    | 6   | 2   | 1  |
|       |     |     |    |
| Total | 592 | 172 | 30 |

A total of 172 of the 202 surveys returned to the Council were usable. The 30 returns which could not be used were inappropriate mailings that fell into the following general categories: did not charter/fish in 1989; private boat, not for hire; dive boat, primarily after lobsters; returned as undeliverable by Post Office; or sold boat. Usable returns equaled 29% of total mailings, with the percentage ranging from approximately 20% - 50% for individual states.

Some of the analyses conducted on the survey divided the responses into "Party boat" versus "Charter boat" categories. Typically, charter vessels are thought of as hiring out for a day's fishing to a small number of individuals at a cost of over \$100 per person. They provide a high level of personal attention to the passengers and will make special efforts to find the particular species of interest to their clients.

"Party boats" are generally larger vessels which run on a fixed schedule and carry from 10 to 100 passengers, averaging around 20. They offer fewer options and less attention to passengers, yet charge much lower fares than charter boats (in the \$20 - \$40 range).

In order to have the ability to differentiate between these two groups, the data were partitioned based on the reported number of passengers each vessel could carry. Examination of the data showed a logical division between those vessels which reported carrying 8 or fewer passengers and those able to carry more than 8. The average fee charged per person dropped significantly for those vessels carrying more than 8 passengers. For purposes of this analysis then, "charter boats" are defined as those boats carrying 8 or fewer passengers, and "party boats" are those which may carry 9 and above. It is recognized that charter boats are generally licensed for six passengers and, in fact, responses to another question indicated that the average charter boat carried 6 passengers, with a standard deviation (SD) of 0.4, while the average party boat carried 53 (SD = 32), so it is quite likely that the respondents which indicated they owned a charter boat that carried eight people were including the captain and mate whereas in the subsequent question they were referring to the six paying passengers.

Calculating mean values of responses allows comparison of the different species using a single number for each. The first question on the survey attempted to gauge the interest or demand which party and charter boat customers exhibited for common species (or species groups). Given a five point scale, owners were asked to rank each species as being: 1 = Low, 2 = Somewhat Low, 3 = Moderate, 4 = Somewhat High, or 5 = High in interest to their customers.

Spot ranked as the most desirable fish for party boats (mean interest = 4.7), illustrating its importance to the well-represented boats of Virginia (Table 96). It was followed by bluefish (4.6), then summer flounder (3.6), Atlantic Mackerel (3.5), and striped bass (3.5). The top four fish which party boats reported catching were: bluefish (4.0), Atlantic mackerel (3.5), spot (3.4), and black sea bass (2.9).

Table 96. Relative Customer Interest and Success in Catching Selected Species in 1989. (1 = Low, 2 = Somewhat Low, 3 = Moderate, 4 = Somewhat High, and 5 = High).

| Species                       | Charter        |                | Party          |                |
|-------------------------------|----------------|----------------|----------------|----------------|
|                               | 1985<br>(mean) | 1989<br>(mean) | 1985<br>(mean) | 1989<br>(mean) |
| Large pelagics (marlin, tuna) | 3.9            | 2.4            | 3.1            | 2.8            |



|                                       |     |     |     |     |
|---------------------------------------|-----|-----|-----|-----|
| Sharks (other than dogfish)           | 3.2 | 2.4 | 2.1 | 1.9 |
| Bluefish                              | 3.9 | 3.9 | 4.6 | 4   |
| Atlantic mackerel                     | 2.4 | 3   | 3.5 | 3.5 |
| Summer flounder                       | 3.2 | 1.9 | 3.6 | 1.5 |
| Scup                                  | 1.4 | 1.7 | 2.2 | 2   |
| Black sea bass                        | 2.1 | 2.6 | 3.2 | 2.9 |
| Hakes                                 | 1.4 | 1.6 | 2.3 | 2.5 |
| Groundfish (cod, haddock, yellowtail) | 3   | 2.6 | 3   | 2.4 |
| Weakfish                              | 3.1 | 1.7 | 3.3 | 1.7 |
| Striped bass                          | 3.7 | 2.5 | 3.5 | 1.7 |
| Other: spot                           | 4.6 | 3.9 | 4.7 | 3.4 |

Charter boat owners reported a preference ordering similar to that of party boats for their customers, with the exception that large pelagics took the second ranked spot along with bluefish (Table 96). The top five desired species were: spot (4.6), large pelagics (3.9), bluefish (3.9), striped bass (3.7), and summer flounder (3.2).

In 1989, the average party boat customer traveled 67 miles (SD= 43 mi). The farthest party boat customer traveled 695 miles (SD = 1,125 mi.). In 1989, the average charter boat customer traveled 123 miles (SD = 194 mi.). The farthest charter boat customer traveled 727 miles (SD = 914 mi.).

Charter boat respondents indicated that 38% of their customers were more interested in a particular species, 15% were more interested in fishing enjoyment, and 46% were about equally interested in each. For party boats, the responses were 43% for a particular species, 12% for the fishing experience, and 45% equally for each.

For charter boats, 89% of the respondents were both owner and operator (7% just owner, 5% just captain). The party boat responses were 94% owner and captain, 2% just owner, and 4% just captain. Only 14% of the charter boats were used year round (86% seasonally), while 18% of the party boats were used year round (82% seasonally).

Thirty-six percent of the charter boat respondents indicated that they fished commercially in 1989, with 91% of those fishing commercially from the charter boat and 9% from another boat. For party boats, 26% of the respondents indicated they had fished commercially in 1989, with 69% of those fishing commercially from the party boat and 31% from another boat.

On a scale of 1 (almost none) to 5 (almost all), respondents were asked what part of their personal earnings in 1989 came from party and charter boat fishing, commercial fishing, or other sources. For charter boat respondents, the mean answers were: charter or party boat fishing, 2.2; commercial fishing, 1.5; and other sources, 4.0. For party boat respondents, the mean answers were: charter or party boat fishing, 3.2; commercial fishing 1.3; and other sources, 2.4.

Respondents were also asked what their perception of fishing success was for 1989 and what they thought their customers' perceptions of 1989 fishing success was. Ranking was on a scale of 1 (good) through 3 (bad). For charter boats, the operators reported a mean of 2.1 (SD = 0.7) for their own view and 1.9 (SD =

0.7) for their customers. For party boat operators, their own perception was 2.2 (SD = 0.6), while they thought their customers would rate the season at 2.0 (SD = 0.6).

The survey included a series of questions to determine how the respondents felt business was in 1989 compared to 1985. Both charter and party boats made slightly fewer trips in 1989 compared to 1985 (Table 97). The days per trip and/or trips per day were essentially unchanged. They operated fewer days per week, on average, and carried slightly fewer customers. The average price per trip increased from \$121.80 to \$149.50 for charter boats and \$26.20 to \$29.20 for party boats. The average number of fish taken per customer fell from 10.9 to 8.3 for charter boats and from 15.2 to 9.9 for party boats between 1985 and 1989. The number of crew members stayed relatively constant. The average cost per trip rose from \$96.10 to \$131.10 for charter boats and from \$113.30 to \$146.60 for party boats during the period.

Table 97. Party and charter boat operating experience in 1985 and 1989.

|  | Charter        |                | Party          |                |
|--|----------------|----------------|----------------|----------------|
|  | 1985<br>(mean) | 1989<br>(mean) | 1985<br>(mean) | 1989<br>(mean) |
| Ave. number of trips per year          | 57             | 50             | 142            | 130            |
| Ave. number of trips per day           | 1              | 1              | 1.3            | 1.4            |
| Ave. number of days per trip           | 3.2            | 3.1            | 5              | 4.6            |
| Ave. number of anglers per trip        | 5.2            | 5.1            | 20.9           | 19.5           |
| Ave. trip price per customer (\$)      | 121.8          | 149.5          | 26.2           | 29.2           |
| Ave. number of fish Taken per customer | 10.9           | 8.3            | 15.2           | 9.9            |
| Ave. number of crew members            | 1.4            | 1.4            | 2.1            | 2              |
| Ave. cost of fuel & supplies (\$)      | 96.1           | 131.1          | 113.3          | 146.6          |

#### 4.5 Marine Recreational Descriptive Statistics

In 1994, sportfishing surveys were conducted by NMFS in the Northeast Region (Maine to Virginia) to obtain demographic and economic information on marine recreational fishing participants from Maine to Virginia. Data from the surveys were then used to access socioeconomic characteristics of these participants, as well as to identify their marine recreational fishing preferences and their perceptions of current and prospective fishery management regulations. This information will be used in future stages of the research to estimate statistical models of the demand for marine recreational fishing for eight important recreational species. The information that follows is excerpted and paraphrased from a preliminary report by Steinback *et al.* (1999).

"Marine recreational fishing is one of the most popular outdoor recreational activities in America. In 1992, the lowest level of participation during the last ten years, approximately 2.57 million residents of coastal states in the Northeast Region participated in marine recreational fishing in their own state. Participation increased approximately 5% in 1993 (2.7 million) and increased another 14% in 1994 (3.1 million), exceeding the ten-year average of 2.9 million. Although the total number of finfish caught in the Northeast Region has declined over the past ten years effort (trips) has remained relatively stable. An estimated 22.4 million fishing trips were taken in 1994, up from 19.3 million in 1993."

The following discussion contains demographic and socioeconomic characteristics of anglers, as well as their preferences, attitudes, and opinions, toward recreational fishing activities and regulations. There was

little or no difference in mean age across subregions. "The largest proportion of anglers in both subregions were 36-45 years old (NE=28%, MA=25%). However, New England anglers were younger than Mid-Atlantic anglers. Results show that participation in marine recreational fishing increased with age, peaked between ages of 36 to 45, and subsequently declined thereafter. The resultant age distribution is similar to the findings of other marine recreational studies. However, the distribution is not reflective of the general population in these subregions. Bureau of the Census estimates indicate population peaks between the ages of 25 to 34 in both subregions, declines until the age of 64 and then increases substantially." The complete distribution of recreational anglers by age for both subregions is as follows: less than 18, 25.2% in NE and 25.6% in MA; between the ages of 18-24, 9.8% in NE and 9.7% in MA; between 25-34, 16.4% in NE and 17.0% in MA; between 35-44, 16.3% in NE and 16.2% in MA; between 45-54, 11.5% in NE and 11.8% in MA; between 55-64, 8.2% in NE and 8.4% in MA; and 65 and over, 12.6% in NE and 11.3% in MA. In this survey, anglers under the age of 16 were not interviewed and are not included in the analysis.

In both subregions, at least 88% of the anglers (age 25 and over) had obtained at least a high school degree (NE=91%, MA=88%). "While the educational background is similar across subregions, a greater portion of the anglers in New England earned college or post graduate/professional degrees (NE=29%, MA=23%). The shape of the educational distribution essentially mirrored the general population in both subregions. However, the average number of anglers without a high school degree was considerably lower than Bureau of the Census estimates (age 25 and over) for the general population. On the other hand, it appears that anglers in New England and the Mid-Atlantic earned less post graduate/professional degrees than Bureau of Census estimates."

When anglers were asked to describe their racial or ethnic origin, almost all of the anglers interviewed in both subregions considered themselves to be white (NE=95%, MA=90%). "In the Mid-Atlantic, most of the remaining individuals were black (7%), leaving 3% to be of other ethnic origins. In New England, the remaining anglers were evenly distributed across other ethnic origins. The high occurrence of white fishermen is representative of the general population of the coastal states in New England. Approximately 94% of the population in 1993 was estimated to be white. However, in the Mid-Atlantic, the percentage of white anglers was considerable higher than Bureau of Census populations estimates, and the percentage of black fishermen was 12% lower."

When anglers were asked to indicate from a range of categories what their total annual household income was, only minor differences between subregions were found. "The largest percentage of household incomes fell between \$30,001 and \$45,000 for both subregions (NE=27%, MA=26%). In comparison to the general population, anglers' annual household incomes are relatively higher in both subregions...Results are consistent with previous studies which showed that angler household incomes are generally higher than the population estimates."

If it is assumed that "years fished" is a proxy for "experience," the survey data shows that anglers in New England are relatively less experienced than anglers in the Mid-Atlantic. The distribution of recreational anglers years of experience is as follows: 0-5 years of experience, 22% in NE and 16% in MA; 6-10 years of experience, 10% in NE and 10% in MA; 11-15 years of experience, 13% in NE and 14% in MA; 16-20 years of experience, 9% in NE and 9% in MA; 21-25 years of experience, 12% in NE and 12% in MA; 26-30 years of experience, 13% in NE and 12% in MA; and 30 or more years of experience, 21% NE and 26% in MA.

On average, it was found that New England anglers spent more on boat fees, lodging, and travel expenses than Mid-Atlantic anglers. "During the follow-up telephone portion of the survey, anglers that fished from a party/charter boat or a private/rental boat were asked how much they personally spent on boat fees for the trip in which they were interviewed. Boat fees averaged \$61.00 per trip in New England and \$51.00 in the Mid-Atlantic." Two categories of lodging expenses were obtained. "The first category (Lodging (>0)) is an estimate of the mean lodging expense per night for those anglers who indicated they spent at least one night away from their residence and personally incurred a lodging cost. Subsequently, the second category

(Lodging (all)) is an estimate of mean lodging expenses across all overnight anglers, regardless of whether an angler incurred a lodging expense. Per night costs were estimated by dividing total lodging costs for the trip by the number of days the angler was away from his/her residence on the trip." Anglers that personally incurred lodging expenses spent \$58.00 on average per night in New England and \$47.00 per night in the Mid-Atlantic. "Across all overnight anglers, per night lodging expenses in New England averaged \$29.00 and in the Mid-Atlantic, \$21.00." Anglers expenditures also included money spent on gas, travel fares, tolls, and ferry and parking fees. "One-way travel expenditures averaged \$11.00 in New England and \$8.00 in the Mid-Atlantic per trip. Therefore, if arrival costs are tantamount to departure costs, average round-trip travel expenses would approximate \$22.00 in New England and \$16.00 in the Mid-Atlantic."

Survey results show that over 50% of the anglers in both subregions indicated boat ownership (NE=51%, MA=53%). These results were obtained when anglers were asked if anyone living in their household owns a boat that is used for recreational saltwater fishing.

Regarding the duration of the interviewed trip, "at least 80% of the anglers in both subregions indicated they were on a one-day fishing trip (NE=80%, MA=84%). One-day fishing trips were defined to be trips in which an angler departs and returns on the same day. Less than one fourth of the respondents indicated the day fishing was part of a longer trip which they spent at least one night away from their residence (NE=20%, MA=16%)."

"Respondents were asked why they chose to fish at the site they were interviewed... 'Convenience' and 'better catch rates' were the main reasons why anglers chose fishing sites in both subregions. Forty-nine percent of the anglers in New England and 57% of the anglers in the Mid-Atlantic indicated 'convenience' as either first or second reason for site choice. 'Better catch rates' was the first or second stated reason for site choice by 51% of the anglers in New England and 50% of the anglers in the Mid-Atlantic. Other notable responses were 'always go there,' 'boat ramp,' 'access to pier,' and 'scenic beauty.'...Results indicate that although anglers chose fishing sites for many different reasons, sites that offered good catch rates and were convenient attracted the most anglers."

Recreational anglers were asked to rate recreational fishing against their other outdoor activities during the last two months. Specifically, they were asked if fishing was their most important outdoor activity, their second most important outdoor activity, or only one of many outdoor activities? "Over 60% of the respondents in both subregions (NE=61%, MA=68%) reported marine recreational fishing was their most important outdoor activity during the past two months. Less than 30% in both subregions (NE=27%, MA=20%) said recreational fishing was only one of many outdoor activities." This is consistent with national outdoor recreation surveys carried over the past three decades indicating that fishing is consistently one of the top outdoor recreational activities in terms of number of people who participate.

Recreational anglers ratings of reasons (7 preestablished reasons) for marine fishing are presented in Table 98. More than 65% of the anglers in both subregions said that it was very important to go marine fishing because it allowed them to: spend quality time with friends and family (NE=81%, MA=85%); enjoy nature and the outdoors (NE=89%, MA=87%); experience or challenge of sport fishing (NE=69%, MA=66%); and relax and escape from my daily routine (NE=83%, MA=86%). "The reasons that were rated as not important by the largest proportion of anglers consisted of: catch fish to eat (NE=42%), to be alone (NE=55%, MA=58%), and to fish in a tournament or when awards were available (NE=79%, MA=73%). In the Mid-Atlantic, although to catch fish to eat was rated as being somewhat important by the largest proportion of anglers (40%), approximately 31% felt that catching fish to eat was very important. However, in New England, only 20% concurred. It is clear from these responses that marine recreational fishing offers much more than just catching fish to anglers. Over 80% of the respondents in both subregions perceived recreational fishing as a time to spend with friends and family, a time to escape from their daily routine, and time to enjoy nature and outdoors. While catching fish to eat is somewhat important to anglers, findings of this survey generally concur with previous studies that found non-catch reasons are

rated highly by almost all respondents while catch is very important for about a third and catching to eat fish is moderately important for about another third."

Table 98. Recreational anglers' ratings (mean) of reasons for marine fishing, by subregion. Source: Steinback *et al.*, 1999.

| Statement  | New England   |                    |                | Mid-Atlantic  |                    |                |
|--|---------------|--------------------|----------------|---------------|--------------------|----------------|
|  | Not Important | Somewhat Important | Very Important | Not Important | Somewhat Important | Very Important |
| To Spend Quality Time with Friends and Family              | 4.4%          | 14.3%              | 81.3%          | 3.0%          | 12.0%              | 85.0%          |
| To Enjoy Nature and the Outdoors                           | 1.4%          | 10.1%              | 88.5%          | 1.1%          | 11.6%              | 87.3%          |
| To Catch Fish to Eat                                       | 42.2%         | 37.4%              | 20.4%          | 29.3%         | 40.1%              | 30.6%          |
| To Experience the Excitement or Challenge of Sport Fishing | 6.2%          | 24.9%              | 68.8%          | 8.4%          | 26.0%              | 65.6%          |
| To be Alone  | 55.0%         | 27.9%              | 17.1%          | 57.7%         | 25.8%              | 16.4%          |
| To Relax and Escape from my Daily Routine                  | 3.4%          | 13.3%              | 83.3%          | 2.6%          | 11.9%              | 85.5%          |
| To Fish in a Tournament or when Citations are Available    | 78.6%         | 14.0%              | 7.4%           | 73.4%         | 17.1%              | 9.5%           |

"The economic survey sought to solicit anglers opinions regarding four widely applied regulatory methods used to restrict total recreational catch of the species of fish for which they typically fish: (1) limits on the minimum size of the fish they can keep; (2) limits on the number of fish they can keep; (3) limits on the times of the year when they can keep the fish they catch; and (4) limits on the areas they fish. Anglers were asked whether or not they support or opposed the regulations." As indicated in Table 99, strong support existed for all regulatory methods in both subregions. Limits on the minimum size of fish anglers could keep generated the highest support in both regions (NE=93%, MA=93%), while limits on the area anglers can fish, although still high, generated relatively lower support (NE=68%, MA=66%).

Table 99. Recreational anglers' ratings (mean) of fishing regulation methods, by subregion. Source: Steinback *et al.*, 1999.

| Type of Regulation   | New England |        | Mid-Atlantic |        |
|--|-------------|--------|--------------|--------|
|  | Support     | Oppose | Support      | Oppose |
| Limits on the Minimum Size of Fish You Can Keep                      | 92.5%       | 7.5%   | 93.2%        | 6.8%   |
| Limits on the Number of Fish You Can Keep                            | 91.1%       | 8.9%   | 88.3%        | 11.7%  |
| Limits on the Times of the Year When You Can Keep the Fish You Catch | 78.8%       | 21.2%  | 77.1%        | 22.9%  |

|                                  |       |       |       |       |
|----------------------------------|-------|-------|-------|-------|
| Limits on the Areas You Can Fish | 67.9% | 32.1% | 66.0% | 34.0% |
|----------------------------------|-------|-------|-------|-------|

Regulations which limit the number of fish anglers can keep ranked second (NE=91%, MA=88%). The results from this solicitation indicate that recreational anglers in the Northeast Region appear to be conservation oriented and generally support regulations employed to restrict total catch. Not surprisingly, when analyzing anglers' opinions regarding the four widely applied regulatory methods, it was found that anglers in all modes indicated strong support for the regulatory measures. With minimum size limits generating the strongest support, followed by catch limits, seasonal closures, and lastly, area closures (Table 100). "Although party/charter, private/rental, and shore respondents did offer varying degrees of support for each of a selection of regulatory measures, similar support existed across all modes. Support was highest for common regulatory methods currently being implemented in New England and the Mid-Atlantic (e.g., size and bag limits), than for area and seasonal closures."

Table 100. Recreational anglers' ratings (mean) of fishing regulation methods, by mode. Source: Steinback *et al.*, 1999.

| Type of Regulation   | Party/Charter |            | Private/Rental |            | Shore   |            |
|--|---------------|------------|----------------|------------|---------|------------|
|  | Support       | Oppos<br>e | Support        | Oppos<br>e | Support | Oppos<br>e |
| Limits on the Minimum Size of Fish You Can Keep                      | 92.1%         | 7.9%       | 94.4%          | 5.6%       | 90.1%   | 9.9%       |
| Limits on the Number of Fish You Can Keep                            | 87.9%         | 12.1%      | 90.0%          | 10.0%      | 87.7%   | 12.3%      |
| Limits on the Times of the Year When You Can Keep the Fish You Catch | 79.2%         | 20.8%      | 78.3%          | 21.7%      | 75.0%   | 25.0%      |
| Limits on the Areas You Can Fish                                     | 74.4%         | 25.6%      | 65.9%          | 34.1%      | 63.6%   | 36.4%      |

## 5.0 ANALYSIS OF IMPACTS ON THE ENVIRONMENT

### 5.1 Impacts of Alternatives upon the Affected Environment

The environment in which the bluefish fishery is prosecuted was described in detail by the Council in the FMP and Amendment 1. This fishery management plan regulates the fishery in the U.S. waters of the Western Atlantic Ocean. The fishery is prosecuted by vessels throughout the range, though the geographic focus of the fishery varies somewhat from year to year.

Bluefish are pursued in both state and EEZ waters by a variety of commercial gears. Coastwide (1987-1996 combined) most bluefish (48%) were landed by gillnets (all types combined) followed by otter trawls (19%). Fish pound nets accounted for 7% of the commercial catch followed by hand and troll lines (6%) and haul seines (3%) during the same time period. Some type of gillnet caught significant amounts of bluefish in all states except Connecticut, South Carolina, Georgia and Florida. Almost all of the bluefish in Maine and New Hampshire were caught by gillnets and this gear type was also predominant in Delaware waters. Runaround gillnets were predominant in New Jersey.

During the period 1976-1987, beach haul seines harvested a significant portion of bluefish in New York and South Carolina. The quantities of bluefish harvested by this gear during 1987-1996 declined considerably relative to earlier years, with measurable landings only in New York, Maryland, Virginia, and North Carolina. The states of Maryland and South Carolina had more bluefish landed commercially by hand lines from 1987

to 1996 than any other gear type. Fish otter trawls were predominant in Rhode Island, Connecticut, and New York.

Quantification of specific gear types on various bottom types is poorly understood. The Council characterized gillnets as having a potential impact to the environment. It can be assumed that increased effort would tend to have greater negative consequences. Conversely, any action which acts to reduce fishing effort, would tend to reduce the negative gear impacts on the physical environment. There is no way to establish that one quota alternative will have fewer impacts on the environment relative to another. For instance, it could be concluded that a larger quota would result in a larger number of or longer fishing trips, and, therefore, the potential for greater habitat impacts. However, this is not necessarily the case. A larger quota could mean a state establishes a higher trip limit, thereby resulting in an equal number of fishing trips. Given this uncertainty, the various alternatives discussed in this document cannot be analyzed individually for impacts on the affected environment.

In addition to the issue of general habitat degradation, several habitats within the bluefish management unit are protected under the National Marine Sanctuaries Act of 1973. National marine sanctuaries are allowed to be established under the National Marine Sanctuaries Act of 1973. Currently, there are 11 designated marine sanctuaries that create a system that protects over 14,000 square miles (National Marine Sanctuary Program 1993).

There are four designated national marine sanctuaries in the area covered by the FMP: the *Monitor* National Marine Sanctuary off North Carolina, the Stellwagen Bank National Marine Sanctuary off Massachusetts, Gray's Reef off Georgia and the Florida Keys National Marine Sanctuary. There is currently one additional proposed sanctuary on the east coast, the Norfolk Canyon.

The *Monitor* National Marine Sanctuary was designated on 30 January 1975, under Title III of the Marine Protection, Research and Sanctuaries Act of 1972 (MPRSA). Implementing regulations (15 CFR 924) prohibit deploying any equipment in the Sanctuary, fishing activities which involve "anchoring in any manner, stopping, remaining, or drifting without power at any time" (924.3 (a)), and "trawling" (924.3 (h)). The Sanctuary is clearly designated on all National Ocean Service (NOS) charts by the caption "protected area." This minimizes the potential for damage to the Sanctuary by fishing operations. Correspondence for this sanctuary should be addressed to: *Monitor* NMFS, NOAA, Building 1519, Fort Ousterhout, Virginia 23604.

Gray's Reef was designated a National Marine Sanctuary in January 1981. Located 17 miles off the coast of Georgia, Gray's Reef is one of the largest nearshore sandstone reefs in the southeastern United States. The sanctuary encompasses 17 nm<sup>2</sup> of live-bottom habitat. Implementing regulations (15 CFR 922.90) permit recreational fishing and commercial fishing is restricted. Specifically, wire fish traps and bottom tending fishing gears (dredges, trawls etc.) are prohibited. Correspondence for this sanctuary should be addressed to: Gray's Reef Sanctuary Manager, 10 Ocean Science Circle, Savannah, Georgia 31411.

NOAA/NOS issued a proposed rule on 8 February 1991 (56 FR 5282) proposing designation under MPRSA of the Stellwagen Bank National Marine Sanctuary, in federal waters between Cape Cod and Cape May, Massachusetts. On 4 November 1992, the Sanctuary was Congressionally designated. Implementing regulations (15 CFR 940) became effective March 1994. Commercial fishing is not specifically regulated by Stellwagen Bank regulations. The regulations do, however, call for consultation between federal agencies and the Secretary of Commerce on proposed agency actions in the vicinity of the Sanctuary that "may affect" sanctuary resources. Correspondence for this sanctuary should be addressed to: Stellwagen Bank NMS, 14 Union Street, Plymouth, Massachusetts 02360.

The United States Congress passed the Florida Keys National Marine Sanctuary and Protection Act of 1990 designating the Florida Keys a National Marine Sanctuary. The act required NOAA to develop a comprehensive management plan with implementing regulations to govern the overall management of the Sanctuary and to protect and conserve its resources. The Sanctuary consists of 2,800 nm<sup>2</sup> of coastal and

oceanic waters and the associated submerged lands surrounding the Florida Keys, extending westward to include the Dry Tortugas, but excluding the Dry Tortugas National Park. The sanctuary prohibits the taking of coral or live rock, except as permitted by the NMFS or the state of Florida. The sanctuary contains designated Sanctuary Preservation Areas and Replenishment Reserves where the taking or disturbance of sanctuary resources is prohibited. Fishing is prohibited in these non-consumptive areas. Correspondence for this sanctuary should be addressed to Superintendent, NOAA/Florida Keys National Marine Sanctuary, P.O. Box 500368, Marathon, Florida 33050.

Details on sanctuary regulations may be obtained from the Chief, Sanctuaries and Resources Division (SSMC4) Office of Ocean and Coastal Resource Management, NOAA, 1305 East-West Highway, Silver Spring, MD 20910.

## **5.2 Impacts of Alternatives upon Endangered or Threatened Species or Marine Mammal Populations**

The impacts of the bluefish fishery upon endangered and threatened species and marine mammal populations are described in detail by the Council in the FMP amendment that instituted fishery management measures for these fisheries.

Four hundred and seventy-one large whale sightings, 1,547 small whale sightings, and 1,172 sea turtles were encountered in the surveys. The "estimated minimum population number" for each mammal and turtle in the area, as well as those species currently included under the Endangered Species Act, were also tabulated (University of Rhode Island 1982).

CETAP concluded that both large and small cetaceans were widely distributed throughout the study area in all four seasons and grouped the 13 most commonly seen species into three categories, based on geographical distribution. The first group contained only the harbor porpoise, which is distributed only over the shelf and throughout the Gulf of Maine, Cape Cod, and Georges Bank, but probably not southwest of Nantucket. The second group contained the most frequently encountered baleen whales (fin, humpback, minke, and right whales) and the white-sided dolphin. These were found in the same areas as the harbor porpoise and also occasionally over the shelf at least to Cape Hatteras or out to the shelf edge. The third group indicated a "strong tendency for association with the shelf edge" and included the grampus, striped, spotted, saddleback, and bottlenose dolphins, and the sperm and pilot whales.

Loggerhead turtles were found throughout the study area, but appeared to migrate north to about Massachusetts in summer and south in winter. Leatherbacks appeared to have had a more northerly distribution. CETAP hypothesized a northward migration of both species in the Gulf Stream with a southward return in continental shelf waters nearer to shore. Both species usually were found over the shoreward half of the slope and in depths less than 200 feet. The northwest Atlantic may be important for sea turtle feeding or migrations, but the nesting areas for these species generally are in the South Atlantic and Gulf of Mexico.

This problem may become acute when climatic conditions result in concentration of turtles and fish in the same area at the same time. These conditions apparently are met when temperatures are cool in October but then remain moderate into mid-December and result in a concentration of turtles between Oregon Inlet and Cape Hatteras, North Carolina. In most years, sea turtles leave Chesapeake Bay and filter through the area a few weeks before the bluefish fishery becomes concentrated. Efforts are currently under way (by VIMS and the U.S. Fish and Wildlife Service refuges at Back Bay, Virginia, and Pea Island, North Carolina) to more closely monitor these mortalities due to trawls. Fishermen are encouraged to carefully release turtles captured incidentally and to attempt resuscitation of unconscious turtles as recommended in the 1981 *Federal Register* (pages 43976 and 43977).



The only other endangered species occurring in the northwest Atlantic is the shortnose sturgeon (*Acipenser brevirostrum*). The Councils urge fishermen to report any incidental catches of this species to the Regional Administrator, NMFS, One Blackburn Drive, Gloucester, Massachusetts 01930, who will forward the information to persons responsible for the active sturgeon data base.

The range of bluefish and the above mentioned marine mammals and endangered species overlap, and there always exists a potential for an incidental kill. Except in unique situations, such accidental catches should have a negligible impact on marine mammal or abundances of endangered species, and the Councils do not believe that implementation of this FMP will have any adverse impact upon these populations.

Commercial and recreational fisheries lose thousands of pounds of fishing gear annually. Incidences of entanglement in and ingestion of this gear is common among sea turtles and marine mammals and may result directly or indirectly in some deaths.

### 5.3 Impact of Alternative 1 (Preferred) on the Environment

This alternative examines the impacts to the environment that would result from Alternative 1 (preferred). The derivation of the TAL and its allocation among the commercial and recreational sectors are fully described in Section 3.0 of the EA. The preferred alternative would set the coastwide limit at 26.865 million lb (12.19 million kg). Based on this limit, 10.5 million lb (4.762 million kg) would be allocated to the commercial fishery and 16.365 million lb (7.423 million kg) to the recreational fishery in 2002.

An update on the status of the bluefish stock (Lazar 2001) indicates that fishing mortality rates on bluefish peaked in 1991 at 0.84 and have steadily declined since then to 0.326 in 2000. A two year projection (using a constant fishing mortality rate  $F=0.326$  - equal to the 2000 rate) indicates that the bluefish stock will increase from an estimated 2001 biomass of 59.64 million lb (27.05 million kg) to 78.44 million lb (35.60 million kg) in 2002.

The proposed commercial quota would increase overall landings. The commercial quota will be allocated as indicated in Table 101. The state by state quota allocation for 2002 under Alternative 1 is shown in Table 101.

Table 101. The 2002 state by state commercial bluefish quota and the 2000 commercial landings by state. Source: NMFS, General Canvass Data.

| State | % of quota | 2002 Commercial Quota Alternative 1 | 2002 Commercial Quota Alternative 2 | 2002 Commercial Quota Alternative 3 | 2000 Landings |
|-------|------------|-------------------------------------|-------------------------------------|-------------------------------------|---------------|
| ME    | 0.6685     | 70,193                              | 30,531                              | 64,062                              | 118           |
| NH    | 0.4145     | 43,523                              | 18,931                              | 39,722                              | 23,938        |
| MA    | 6.7167     | 705,254                             | 306,761                             | 643,661                             | 282,353       |
| RI    | 6.8081     | 714,851                             | 310,935                             | 652,420                             | 347,553       |
| CT    | 1.2663     | 132,962                             | 57,834                              | 121,350                             | 33,452        |
| NY    | 10.3851    | 1,090,436                           | 474,302                             | 995,204                             | 1,805,597     |
| NJ    | 14.8162    | 1,555,701                           | 676,677                             | 1,419,836                           | 1,341,403     |
| DE    | 1.8782     | 197,211                             | 85,780                              | 179,988                             | 28,525        |

|       |          |            |           |           |           |
|-------|----------|------------|-----------|-----------|-----------|
| MD    | 3.0018   | 315,189    | 137,096   | 287,662   | 84,250    |
| VA    | 11.8795  | 1,247,348  | 542,553   | 1,138,412 | 532,852   |
| NC    | 32.0608  | 3,366,384  | 1,464,262 | 3,072,386 | 3,362,645 |
| SC    | 0.0352   | 3,696      | 1,608     | 3,373     | 121       |
| GA    | 0.0095   | 998        | 434       | 910       | 799       |
| FL    | 10.0597  | 1,056,269  | 459,441   | 964,021   | 142,186   |
| Total | 100.0001 | 10,500,011 | 4,567,145 | 9,583,010 | 7,985,792 |

The bluefish measures should not result in any negative impacts on other fisheries. Bluefish is primarily a recreational fishery caught by hook and line. The commercial fishery for bluefish is primarily prosecuted with gillnets and otter trawls. The 2002 commercial quota is 0.917 million lb more than the 2001 quota. On average, commercial bluefish landings for the 1996-2000 period are about 9.434 million lb (4.279 million kg) (Table 2). Unless market conditions change substantially in year 2002, commercial bluefish fishermen on a coastwide basis would likely land bluefish in an amount close to the 1995-1999 average. However, landings may increase in some states like North Carolina where the quota constrained fishermen in 2001. In fact, as the result of increased landings, North Carolina received transfers of bluefish from other states. In addition, landings to date indicate that there will be overages in New York in 2001. The estimated overages will be used to adjust the final 2002 quota in that state. As such, fishing opportunities in that state will differ from those in 2001. There is no indication that the market environment for commercially caught bluefish will change considerably in year 2002. As such, increase in effort in the directed bluefish fishery is not expected, thus, the incidental catch rates of other species will likely not change.

In the absence of a quota transfer, the commercial fishery would receive a 4.567 million lb (2.07 million kg) quota for 2002. This would represent a reduction of 52% from the 2001 quota (9.58 million lb; 4.35 million kg) and a 43% reduction from the 2000 landings (7.986 million lb; 3.62 million kg). Given recent recreational landings (11.7 million lb in 1996; 14.3 million lb in 1997; 12.3 million lb in 1998; 8.3 million lb in 1999 and 10.2 million lb in 2000), the projected recreational landings for 2002 are expected to be less than 83% of the TAL in year 2002. As such, the Council and Board decided to set the 2002 commercial allocation equal to 10.5 million lb (4.762 million kg), the most allowed by Amendment 1 regulation.

A significant portion of bluefish commercial landings are bycatch. If the transfer from the recreational fishery to the commercial fishery was not made large quantities of bluefish would be discarded by commercial fishermen. Therefore, the mortality of bluefish would not be reduced and fish would be wasted.

The stock assessment indicates that the stock size in 2002 will allow a landing limit of 28.865 million lb (13.09 million kg) to achieve the target fishing mortality rate in 2002. The proposed commercial quota allocation under this alternative would provide commercial fishermen with increased fishing opportunities in 2002 compared to 2001. Stable or increase landings from one year to the next are desirable from both a management and industry perspective. Drastic reductions in the quota from one year to the next could lead to increased levels of noncompliance by both commercial and recreational fishermen. A stable landings pattern would allow fishermen, processors, party/charter boat operators, equipment and bait suppliers to make business decisions.

A recreational harvest limit was established for the first time in 2000, with the implementation of Amendment 1. A recreational harvest limit of 16.365 million lb (7.423 million kg) in 2002 would be more than 61% the recreational landings for 2000. The possession limit would remain at 15 fish.

Unfortunately, very little information is available to empirically estimate how sensitive the affected party/charter boat anglers might be to the proposed regulations. The allocation transfer from the recreational sector to the commercial sector is not anticipated to have any negative effects on recreational fishermen. The recreational harvest limit for 2002, after the transfer is made, would be double the recreational landings estimated for 2000. Given the level of the recreational harvest limit for 2002 and recreational landings in recent years it is not anticipated that this management measure will affect the demand for party/charter boat trips in a negative manner. As such, the transfer is not expected to affect recreational landings in 2002.

The TAL proposed under this alternative (as well as the other alternatives evaluated in this document) would achieve the target F in 2002. This alternative was chosen by the Council and Board because it provides the best allocation among the commercial and recreational sectors considering recent fishing practices.

In addition to the proposed TAL for bluefish, the Council and Commission recommended a research set-aside for the bluefish fishery. In the annual specification process for 2002, the Council approved a research set aside amount equal to 2 percent of the total allowable harvest. Assuming that NMFS approves the preferred TAL alternative for bluefish, the set-aside amount would be 537,300 lb. The social and economic impacts of this research should be minimal. The set-aside could be worth as much as \$188,055 dockside based on a 2000 price of \$0.35 per pound. As such, assuming an equal reduction amongst all active vessels (See PREE), this could mean a reduction of about \$92 per individual vessel. Changes in the recreational harvest limit would be insignificant; the limit changes from 16.365 to 16.038 million lb (a 2 percent decrease) if 2 percent of the TAL is used for research. As such, it is unlikely that there would be negative impacts.

#### **5.4 Impact of Alternative 2 (No Action) on the Environment**

The derivation of the TAL and its allocation among the commercial and recreational sectors for Alternative 2 are fully described in Section 3.0 of the EA. This alternative is identical to Alternative 1, except that no transfer is made to the commercial fishery. This alternative would set the coastwide limit at 26.865 million lb (12.19 million kg). Based on this limit, 4.567 million lb (2.07 million kg) would be allocated to the commercial fishery and 22.298 million lb (10.11 million kg) to the recreational fishery in 2002.

An update on the status of the bluefish stock (Lazar 2001) indicates that fishing mortality rates on bluefish peaked in 1991 at 0.84 and have steadily declined since then to 0.326 in 2000. A two year projection (using a constant fishing mortality rate  $F=0.326$  - equal to the 2000 rate) indicates that the bluefish stock will increase from an estimated 2001 biomass of 59.64 million lb (27.05 million kg) to 78.44 million lb (35.60 million kg) in 2002.

The proposed commercial quota would decrease overall commercial bluefish landings by approximately 3.419 million lb (1.55 million kg) compared to 2000 landings (Table 101). The commercial quota will be allocated as indicated in Table 101. The bluefish commercial quota will be managed by a system similar to the one used to manage the summer flounder commercial quota. The state by state quota allocation for 2002 under Alternative 2 is shown in Table 101.

The bluefish measures should not result in any negative impacts on other fisheries. Bluefish is primarily a recreational fishery caught by hook and line. The commercial fishery for bluefish is primarily prosecuted with gillnets and a significant portion of commercial landings are bycatch (MAFMC 1990). This 2002 commercial quota would allow fishermen to land fewer bluefish compared to 2000 (3.419 million lb; 1.55 million kg). As such, effort in the directed bluefish fishery could decrease and the incidental catch rates of other species would also decrease.

A significant portion of bluefish commercial landings are bycatch and as such, the lack of transfer to the commercial fishery could result in large quantities of bluefish discarded by fishermen. The mortality of bluefish would not be reduced and fish would be wasted.

Increased stock size in 2002 will increase the likelihood that a landing limit of million lb 26.865 million lb (12.19 million kg) will achieve the target fishing mortality rate in 2001. A recreational harvest limit of 22.298 million lb (10.11 million kg) in 2001 would be more than two times the amount of recreational landings for 2000.

Unfortunately, very little information is available to empirically estimate how sensitive the affected party/charter boat anglers might be to the proposed regulations. Given the level of the recreational harvest limit for 2002 and recreational landings in recent years it is not anticipated that this management measure will affect the demand for party/charter boat trips in a negative manner.

The TAL proposed under this alternative (as well as the other alternatives evaluated in this document) would achieve the target F in 2001. However, this alternative was not chosen by the Council and Board because it does not provide the best allocation among the commercial and recreational sectors considering recent fishing practices. In addition, this alternative could result in more bluefish being discarded.

### **5.5 Impact of Alternative 3 (Status Quo) on the Environment**

The derivation of the TAL and its allocation among the commercial and recreational sectors for Alternative 3 are fully described in Section 3.0 of the EA. This alternative is identical to Alternative 1, except that a transfer of 5.016 million lb (2.28 million kg) is made to the commercial fishery. This alternative would set the coastwide limit at 26.865 million lb (12.19 million kg). Based on this limit, 9.583 million lb (4.35 million kg) would be allocated to the commercial fishery and 17.282 million lb (7.84 million kg) to the recreational fishery in 2002.

An update on the status of the bluefish stock (Lazar 2001) indicates that fishing mortality rates on bluefish peaked in 1991 at 0.84 and have steadily declined since then to 0.326 in 2000. A two year projection (using a constant fishing mortality rate  $F=0.326$  - equal to the 2000 rate) indicates that the bluefish stock will increase from an estimated 2001 biomass of 59.64 million lb (27.05 million kg) to 78.44 million lb (35.60 million kg) in 2002.

The proposed commercial quota would allow overall commercial bluefish landings to increase by approximately 1.597 million lb (0.72 million kg) compared to 2000 landings (Table 101). The commercial quota will be allocated as indicated in Table 101. The bluefish commercial quota will be managed by a system similar to the one used to manage the summer flounder commercial quota. The state by state quota allocation for 2002 under Alternative 3 is shown in Table 101.

The bluefish measures should not result in any negative impacts on other fisheries. Bluefish is primarily a recreational fishery caught by hook and line. The commercial fishery for bluefish is primarily prosecuted with gillnets and otter trawls. This 2002 commercial quota would allow fishermen to land an additional 1.597 million lb (0.72 million kg) of bluefish compared to 2000. However, on average, commercial bluefish landings for the 1996-2000 period are about 9.434 million lb (4.28 million kg) (Table 2). Unless market conditions change substantially in year 2002, commercial bluefish fishermen would likely have bluefish landings close to the 1996-2000 average. However, landings may increase in some states like North Carolina where the quota constrained fishermen in 2001. In fact, as the result of increased landings, North Carolina received transfers of bluefish from other states. In addition, landings to date indicate that there will be overages in New York in 2001. The estimated overages will be used to adjust the final 2002 quota in that state. As such, fishing opportunities in that state will differ from those in 2001. There is no indication that the market environment for commercially caught bluefish will change considerably in year 2002.

Increased stock size in 2002 will increase the likelihood that a landing limit of million lb 26.865 million lb (12.19 million kg) will achieve the target fishing mortality rate in 2002.

A recreational harvest limit of 17.28 million lb (7.83 million kg) in 2001 would be about double the amount of recreational landings for 2000.

Unfortunately, very little information is available to empirically estimate how sensitive the affected party/charter boat anglers might be to the proposed regulations. The allocation transfer from the recreational sector to the commercial sector is not anticipated to have any negative effects on recreational fishermen. The recreational harvest limit for 2002, after the transfer is made, would be about double the recreational landings estimated for 2000. Given the level of the recreational harvest limit for 2002 and recreational landings in recent years it is not anticipated that this management measure will affect the demand for party/charter boat trips in a negative manner. As such, the transfer is not expected to affect recreational landings in 2002.

## **5.6 Social Impacts**

It is important to mention that the proposed commercial quota for bluefish for year 2002 is slightly higher than the quota specified for 2001. However, when the overall 2002 adjusted commercial quota is allocated to individual states, New York and North Carolina are subject to a reduction in landings in year 2002 compared to their 2001 adjusted quotas (See PREE, Sec. 5.0). Nevertheless, the landings and revenues per vessel for the state whose quotas are being lowered in Alternative 1 (the preferred alternative) are such a small portion of overall landings and revenues for the majority of those vessels that impacts are expected to be small (See PREE, Sec. 5.0).

Alternative 1 establishes a recreational harvest limit that is about 61% greater than the 2000 landings. The specifications are not expected to affect in a negative way the overall demand for recreational fishing trips in the Atlantic Coast (See PREE, Sec. 5.0). As such, there should not be significant adverse impacts to ports and communities.

A description of the principal ports and communities is presented in Section 4.3 of the EA. McCay and Cieri (2000) did not report considerable or widespread gear specialization for bluefish. Gear that contributed to bluefish landings included handlines, drift and sink gillnets, beach seines, and various other gear. However, the value of bluefish to total port landings was small in 1998 (4.6% in Freeport, NY; 4.2% in Mattituck and Greenport, NY; 2.1% in Montauk, NY; 5.2% in Shinnecock and Hampton Bay, NY; 0.2% in Cape May, NJ; less than 2% in Wildwood, NJ; less than 0.1% in Cumberland County, NJ; 0.2% in Delaware; 0.3% in Ocean City, MD; 0.1% in Chesapeake, Bay; 0.7% in Virginia Beach and Lynhaven, VA; 0.4% in Hampton and Seaford, VA; 0.6% in Northampton County, VA; 0.5% in Accomack County, VA; 6.4% in Dare County, NC). McCay and Cieri (2000) also report landings for bluefish in Amagansett, NY; Brooklyn, NY; Belford and Point Pleasant, NJ; Barnegat Light, NJ; Cape May County, NJ; York County, VA; Carteret County, NC; Hyde County, NC; Halifax County, NC; and Columbus County, NC.

A distinction needs to be made, however, between impacts to individuals and impacts to communities. Where the number of affected individuals in a community is large, the types and degree of impacts are likely to be the same at each level. Where the numbers of individuals are small, however, they may not be the same at each level.

While some individual fishermen and their families may find the final management measures for 2002 to have significant impacts, the larger communities and towns in which they live will not.

### Vessel affected under the 2002 recommended harvest levels (Alternative 1)

Under Alternative 1 (See PREE, Sec. 5.0), a total of 33 vessels are impacted. Thirty-one (94%) of the affected vessels hold some combination of federal permits. That means that all of these vessels have shown landings of bluefish in 2000, and also hold federal permits for other fisheries in 2000. It is possible that the remaining 2 (6%) vessels that do not show having any federal permits in 2000 have opted for fishing in state waters only and as such, did not renew their federal permits in 2000, or have ceased business.

Many of these vessels hold permits in various fisheries (Table 104)— especially commercial permits for multispecies; sea scallops, scup, black sea bass, dogfish, monkfish, and squid-mackerel-butterfish. In addition, most vessel also hold a variety of other incidental permits, though the degree to which they can compensate for reductions in bluefish due to reductions in 2002 quota versus 2001 adjusted quota is questionable. Vessels holding multiple permits would be able to maintain diverse fishing opportunities.

Table 104. Federal permits held by the 33 commercial vessels impacted under Alternative 1.

|                              | Northeast Region Permit Status <sup>a</sup> |                                     | Number of Vessels | Percent of Permitted Vessels |
|------------------------------|---|-------------------------------------|-------------------|------------------------------|
|                              |   |                                     |                   |                              |
| Commercial                   | Multispecies                                | Limited Access                      | 10                | 30                           |
|                              | Multispecies                                | Open Access                         | 17                | 52                           |
|                              | Atl. Sea Scallop                            | Open Access                         | 13                | 39                           |
|                              | Surfclam                                    | Open Access <sup>b</sup>            | 4                 | 12                           |
|                              | Ocean Quahog                                | Open Access <sup>b</sup>            | 5                 | 15                           |
|                              | Lobster                                     | Limited Access                      | 4                 | 12                           |
|                              | Summer Flounder                             | Limited Access                      | 9                 | 27                           |
|                              | Scup  | Limited Access                      | 21                | 64                           |
|                              | Loligo/Illex/ Butterfish                    | Limited Access                      | 4                 | 12                           |
|                              | Loligo/Illex/ Butterfish                    | Incidental/Open Access <sup>c</sup> | 22                | 67                           |
|                              | Black Sea Bass                              | Limited Access                      | 23                | 70                           |
|                              | Dogfish                                     | Open Access                         | 26                | 79                           |
|                              | Monkfish                                    | Limited Access                      | 5                 | 15                           |
|                              | Monkfish                                    | Incidental/Open Access <sup>c</sup> | 15                | 45                           |
| Recreational (Party/Charter) | Multispecies                                | Open Access                         | 3                 | 9                            |
|                              | Lobster                                     | Limited Access                      | 1                 | 3                            |
|                              | Summer Flounder                             | Open Access                         | 7                 | 21                           |
|                              | Scup  | Open Access                         | 5                 | 15                           |
|                              | Squid/Mackerel/ Butterfish                  | Open Access                         | 4                 | 12                           |
|                              | Black Sea Bass                              | Open Access                         | 5                 | 15                           |

<sup>a</sup>For specific restrictions refer to Northeast Fisheries Regulations.

<sup>b</sup>To harvest and land, and allocation of quota is required.

<sup>c</sup>Includes: multispecies, squid, mackerel, butterfish, and monkfish.

Twenty-nine vessels identified as having federal permits for any species are h-ported (home port) in New York (Table 105). This is to be expected, as New York will incur a substantial decrease in their 2002 quota allocation compared to the 2001 adjusted quota. The impacted vessels in New York appear to be primarily smaller vessels (Table 105). Smaller vessels generally have few options for changing their fishing locations or ports of landing. This latter point is emphasized by the indication of a high level of coincidence between h-port and p-port (principal port) of landing.

Table 105. Impacted commercial vessels based on 2000 descriptive data from NMFS permit files under Alternative 1.

|                                    | NY | Other |
|------------------------------------|----|-------|
| # Permits by H-port state          | 29 | 4     |
| # Permits by P-port state          | 29 | 4     |
| # Permits by Mailing Address state | 29 | 4     |
| Avg. Length in Feet by P-port      | 41 |       |

|  |     |     |
|--|-----|-----|
| Avg. GRT by P-port                             | 17  |     |
| % of vessels where h-port state = p-port state | 100 | 100 |

Impacted vessels are concentrated in New York, with Suffolk County and the port of Montauk/Montauk point being the most heavily impacted (Table 106).

Table 106. Distribution of all impacted vessels by state, county and h-port, from 2000 NMFS permit files - h-ports with fewer than four vessels are not reported - only county-level data supplied; counties with fewer than three vessels are not reported.

| State    | County      | Home port             | No. Vessels |
|----------|-------------|-----------------------|-------------|
| New York | Suffolk     | Montauk/Montauk Point | 9           |
|          |             | Other                 | 12          |
|          | Unspecified | New York              | 8           |

#### *Effects of research set-aside quota*

In addition to the proposed TAL for bluefish, the Council and Commission recommended a research set-aside for the bluefish fishery. In the annual specification process for 2002, the Council approved a research set aside amount equal to 2 percent of the total allowable harvest. Assuming that NMFS approves the preferred TAL alternative for bluefish, the set-aside amount would be 537,300 lb. The social and economic impacts of this research should be minimal. The set-aside could be worth as much as \$188,055 dockside based on a 2000 price of \$0.35 per pound. As such, assuming an equal reduction amongst all active vessels (See PREE), this could mean a reduction of about \$92 per individual vessel. Changes in the recreational harvest limit would be insignificant; the limit changes from 16.365 to 16.038 million lb (a 2 percent decrease) if 2 percent of the TAL is used for research. As such, it is unlikely that there would be negative impacts.

#### Vessel affected under the most restrictive alternative (Alternative 2)

The social impact analysis first examined the anticipated impacts under that which was recommended by the Council and Board, and then further examined Alternative 2 - the most restrictive alternative. It is presumed that impacts of other alternatives will be less than impacts under this alternative. Under Alternative 2, 124 vessels would be affected (See PREE, Sec. 5.0).

One hundred-two (82%) of the affected vessels hold some combination of federal permits. That means that all of these vessels have shown landings of bluefish in 2000, and also hold federal permits for other fisheries in 2000. It is possible that the remaining 22 (18%) vessels that do not show having any federal permits in 2000 have opted for fishing in state waters only, and as such, did not renew their federal permits in 2000, or have ceased business.

Many of these vessels hold permits in various fisheries (Table 107)— especially commercial permits for multispecies; sea scallops; summer flounder, scup, black sea bass, mackerel, dogfish, and monkfish. In addition, most vessel also hold a variety of other incidental permits, though the degree to which they can compensate for reductions in bluefish due to reductions in 2002 quota versus 2001 adjusted quota is questionable. Vessels holding multiple permits would be able to maintain diverse fishing opportunities. They do, thus, have access to some alternative fisheries, though at least multispecies and scallop are already under heavy regulation and likely to have increasingly stringent catch limits for the near future.



Table 107. Federal permits held by the 124 vessels impacted under Alternative 2.

|                                 | Northeast Region Permit Status <sup>a</sup> |                          | Number of Vessels | Percent of Permitted Vessels |
|---------------------------------|---|--------------------------|-------------------|------------------------------|
|                                 | Species                                     | Access                   |                   |                              |
| Commercial                      | Multispecies                                | Limited Access           | 21                | 17                           |
|                                 | Multispecies                                | Open Access              | 51                | 41                           |
|                                 | Atl. Sea Scallop                            | Open Access              | 34                | 27                           |
|                                 | Surfclam                                    | Open Access <sup>b</sup> | 12                | 10                           |
|                                 | Ocean Quahog                                | Open Access <sup>b</sup> | 13                | 10                           |
|                                 | Lobster                                     | Limited Access           | 6                 | 5                            |
|                                 | Summer Flounder                             | Limited Access           | 19                | 15                           |
|                                 | Scup  | Limited Access           | 31                | 25                           |
|                                 | Loligo/Illex/<br>Butterfish                 | Limited Access           | 6                 | 5                            |
|                                 | Mackerel                                    | Open Access              | 62                | 50                           |
|                                 | Black Sea Bass                              | Limited Access           | 44                | 35                           |
|                                 | Dogfish                                     | Open Access              | 76                | 61                           |
|                                 | Monkfish                                    | Limited Access           | 16                | 13                           |
|                                 | Monkfish                                    | Incidental               | 42                | 34                           |
| Recreational<br>(Party/Charter) | Multispecies                                | Open Access              | 19                | 15                           |
|                                 | Lobster                                     | Limited Access           | 1                 | 1                            |
|                                 | Summer Flounder                             | Open Access              | 25                | 20                           |
|                                 | Scup  | Open Access              | 19                | 15                           |
|                                 | Squid/Mackerel/<br>Butterfish               | Open Access              | 18                | 15                           |
|                                 | Black Sea Bass                              | Open Access              | 20                | 16                           |

<sup>a</sup>For specific restrictions refer to Northeast Fisheries Regulations.

<sup>b</sup>To harvest and land, and allocation of quota is required.

<sup>c</sup>Includes: multispecies, squid, mackerel, butterfish, and monkfish.

Seventy-three of the 124 vessels identified as having federal permits for any species are h-ported (home port) principally in New York and New Jersey (Table 108). By p-port of landing the same pattern is found, and impacted vessels are mainly located in New York and New Jersey, followed by Massachusetts, North Carolina, and Rhode Island (Table 108). The largest vessels are found in New Jersey, followed by North Carolina and New York. Larger vessels often have more options than smaller vessels, due to increased range and more deck space for alternative gear configurations. This can help them to respond to cuts in quota in particular states. They also, however, need larger volumes to remain profitable.

Table 108. Impacted commercial vessels based on 1999 descriptive data from NMFS permit files - No vessel characteristics data are reported for states with fewer than 3 permits.

|                                    | MA | NC | NJ | NY | RI | Other |
|------------------------------------|----|----|----|----|----|-------|
| # Permits by H-port state          | 19 | 15 | 31 | 42 | 5  | 4     |
| # Permits by P-port state          | 19 | 15 | 31 | 44 | 5  | 3     |
| # Permits by Mailing Address state | 19 | 15 | 34 | 42 | 5  | 2     |
| Avg. Length in Feet by P-port      | 27 | 44 | 46 | 35 | 46 |       |

|  |    |     |     |     |    |    |
|--|----|-----|-----|-----|----|----|
| Avg. GRT by P-port                             | 7  | 31  | 28  | 19  | 16 |    |
| % of vessels where h-port state = p-port state | 95 | 100 | 100 | 100 | 80 | 75 |

Impacted vessels are concentrated in New York and New Jersey (Table 109). Within these states, the most impacted counties are: North Carolina -- Ocean, New York — Suffolk. Within these counties, some individual ports have concentrations of vessels; in other cases only one or two vessels may be found per port but the overall number in the county is large. Some individual ports with large numbers of impacted vessels are: Montauk and New York, New York; Wanchese, NC; and Barnegat Light, NJ.

Table 109. Distribution of all impacted vessels by state, county and h-port, from 1999 NMFS permit files - h-ports with fewer than three vessels are not reported - only county-level data supplied; counties with fewer than three vessels are not reported.

| State          | County     | Home port      | Number of Vessels |
|----------------|------------|----------------|-------------------|
| North Carolina | Dare       | Wanchese       | 7                 |
|                |            | Other          | 5                 |
| New Jersey     | Ocean      | Barnegat Light | 10                |
|                |            | Point Pleasant | 9                 |
|                |            | Other          | 4                 |
|                | Cape May   | Other          | 4                 |
| New York       | Suffolk    | Montauk        | 10                |
|                |            | Hampton Bay    | 4                 |
|                |            | Other          | 9                 |
|                | Other      | New York       | 14                |
| Massachusetts  | Barnstable | Other          | 11                |

With regard to recreational fishermen, Alternative 2 establishes a recreational harvest limit that is over two times greater than the 2000 landings. The specifications are not expected to affect in a negative way the overall demand for recreational fishing trips in the Atlantic Coast (See PREE, Sec. 5.0). As such, there should not be significant adverse impacts to ports and communities.

## 6.0 ESSENTIAL FISH HABITAT ASSESSMENT

Bluefish have essential fish habitat (EFH) designated in many of the same areas that have been designated as EFH for most of the MAFMC managed species of surfclams/ocean quahogs, squid/mackerel/butterfish, summer flounder, scup, black sea bass, and dogfish, as well as the NEFMC species of groundfish within the Northeast Multispecies FMP, including: Atlantic cod, haddock, monkfish, ocean pout, American plaice, pollock, redfish, white hake, windowpane flounder, winter flounder, witch flounder, yellowtail flounder, Atlantic halibut and Atlantic sea scallops. Numerous species within the NMFS Highly Migratory Species Division and the SAFMC have EFH identified in areas also identified as EFH for bluefish. Broadly, EFH is designated as the pelagic waters along the continental shelf from Massachusetts to North Carolina. Specifically, the definitions as approved in Amendment 1 (MAFMC 1999) are:

## Identification and Description

**Eggs:** 1) North of Cape Hatteras, pelagic waters found over the Continental Shelf (from the coast out to the limits of the EEZ) at mid-shelf depths, from Montauk Point, NY south to Cape Hatteras in the highest 90% of the area where bluefish eggs were collected in the MARMAP surveys; and 2) South of Cape Hatteras, 100% of the pelagic waters over the Continental Shelf (from the coast out to the eastern wall of the Gulf Stream) through Key West, Florida at mid-shelf depths. Bluefish eggs are generally not collected in estuarine waters and thus there is no EFH designation inshore. Generally, bluefish eggs are collected between April through August in temperatures greater than 64 °F (18 °C) and normal shelf salinities (>31 ppt).

**Larvae:** 1) North of Cape Hatteras, pelagic waters found over the Continental Shelf (from the coast out to the limits of the EEZ) most commonly above 49 ft (15 m), from Montauk Point, New York south to Cape Hatteras, in the highest 90% of the area where bluefish larvae were collected during the MARMAP surveys; 2) South of Cape Hatteras, 100% of the pelagic waters greater than 15 meters over the Continental Shelf (from the coast out to the eastern wall of the Gulf Stream) through Key West, Florida; and 3) the "slope sea" and Gulf Stream between latitudes 29° 00 N and 40° 00 N. Bluefish larvae are not generally collected inshore so there is not EFH designation inshore for larvae. Generally, bluefish larvae are collected April through September in temperatures greater than 64 °F (18 °C) in normal shelf salinities (>30 ppt).

**Juveniles:** 1) North of Cape Hatteras, pelagic waters found over the Continental Shelf (from the coast out to the limits of the EEZ) from Nantucket Island, Massachusetts south to Cape Hatteras, in the highest 90% of the area where juvenile bluefish are collected in the NEFSC trawl survey; 2) South of Cape Hatteras, 100% of the pelagic waters over the Continental Shelf (from the coast out to the eastern wall of the Gulf Stream) through Key West, Florida; 3) the "slope sea" and Gulf Stream between latitudes 29° 00 N and 40° 00 N; and 4) all major estuaries between Penobscot Bay, Maine and St. Johns River, Florida. Generally juvenile bluefish occur in North Atlantic estuaries from June through October, Mid-Atlantic estuaries from May through October, and South Atlantic estuaries March through December, within the "mixing" and "seawater" zones (Nelson *et al.* 1991, Jury *et al.* 1994, Stone *et al.* 1994). Distribution of juveniles by temperature, salinity, and depth over the continental shelf is undescribed (Fahay 1998).

**Adults:** 1) North of Cape Hatteras, over the Continental Shelf (from the coast out to the limits of the EEZ), from Cape Cod Bay, Massachusetts south to Cape Hatteras, in the highest 90% of the area where adult bluefish were collected in the NEFSC trawl survey; 2) South of Cape Hatteras, 100% of the pelagic waters over the Continental Shelf (from the coast out to the eastern wall of the Gulf Stream) through Key West, Florida; and 3) all major estuaries between Penobscot Bay, Maine and St. Johns River, Florida. Adult bluefish are found in North Atlantic estuaries from June through October, Mid-Atlantic estuaries from April through October, and in South Atlantic estuaries from May through January in the "mixing" and "seawater" zones (Nelson *et al.* 1991, Jury *et al.* 1994, Stone *et al.* 1994). Bluefish adults are highly migratory and distribution varies seasonally and according to the size of the individuals comprising the schools. Bluefish generally found in normal shelf salinities (> 25 ppt).

## Gear impacts to bluefish EFH

Auster and Langton (1998) state that, "One of the most difficult aspects of estimating the extent of fishing impacts on habitat is the lack of high resolution data on the distribution of fishing effort." Currently, there is no way to fully gauge the present intensity and severity of mobile gear in contact with the bottom (bottom otter trawl, clam dredge, scallop dredge, and dredge-other), therefore these gears are characterized as having a "potential adverse impact" on summer flounder, scup, and black sea bass EFH (MAFMC 1999). The types of habitat in which these gears are fishing and with what kind of intensity is unquantified in the Mid-Atlantic. Auster and Langton (1998) cite studies that indicate that mobile clam dredges, traps and pots being drug and dropped, and bottom otter trawls coming into contact with the bottom have impacted structural habitat, community structure, and ecosystem process. They also cite several conceptual models to determine the impacts of gears on different types of habitat. However, without high resolution data on

fishing effort and the habitat complexity that is being fished, it is currently difficult to predict impact of these gears.

Bluefish are a predominantly pelagic species (Fahay 1998). Life history data show that there are only loose associations of bluefish with any particular substrate or submerged aquatic vegetation (SAV; Fahay 1998). Bluefish do occur throughout the geographic range of SAV in the US. Juveniles are the only life stage which spatially and temporally co-occur on a regular basis with SAV. Bluefish juveniles and adults commonly occur in estuarine areas during the period of the year when eelgrass is present and prey on species which are associated with SAV. Some degree of linkage is likely, but given the extent to which the life cycle of bluefish occurs offshore outside the range of SAV, it is probably less than for other species (Laney 1997).

Bluefish prey include a wide range of species (Fahay 1998); therefore, it is unlikely that fishing gear will have a direct impact on the food web of bluefish. The possibility exists of an indirect effect on prey items through indirect ecosystems effects, but these are unquantifiable at this time.

While gear that impacts the bottom may have potential impact, it is unlikely that mobile fishing gear has a significant impact on bluefish EFH. However, effort of mobile gear in federal and state waters throughout the entire bluefish range is not quantified. Therefore, it is difficult to predict the exact impact that mobile gear in contact with the bottom will have on bluefish habitat. Of the three types of fishing impacts identified by Auster and Langton (1998), the only potential impact is indirect ecosystem effects. Although there is no way to gauge the intensity and severity of mobile gear in contact with the ocean bottom (bottom otter trawl, clam dredge, scallop dredge, and dredge-other), these gears are characterized currently as having a "potential adverse impact" on bluefish EFH.

Although it is unlikely that stationary fishing gear will have a direct impact on bluefish EFH, ghost fishing by gillnets is a problem, but one which is impossible to quantify. Therefore, gillnets will be characterized as having potential impact on bluefish EFH. Consistent regulations along the entire Atlantic coast concerning trap numbers, placement, harvest, and use of biodegradable materials may help to alleviate this problem to some extent.

The proposed commercial quota for bluefish for 2002, is only slightly larger (10%) than that for 2001 and therefore should cause no change in any habitat impacts. Although the recreational harvest limit is higher than 2001 it is not expected to cause any changes in habitat impacts. Therefore, the MAFMC has determined that these actions will have no more than minimal adverse impact upon the listed EFH.

## **7.0 LIST OF AGENCIES AND PERSONS CONSULTED IN FORMULATING THE ACTION**

The bluefish specifications were submitted to the National Marine Fisheries Service (NMFS) by the Mid-Atlantic Fishery Management Council and the Atlantic States Marine Fisheries Commission.

## **8.0 LIST OF PREPARERS OF THE ENVIRONMENTAL ASSESSMENT**

This environmental assessment was prepared by the Mid-Atlantic Council and the Northeast Regional Office of NMFS, and is based, in part, on information provided by the Northeast Fisheries Science Center (Center).

## **9.0 FINDING OF NO SIGNIFICANT ENVIRONMENTAL IMPACT**

Having reviewed the environmental assessment and the available information relating to the 2002 Atlantic bluefish specifications, I have determined that there will be no significant adverse environmental impact resulting from the action and that preparation of an environmental impact statement on the action is not required by Section 102(2)(c) of the National Environmental Policy Act or its implementing regulations.

\_\_\_\_\_  
Assistant Administrator for  
Fisheries, NOAA

\_\_\_\_\_  
Date

## **OTHER APPLICABLE LAWS**

### **1.0 PAPERWORK REDUCTION ACT OF 1995**

The Paperwork Reduction Act (PRA) concerns the collection of information. The intent of the PRA is to minimize the federal paperwork burden for individuals, small business, state and local governments, and other persons as well as to maximize the usefulness of information collected by the federal government.

The Council is not proposing measures under this regulatory action that require review under PRA. There are no changes to existing reporting requirements previously approved under OMB Control Nos. 0648-0202 (Vessel permits), 0648-0229 (Dealer reporting) and 0648-0212 (Vessel logbooks).

As stated above, this action does not propose new reporting or record keeping measures. There are no changes to existing reporting requirements.

### **2.0 COASTAL ZONE MANAGEMENT ACT**

The Council determined that this action is consistent to the maximum extent practicable with the approved coastal management programs of Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, Pennsylvania, New Jersey, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, and Florida. This determination was submitted on September 19, 2001, for review by the responsible state agencies under section 307 of the Coastal Zone Management Act.

### **3.0 EXECUTIVE ORDER 13132**

This action does not contain policies with federalism implications under E.O. 13132.

### **4.0 RELEVANT FEDERAL RULES**

This action will not duplicate, overlap or conflict with any other federal rules.

## **PRELIMINARY REGULATORY ECONOMIC EVALUATION (PREE)**

This section provides the analysis and conclusions to address the requirements of Executive Order 12866 and the Regulatory Flexibility Act (RFA). Since many of the requirements of these mandates duplicate those required under the Magnuson-Stevens Act and NEPA, this section contains references to other appropriate sections of this document. The following sections provide the basis for concluding that the proposed action is not significant under E.O. 12866 and will not have a significant economic impact on a substantial number of small entities under the RFA.

### **1.0 INTRODUCTION**

The National Marine Fisheries Service (NMFS) requires the preparation of a Regulatory Impact Review (RIR) for all regulatory actions that either implement a new Fishery Management Plan (FMP) or significantly amend an existing plan. This RIR is part of the process of preparing and reviewing FMPs and provides a comprehensive review of the changes in net economic benefits to society associated with proposed regulatory actions. This analysis also provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problems. The purpose of this analysis is to ensure that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost-effective way. This RIR addresses many items in the regulatory philosophy and principles of Executive Order (E.O.) 12866.

Also included is a Regulatory Flexibility Analysis (RFA). This analysis is being undertaken in support of a complete analysis for the 2002 specifications for bluefish. A complete description of the fishery, and the need for, and objectives of, this rule can be found in the Introduction of the EA. The legal basis of this rule can be found in Section 1.0 of the EA.

### **2.0 EVALUATION OF REGULATORY IMPACT REVIEW (E.O. 12866)**

The proposed action does not constitute a significant regulatory action under E.O. 12866 for the following reasons. First, it will not have an annual effect on the economy of more than \$100 million. The measures considered in this quota paper will not affect total revenues generated by the commercial sector or party/charter sector to the extent that a \$100 million annual economic impact will occur in the bluefish fisheries.

Based on NMFS landings data, the total commercial value in 2000 (Maine to Florida) was estimated at \$2.8 million for bluefish. The proposed bluefish quota for 2002 is only slightly larger than that implemented for 2001 and would allow fishermen to land an additional 2.514 million lb (1.14 million kg) of bluefish compared to 2000 landings. However, on average, bluefish landings for the 1996-2000 period are about 9.434 million lb (4.28 million kg) (Table 2). While the overall bluefish landings in 2001 are likely to be below the overall quota, a preliminary assessment of the 2001 fishing season indicate that landings in New York will be about 81.4% above the 2001 quota for that state. In addition, landings in North Carolina were constrained by the initial quota for 2001. As the result of increased landings, North Carolina received transfers of bluefish from other states (100,000 lb from Maryland, 300,000 lb from Virginia, and 300,000 lb from Florida) and it is not projected to incur overages in 2001. Unless market conditions change substantially in year 2002, commercial bluefish fishermen would likely have bluefish landings close to the 1996-2000 average. There is no indication that the market environment for commercially caught bluefish will change considerably in year 2002. As such, it is expected that overall exvessel revenues from bluefish will not significantly change in 2002 from 2000 as a consequence of the proposed commercial quota.

According to MRFSS data, the number of recreational fishing trips for all modes combined as reported by anglers indicating that the primary species sought was bluefish on the Atlantic coast was 1,225,162 (413,233 North Atlantic subregion; 811,929 Mid-Atlantic subregion; and not reported for South Atlantic

subregion) in 2000. MRFSS data also indicates that in 2000, party/charter fishing trips contributed 3.5%, 5.8%, and 2.6% of the total number of fishing trips made by marine recreational anglers in the North Atlantic, Mid-Atlantic, and South Atlantic subregions, respectively. As such, it is estimated that the number of party/charter fishing trips that sought bluefish as the primary species in the North Atlantic and Mid-Atlantic subregions in 2000 were 14,563 and 47,374, respectively.

With the implementation of Amendment 1 a recreational harvest limit was established for the first time. A recreational harvest limit of 16.365 million lb (7.423 million kg) in 2002 would be more than 61% the amount of recreational landings for 2000. At the present time there are neither behavioral or demand data available to estimate how sensitive party/charter boat anglers might be to proposed fishing regulations. However, given the level of the recreational harvest limit for 2002 and recreational landings in recent years it is not anticipated that this management measure will affect the demand for party/charter boat trips.

The actions are necessary to advance the recovery of the bluefish stock, and to establish the harvest of this species at sustainable levels. The action benefits in a material way the economy, productivity, competition and jobs. The action will not adversely affect, in the long-term, competition, jobs, the environment, public health or safety, or state, local, or tribal government communities. Second, the action will not create a serious inconsistency or otherwise interfere with an action taken or planned by another agency. No other agency has indicated that it plans an action that will affect the bluefish fishery in the EEZ. Third, the actions will not materially alter the budgetary impact of entitlement, grants, user fees, or loan programs or the rights and obligations of their participants. And, fourth, the actions do not raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in E.O. 12866.

### **3.0 REVIEW OF IMPACTS RELATIVE TO THE REGULATORY FLEXIBILITY ANALYSIS**

#### **3.1 Introduction and Methods**

The Regulatory Flexibility Act (RFA) requires the federal rulemaker to examine the impacts of proposed and existing rules on small businesses, small organizations, and small governmental jurisdictions. In reviewing the potential impacts of proposed regulations, the agency must either certify that the rule "will not, if promulgated, have a significant economic impact on a substantial number of small entities" or prepare an Initial Regulatory Flexibility Analysis (IRFA). The Small Business Administration (SBA) defines a small business in the commercial fish industry, as a firm with annual receipts (gross revenues) not in excess of \$3.0 million. Party and charter boats are defined as having annual receipts (gross revenues) not in excess of \$5.0 million. This rule could affect any vessel that fish for bluefish in federal or state waters.

An active participant in the commercial sector was defined as being any vessel that reported having landed one or more pounds of bluefish from the Dealer data during calendar year 2000. This data covers activity by unique vessels. Of the active vessels reported in 2000, 829 vessels landed bluefish from Maine to North Carolina. The Dealer data does not cover vessel activity in the South Atlantic. The Dealer data indicate that 126 federally permitted vessels landed bluefish in North Carolina in 2000. However, the North Carolina landings data for bluefish may be incomplete in this data system. Trip Ticket Report data indicate that 1,088 vessels landed bluefish in North Carolina in 2000 (Lees Sabo, NC Division of Marine Fisheries, pers. comm., 2001). Some of these vessels may be included in the 126 vessels identified as landing bluefish in the Dealer data. As such, double counting is possible. In addition, 136 vessels landed bluefish in Florida's east coast in 1999 (Steve Brown, Fla Fish and Wildlife Conservation Commission, pers. comm., 2001). Bluefish landings in South Carolina and Georgia were negligible compared to the total bluefish landings along the Atlantic coast in 2000. As such, it was assumed that there was no vessel activity for those two states. In addition, it was estimated that in recent years a negligible amount (approximately 2,063) of party/charter vessels may have been active and/or caught bluefish.

Not all landings and revenues reported through the Dealer data can be attributed to a specific vessel. Vessels with no federal permits are not subject to any federal reporting requirements with which to



corroborate the dealer reports. Similarly, dealers that buy exclusively from state waters only vessels and have no federal permits, are also not subject to federal reporting requirements. Thus, it is possible that some vessel activity cannot be tracked with the landings and revenue data that are available. Thus, these vessels cannot be included in the threshold analysis, unless each state were to report individual vessel activity through some additional reporting system - which currently does not exist. This problem has two consequences for performing threshold analyses. First, the stated number of entities subject to the regulation is a lower bound estimate. Second, the portion of activity by these uncounted vessels may cause the estimated economic impacts to be over- or underestimated.

The effects of actions were analyzed by employing quantitative approaches to the extent possible. Where quantitative data were not available, qualitative analyses were conducted.

In order to conduct a more complete analysis, cumulative impacts were examined in three ways to represent three potential quota "alternatives." The first analysis (Alternative 1) examined the measures recommended by the Council and Commission. The other two alternatives considered the least and most restrictive alternatives for both the commercial and recreational fisheries. First, the Northeast Dealer data were queried to identify all vessels that landed at least one or more pounds of bluefish in calendar year 1999. Note that the States of Connecticut and Delaware report canvas (summary) data to NMFS, so landings and revenues by individual vessels cannot be included. Thus, vessels that land exclusively in those states cannot be analyzed. Vessels that land in these, plus other states, are analyzed - but landings and revenues represent only that portion of business conducted in states other than Connecticut and Delaware. It is presumed that the impacts on vessels that cannot be identified will be similar to the participating vessels that are analyzed herein. Recent Trip Ticket report data was also used to identify the vessels that landed bluefish in North Carolina and Florida's east coast.

The second step was to estimate total revenues from all species landed by each vessel during calendar year 2000. This estimate provides the base from which subsequent quota changes and their associated effects on vessel revenues were compared. Since 2000 is the last full year from which data are available (partial year data could miss seasonal fisheries), it was chosen as the base year for the analysis. That is, partial landings data for 2001 were not used in this analysis because the year is not complete. Since the Trip Ticket Report data system does not provide information at the trip level, averages were used to describe the contribution of bluefish to total landings and values for those entities. As such, steps 3 and 4 below do not apply for vessels reporting under the Trip Ticket Report data system.

The third step was to deduct or add, as appropriate, the expected change in vessel revenues depending upon which of the three quota alternatives were evaluated. This was accomplished by estimating proportional reductions or increases in the three quota alternatives versus the base quota year 2000. Landings to date, indicate that there will be overages in the state of New York of 810,393 lbs (81.4%). As the result of increased landings, North Carolina and New York received transfers of bluefish from other states (Maryland, Virginia, and Florida) and they are not projected to incur overages in 2001. In addition to this, for the purpose of estimating the 2002 quotas and revenue changes, it was assumed that the states with overages at the time of the analysis will harvest no additional bluefish and that the industry will fully harvest, and not exceed, the remaining 2001 state allocations.

The fourth step was to divide the estimated 2001 revenues from all species by the 2000 base revenues for every vessel. For step four, if the dividend from step 3 was less than or equal to 0.95 then the vessel was defined as being impacted for purposes of the RFA. For each quota alternative a summary table was constructed that report the results of the threshold analysis by class. These results were further summarized by home state as defined by permit application data.

The threshold analysis just described is intended to identify impacted vessels and to characterize the potential economic impact on directly affected entities. To further characterize the potential impacts on indirectly impacted entities and the larger communities within which owners of impacted vessels reside,

selected county profiles were constructed. Each profile was based on impacts under quota Alternative 2 - the most restrictive possible alternative. Alternative 2 was chosen to identify impacted counties because it would identify the maximum number possible and thus include the broadest possible range of counties in the analysis. Counties included in the profile had to meet the following criteria: the number of impacted vessels per county was either greater than 4, or all impacted vessels in a given state were from the same home county.

Based on these criteria, a total of 5 counties were identified: Dare County, NC; Ocean County and Cape May Counties, NJ; Suffolk County, NY; Barnstable County, MA. Counties not included in this analysis (e.g., Cartered County, NC; Suffolk, Dukes, and Essex Counties, MA; and Philadelphia County, PA; Monmouth County, NJ; and Nassau County, NY) did not have enough impacted vessels to meet the criteria specified, i.e., there were less than 4 impacted vessels per county, or all impacted vessels in a state were not home ported within the same county. In fact, most of these counties only had one affected vessel. In addition, 14 vessels were affected in the port of New York, however, the county was not specified.

It should be noted that the county profiles are intended to characterize the relative importance of commercial fishing and fishing related industries in the home counties. As such, the county profiles provide a link to the Social Impact Analysis (See EA, Sec. 5.6) but are not intended to be a substitute for that analysis. The target counties were identified based on the county associated with the vessels homeport as listed in the owner's 2000 permit application. Since county is not a field in the permit application, the self-reported homeport was matched against port names listed in data tables maintained in the Northeast region to assign a home county.

Counties were selected as the unit of observation because a variety of secondary economic and demographic statistical data were available from several different sources. Limited data are available for place names (i.e. by town or city name) but in most instances reporting is too aggregated or is not reported due to confidentiality requirements. Reported statistics include summaries of landings, federal permits, demographic statistics, and employment, wages, and number of establishments for each county.

#### 4.0 DESCRIPTION OF QUOTA ALTERNATIVES

All quota alternatives considered in this analysis are based on various harvest levels for bluefish (a high, medium, and low level of harvest). These recommendations, and their impact relative to the 2000 landings, were described in Section 5.0 of the EA. Table 101 shows the proposed commercial quotas under the three alternatives evaluated in this analysis and their state-by-state distribution. Table 110 shows the percentage change of the 2002 allowable commercial landings relative to the 2001 adjusted quotas. Note that for states that either transferred quotas to North Carolina i.e., Maryland, Virginia, and Florida, or received transferred quotas from other states i.e., North Carolina, the projected changes are substantially different from other states (excluding New York) due to adjustments associated with those transfers.

Table 110. Percentage changes associated with allowable commercial landings for various alternatives in 2002 (adjusted quota after overages accounted for) relative to 2001 (adjusted quota after transfers were made) by state. Source: NMFS, General Canvass Data.

| State           | 2002 Commercial Quota Alternative 1 | 2002 Commercial Quota Alternative 2 | 2002 Commercial Quota Alternative 3 |
|-----------------|-------------------------------------|-------------------------------------|-------------------------------------|
| ME <sup>a</sup> | 9.56                                | -52.34                              | 0.00                                |
| NH              | 9.56                                | -52.34                              | 0.00                                |
| MA              | 9.56                                | -52.34                              | 0.00                                |

|       |        |         |        |
|-------|--------|---------|--------|
| RI    | 9.56   | -52.34  | 0.00   |
| CT    | 9.56   | -52.34  | 0.00   |
| NY    | -71.86 | -133.57 | -81.42 |
| NJ    | 9.56   | -52.34  | 0.00   |
| DE    | 9.56   | -52.34  | 0.00   |
| MD    | 67.95  | -26.94  | 53.28  |
| VA    | 48.77  | -35.28  | 35.78  |
| NC    | -10.76 | -61.18  | -18.55 |
| SC    | 9.57   | -52.33  | 0.00   |
| GA    | 9.61   | -52.32  | 0.04   |
| FL    | 59.07  | -30.80  | 45.17  |
| Total | 1.11   | -60.79  | -8.45  |

#### 4.1 Quota Alternative 1

Alternative 1 analyzes the cumulative impacts of the harvest limits recommended by the Council and Board for bluefish. Harvest limits were recommended to best achieve the target fishing mortality or exploitation rates specified in this fishery's rebuilding schedule. Specifically, this alternative examines the impacts on industry that would result from a TAL of 26.865 million lb (10.50 million lb commercial; 16.365 million lb recreational).

#### 4.2 Quota Alternative 2

Alternative 2 analyzes the cumulative impacts of the most restrictive possible commercial harvest levels and less restrictive recreational allocation. This alternative would result in the smallest commercial bluefish allocation relative to 2000 quotas. At the same time, this alternative would result in the largest recreational allocation relative to 2000 recreational landings. Specifically, this alternative considers a TAL of 26.865 million lb (4.567 million lb commercial; 22.298 million lb recreational).

#### 4.3 Quota Alternative 3

Alternative 3 analyzes the cumulative impacts of the least restrictive possible commercial harvest levels and most restrictive recreational allocation. This alternative would result in the second largest commercial bluefish allocation relative to 2000 quotas. At the same time, this alternative would result in the second largest recreational allocation relative to 2000 recreational landings. Specifically, this alternative considers a TAL of 26.865 million lb (9.583 million lb commercial; 17.282 million lb recreational).

### 5.0 ANALYSES OF IMPACTS OF ALTERNATIVES

For the purpose of analysis under the following alternatives, several assumptions must be made. First, average revenue changes noted in this analysis are made using 2000 Dealer data and recent State Trip Ticket Report data and participation. As such, revenue changes for 2000 are dependent upon adjusted quotas for 2001 versus specified quotas for 2002. The overall contribution of bluefish to the total value of all fish and shellfish has not substantially changed for North Carolina (0.77% vs 1.03%) and Florida (0.29% vs

0.12%) for the 1998 to 2000 period. Bluefish landings in South Carolina and Georgia were negligible compared to the total bluefish landings along the Atlantic coast in 2000.

For the analyses themselves, reductions are estimated by examining the total revenue earned by an individual vessel in 2000 (Dealer data) or average vessel revenue (recent Trip Ticket Report data), and comparing it to its potential revenue in 2002, given the 2002 commercial harvest levels. The proposed bluefish quota for 2002 would allow fishermen to land an additional 0.917 million lb (0.416 million kg) of bluefish compared to the 2001 quota.

It is most likely that the percent of revenue reduction for impacted vessels varied considerably based on permits it held (i.e., based on the fisheries in which it was able to participate) and species it landed. Diversity in the fleet, perhaps, helps to balance loss in one fishery with revenue generated from other fisheries. Lastly, it is important to keep in mind that while the analyses based on landings for federally permitted vessels only (Dealer data), those vessels may be permitted to, and frequently do, fish in state waters for a species of fish for which it does not hold a federal permit.

### **5.1 Quota Alternative 1**

To analyze the economic effects of this alternative, the total harvest limits specified in Section 4.0 of the PREE were employed. Under this alternative, the allocation to the commercial and recreational fisheries are about 9.56% higher and 42.09% lower than the commercial and recreational quotas for 2001, respectively.

The overall commercial allocation for 2002 is higher than the 2001 commercial quota. When this allocation is distributed to the states, all states except New York and North Carolina show a 2002 quota level which is higher than their adjusted 2001 quota (Table 110). Under Amendment 1 to the Bluefish FMP, states would be allowed to trade or combine quotas and the states could impose trip limits or other measures to manage their quotas. The system would be the same as that operating under the Summer Flounder FMP. In most cases, quotas are transferred among states when fishing fleets follow migration routes of valuable fish stocks. Such is the case in the summer flounder fishery. For example, if summer flounder is present in the northern part of the Atlantic ocean at a specific time of the year and a vessel from a southern state harvests and lands summer flounder in a northern state, then a quota transfer from the southern state can be made to the northern state. This allows vessels to land in a port close to where they are fishing and avoid returning to their home state or principal port to offload their catch. This is of special importance when you have valuable species that have to enter the market in a timely fashion, or have species that may have shorter shelf live. It is not expected that commercial vessels will travel large distances to catch bluefish. However, it is still possible that bluefish quota could be transferred among states and that the New York and/or North Carolina quotas could be increased as a result of such transfers. This could potentially decrease negative impacts. In fact, in 2001, landings in North Carolina were constrained by the initial quota. As the result of increased landings, North Carolina received transfers of bluefish from other states (100,000 lb from Maryland, 300,000 lb from Virginia, and 300,000 lb from Florida) and it is not projected to incur overages in 2001.

#### *Effects of research set-aside quota*

In addition to the proposed TAL for bluefish, the Council and Commission recommended a research set-aside for the bluefish fishery. In the annual specification process for 2002, the Council approved a research set aside amount equal to 2 percent of the total allowable harvest. Assuming that NMFS approves the preferred TAL alternative for bluefish, the set-aside amount would be 537,300 lb. The social and economic impacts of this research should be minimal. The set-aside could be worth as much as \$188,055 dockside based on a 2000 price of \$0.35 per pound. As such, assuming an equal reduction amongst all active vessels (See PREE), this could mean a reduction of about \$92 per individual vessel. Changes in the recreational harvest limit would be insignificant; the limit changes from 16.365 to 16.038 million lb (a 2 percent decrease) if 2 percent of the TAL is used for research. As such, it is unlikely that there would be negative impacts.

## 5.1.1 Commercial Impacts

### 5.1.1.1 Threshold Analysis for Participating Vessels

The results of the threshold analysis from dealer data are reported in Table 111. A total of 33 vessels were projected to be impacted by a decrease in total revenue of 5% or more. The economic range from expected revenue losses range from losses of 50% or greater for a total of 2 vessels to an increase in revenue (relative to 2000) for 545 of the 829 vessels. The revenue loss occur in spite of the fact that the overall proposed quota under Alternative 1 is higher than the specifies quota for 2001. This is primarily due to the fact that the New York quota in 2002 is smaller than the quota in that state in 2001.

Table 111. Threshold analysis of revenues for participating vessel, based on dealer data.

| Quota Alternative 1 Preferred Alternative |  | Number of Vessels with an Increase in Revenue | No Change in Revenue (number) | Number of Impacted Vessels by Reduction Percentile (%) |     |       |       |       |       |     |
|---|--|---|-------------------------------|--|-----|-------|-------|-------|-------|-----|
| Total Vessels                             | Number of Vessels Impacted by Revenue Decrease of 5% or More |   |                               | <5   | 5-9 | 10-19 | 20-29 | 30-39 | 40-49 | ≥50 |
| 829                                       | 33   | 545   | 0                             | 251  | 18  | 8     | 4     | 0     | 1     | 2   |

Impacts of the quotas provisions were examined relative to a vessel's home state as reported on the vessel's permit application (Table 112). "Home state" indicates the state where a vessel is based and primarily ported, and is presumed to reflect where the costs and benefits of management actions return. However, home state is self-reported at the time an individual applies for a federal permit and may not necessarily indicate where the vessel subsequently conducts most of its activity. The number of vessels impacted by revenue decreases of 5% or more by home state ranged from zero for most states to 1 in Virginia, 3 in North Carolina, and 29 in New York. The larger number of impacted vessels in New York is related to the fact that New York's adjusted allocation for 2002 is lower than their 2001 allocation by over 71%.

Table 112. Review of revenue impacts under quota Alternative 1, by home port state.

| State | Participating Vessels | Number of Vessels Impacted by Revenue Decrease of 5% or More | Number of vessels with an Increase in Revenue | No Change in Revenue (number) | Number of Impacted Vessels by Reduction Percentile (percent) |     |       |       |       |       |     |
|-------|-----------------------|--|---|-------------------------------|--|-----|-------|-------|-------|-------|-----|
|       |                       |  |   |                               | <5   | 5-9 | 10-19 | 20-29 | 30-39 | 40-49 | ≥50 |
| MA    | 227                   | 0  | 220   | 0                             | 7  | 0   | 0     | 0     | 0     | 0     | 0   |
| MD    | 13                    | 0  | 13  | 0                             | 0  | 0   | 0     | 0     | 0     | 0     | 0   |
| ME    | 4                     | 0  | 4   | 0                             | 0  | 0   | 0     | 0     | 0     | 0     | 0   |
| NC    | 87                    | 3  | 23  | 0                             | 61   | 3   | 0     | 0     | 0     | 0     | 0   |
| NH    | 27                    | 0  | 24  | 0                             | 3  | 0   | 0     | 0     | 0     | 0     | 0   |
| NJ    | 104                   | 0  | 98  | 0                             | 6  | 0   | 0     | 0     | 0     | 0     | 0   |

|                        |     |    |     |   |     |    |   |   |   |   |   |
|------------------------|-----|----|-----|---|-----|----|---|---|---|---|---|
| NY                     | 189 | 29 | 16  | 0 | 144 | 14 | 8 | 4 | 0 | 1 | 2 |
| PA                     | 8   | 0  | 7   | 0 | 1   | 0  | 0 | 0 | 0 | 0 | 0 |
| RI                     | 84  | 0  | 81  | 0 | 0   | 0  | 0 | 0 | 0 | 0 | 0 |
| VA                     | 51  | 1  | 39  | 0 | 11  | 1  | 0 | 0 | 0 | 0 | 0 |
| OTHER <sup>a</sup>     | 7   | 0  | 6   | 0 | 1   | 0  | 0 | 0 | 0 | 0 | 0 |
| NOT KNOWN <sup>b</sup> | 280 | 0  | 14  | 0 | 18  | 0  | 0 | 0 | 0 | 0 | 0 |
| Total                  | 829 | 33 | 545 | 0 | 251 | 18 | 8 | 4 | 0 | 1 | 2 |

<sup>a</sup>States with fewer than 4 vessels were aggregated (CT, DE, SC, GA, FL).

<sup>b</sup>Vessels have shown landings of bluefish in 2000, but do not hold any commercial federal permits in 2000. These vessels may be fishing exclusively in state waters fisheries for bluefish, and landings are indicated because of reporting requirements for their other federal permits or they do not hold a federal permit to participate in these fisheries any longer.

State Trip Ticket Report data indicate that 1,088 vessels (412 vessels less than 18 ft; 543 vessels between 19-38 ft; and 133 vessels greater than 39 ft) landed bluefish in North Carolina in 2000. On average these vessels generated 10.12% of their total exvessel revenue from bluefish landings. By vessel size, the contribution of bluefish to total revenue for these vessels was 3.93% for vessel 1-18 ft; 18.07% for vessels 19-38 ft; and 10.14% for vessels greater than 39 ft. However, North Carolina landings are expected to decrease by 10.76% as a consequence of the 2002 allocation compared to the adjusted 2001 allocation (after transfers were made to that state). Therefore, it is expected that in North Carolina, on average, vessels would incur a revenue loss as a consequence of this alternative of 1.16%. By vessel size, on average, losses would be 0.41% for vessels 1-18 ft, 1.63% for vessels 19-38 ft, and 0.99% for vessel greater than 39 ft.

If quota allocations were to be transferred from a state or states that do not need to land their entire bluefish quota allocation for 2002, then the number of affected entities described in this threshold analysis could potentially decrease, thus decreasing economic burden. In fact, in 2001, the State of Maine, the Commonwealth of Massachusetts, the State of Connecticut, the State of Florida, and the State of Maryland transferred a total of 434,000 lb of commercial bluefish quota to the State of North Carolina from their respective 2001 quotas. The Commonwealth of Massachusetts also transferred 100,000 lb of commercial bluefish quota to the State of New York from its 2001 quota.

### 5.1.2 Recreational Impacts

Under Alternative 1, the bluefish 2002 recreational harvest limit would be 16.365 million lb. This limit is over 61% greater than the 2000 recreational landings. In addition to the recreational landings limit for 2002, the 15 fish possession limit will remain unchanged.

There is very little information available to empirically estimate how sensitive the affected party/charter boat anglers might be to the proposed fishing regulations. However, given the level of the recreational harvest limit for 2002 and recreational landings in recent years it is not anticipated that this management measure will affect the demand for party/charter boat trips. Given that the recreational harvest limit is over 61% higher than the 2000 landings, the possession limit is expected to increase angler satisfaction and is not expected to result in landings in excess of the recreational harvest limit.

### 5.1.3 Summary of Impacts

In sum, Alternative 1 would result in increased total allowable commercial landings for bluefish in 2002 versus 2001 commercial quota. However, the 2002 allocation for New York and North Carolina is approximately 71% and 10% below their 2001 adjusted quota. The 2002 recreational harvest limit is 61% higher than the recreational landings in 2000.

Under this alternative, according to dealer data, total of 33 of the 829 commercial vessels reporting landings in

2000 (in that data base) were projected to incur revenue losses. The affected entities are mostly smaller vessels that landed bluefish in New York and North Carolina. In addition, given recent State Trip Ticket Report data, on average, a total of 1,088 vessels that landed bluefish in North Carolina could potentially incur a revenue loss as a consequence of this alternative of 1.16%. If quota allocations were to be transferred from a state or states that do not need to land their entire bluefish quota allocation for 2002 to New York and North Carolina, then the number of affected entities could potentially decrease.

Recreational landings and the number of fishing trips targeting for this fishery has declined over the past several years (Table 6) even in the absence of recreational harvest limits. This decrease in the recreational fishery landings could be the result of the stock being overfished (See discussion on page 3, **1.0 ANNUAL SPECIFICATION PROCESS**). However, it is more likely that party/charter boats may be targeting other species such as striped bass, thus accounting for the decrease in the number of fishing trips in this fishery.

It is important to stress that these changes represent merely the potential, i.e., based on available data. Actual changes in revenue will likely vary. This variation would occur for several reasons, including impacts undetermined for unidentifiable vessels. Since recreational landings from the last several years were much lower than the recreational allocation for 2002, ranging between 8.30 and 14.3 million lb., there will be no revenue decrease to the recreational industry.

In addition to the proposed TAL for bluefish, the Council and Commission recommended a research set-aside for the bluefish fishery. In the annual specification process for 2002, the Council approved a research set aside amount equal to 2 percent of the total allowable harvest. Assuming that NMFS approves the preferred TAL alternative for bluefish, the set-aside amount would be 537,300 lb. The social and economic impacts of this research should be minimal. The set-aside could be worth as much as \$188,055 dockside based on a 2000 price of \$0.35 per pound. As such, assuming an equal reduction amongst all active vessels (See PREE), this could mean a reduction of about \$92 per individual vessel. Changes in the recreational harvest limit would be insignificant; the limit changes from 16.365 to 16.038 million lb (a 2 percent decrease) if 2 percent of the TAL is used for research. In terms of the research set aside, there will be no revenue decrease to the industry. The entire quota will be made available. As such, it is unlikely that there would be negative impacts.

**5.2 Quota Alternative 2**

To analyze the economic effects of this alternative, the total harvest limits specified in Section 4.0 of the PREE were employed. Under this alternative, the allocation to the commercial and recreational fisheries are 52.34% and 21.09% lower than the commercial and recreational quotas for 2001, respectively.

**5.2.1 Commercial Impacts**

**5.2.1.1 Threshold Analysis for Participating Vessels**

The results of the threshold analysis from dealer data are reported in Table 113. A total of 124 vessels were projected to be impacted by revenue losses of 5% or more. The economic range from expected revenue losses range from a total of 32 vessels to 705 of the 829 vessels.

Table 113. Threshold analysis of revenues for participating vessel, based on dealer data.

| Quota Alternative 2 | No Change in Revenue<br>(number) | Number of Impacted Vessels by Reduction Percentile (%) |
|---------------------|----------------------------------|--|
|---------------------|----------------------------------|--|

| Total Vessels | Number of Vessels Impacted by Revenue Decrease of 5% or More |   | <5  | 5-10 | 10-19 | 20-29 | 30-39 | 40-49 | ≥50 |
|---------------|--|---|-----|------|-------|-------|-------|-------|-----|
| 829           | 124  | 0 | 705 | 36   | 30    | 19    | 2     | 5     | 32  |

Impacts of the quotas provisions were examined relative to a vessel's home state as reported on the vessel's permit application (Table 114). "Home state" indicates the state where a vessel is based and primarily ported, and is presumed to reflect where the costs and benefits of management actions return. However, home state is self-reported at the time an individual applies for a federal permit and may not necessarily indicate where the vessel subsequently conducts most of its activity. The number of vessels impacted by revenue decreases of 5% or more by home state ranged from zero for Maryland, Maine, and New Hampshire to 44 in New York. In addition, 17 vessels of unknown home port are also impacted. The larger number of impacted vessels in New York and New Jersey may be due to a relatively higher dependence on bluefish.

Table 114. Review of revenue impacts under quota Alternative 2, by home port state.

| State                  | Participating Vessels | Number of Vessels Impacted by Revenue Decrease of 5% or More | No Change in Revenue (number) | Number of Impacted Vessels by Reduction Percentile (percent) |     |       |       |       |       |     |
|------------------------|-----------------------|--|-------------------------------|--|-----|-------|-------|-------|-------|-----|
|                        |                       |  |                               | <5   | 5-9 | 10-19 | 20-29 | 30-39 | 40-49 | ≥50 |
| MA                     | 227                   | 19   | 0                             | 208  | 1   | 3     | 2     | 0     | 1     | 12  |
| MD                     | 13                    | 0  | 0                             | 13   | 0   | 0     | 0     | 0     | 0     | 0   |
| ME                     | 4                     | 0  | 0                             | 4  | 0   | 0     | 0     | 0     | 0     | 0   |
| NC                     | 87                    | 15   | 0                             | 72   | 4   | 6     | 3     | 0     | 1     | 1   |
| NH                     | 25                    | 0  | 0                             | 25   | 0   | 0     | 0     | 0     | 0     | 0   |
| NJ                     | 95                    | 22   | 0                             | 73   | 8   | 7     | 6     | 1     | 0     | 0   |
| NY                     | 189                   | 44   | 0                             | 145  | 19  | 14    | 3     | 1     | 1     | 6   |
| PA                     | 8                     | 1  | 0                             | 7  | 1   | 0     | 0     | 0     | 0     | 0   |
| RI                     | 85                    | 5  | 0                             | 80   | 2   | 0     | 3     | 0     | 0     | 0   |
| VA                     | 51                    | 1  | 0                             | 50   | 1   | 0     | 0     | 0     | 0     | 0   |
| OTHER <sup>a</sup>     | 7                     | 0  | 0                             | 7  | 0   | 0     | 0     | 0     | 0     | 0   |
| NOT KNOWN <sup>b</sup> | 38                    | 17   | 0                             | 21   | 0   | 0     | 2     | 0     | 2     | 13  |
| Total                  | 829                   | 124  | 0                             | 705  | 36  | 30    | 19    | 2     | 5     | 32  |

<sup>a</sup>States with fewer than 4 vessels were aggregated (CT, DE, SC, GA, FL).

<sup>b</sup>Vessels have shown landings of bluefish in 2000, but do not hold any commercial federal permits in 2000. These vessels may be fishing exclusively in state waters fisheries for bluefish, and landings are indicated because of reporting requirements for their other federal permits or they do not hold a federal permit to participate in these fisheries any longer.

State Trip Ticket Report data indicate that 1,088 vessels (412 vessels less than 18 ft; 543 vessels between 19-38 ft; and 133 vessels greater than 39 ft) landed bluefish in North Carolina in 2000. On average these vessels generated 10.12% of their total exvessel revenue from bluefish landings. By vessel size, the contribution of bluefish to total revenue for these vessels was 3.93% for vessel 1-18 ft; 18.07% for vessels 19-38 ft; and 10.14% for vessels greater than 39 ft. It is expected that in North Carolina, on average, vessels would incur a revenue loss as a consequence of this alternative of 7.04%. By vessel size, on average, losses would be 2.37% for vessels 1-18 ft, 6.18% for vessels 19-38 ft, and 5.94% for vessel greater than 39 ft.



### 5.2.2 Recreational Impacts

Under Alternative 2, the bluefish 2002 recreational harvest limit would be 22.298 million lb. This limit is 120% greater than the 2000 recreational landings. In addition to the recreational landings limit for 2002, the 15 fish possession limit will remain unchanged.

There is very little information available to empirically estimate how sensitive the affected party/charter boat anglers might be to the proposed fishing regulations. However, given the level of the recreational harvest limit for 2002 and recreational landings in recent years it is not anticipated that this management measure will affect the demand for party/charter boat trips. Given that the recreational harvest limit is 120% higher than the 2000 landings, the possession limit is expected to increase angler satisfaction and is not expected to result in landings in excess of the recreational harvest limit.

### 5.2.3 Summary of Impacts

In sum, Alternative 2 would result in a decrease in the total allowable commercial landings for bluefish in 2002 versus 2001.

Under this alternative, according to dealer data, total of 124 of the 829 commercial vessels reporting landings in 2000 (in that data base) were projected to incur revenue losses. In addition, given recent Trip Ticket Report data, 676 vessels in North Carolina could potentially lose, on average, less than 7% of their total exvessel revenue.

Recreational landings and the number of fishing trips targeting for this fishery has declined over the past several years (Table 6) even in the absence of recreational harvest limits. This decrease in the recreational fishery landings could be the result of the stock being overfished (See discussion on page 3, **1.0 ANNUAL SPECIFICATION PROCESS**). However, it is more likely that party/charter boats may be targeting other species such as striped bass, thus accounting for the decrease in the number of fishing trips in this fishery.

It is important to stress that these changes represent merely the potential, i.e., based on available data. Actual changes in revenue will likely vary. This variation would occur for several reasons, including impacts undetermined for unidentifiable vessels. Since recreational landings from the last several years were much lower than the recreational allocation for 2002, ranging between 8.30 and 14.3 million lb., there will be no revenue decrease to the recreational industry.

### 5.3 Quota Alternative 3

To analyze the economic effects of this alternative, the total harvest limits specified in Section 4.0 of the PREE were employed. Under this alternative, the allocation to the commercial fishery is the same as that implemented in 2001 and the allocation to the recreational fishery is about 39% lower than the recreational allocation for 2001.

Even though the overall commercial allocation for 2002 is equal to that implemented in 2001, New York and North Carolina have smaller quotas in 2002 relative to 2001 due to overages in New York, and quota adjustments in North Carolina. It is possible that bluefish quota could be transferred among states and that New York and/or North Carolina quotas could be increased as a result of such transfers (See PREE, Sec. 5.1), potentially diminishing negative impacts to affected vessels.

### 5.3.1 Commercial Impacts

#### 5.3.1.1 Threshold Analysis for Participating Vessels

The results of the threshold analysis from dealer data are reported in Table 115. A total of 45 vessels were projected to be impacted. The economic range from expected revenue losses range from losses on the order of greater than 50% for a total of 3 vessels to no change in revenue for 442 vessels, and increase in revenue for 89 of 829 vessels (relative to 2000). The changes in revenue occur in spite of the fact that the overall proposed quota under Alternative 3 is the same as the quota implemented in 2001. These projected changes in revenues are due to overages and quota transfers among states (quota transfers effected the overall 2001 quota of states involved in these transfers).

Table 115. Threshold analysis of revenues for participating vessel, based on dealer data.

| Quota Alternative 3 |   | Increase in Revenue (number) | No Change in Revenue (number) | Number of Impacted Vessels by Reduction Percentile (%) |      |       |       |       |       |     |
|---------------------|---|------------------------------|-------------------------------|--|------|-------|-------|-------|-------|-----|
| Total Vessels       | Number of Vessels Impacted by Reduction |                              |                               | <5   | 5-10 | 10-19 | 20-29 | 30-39 | 40-49 | ≥50 |
| 829                 | 45                                      | 89                           | 442                           | 253  | 25   | 12    | 3     | 2     | 0     | 3   |

Impacts of the quotas provisions were examined relative to a vessel's home state as reported on the vessel's permit application (Table 116). "Home state" indicates the state where a vessel is based and primarily ported, and is presumed to reflect where the costs and benefits of management actions return. However, home state is self-reported at the time an individual applies for a federal permit and may not necessarily indicate where the vessel subsequently conducts most of its activity. The number of impacted vessels by home state ranged from zero for most states to 7 in North Carolina and 36 in New York. In addition, 1 vessel of unknown home port was also impacted. The larger number of impacted vessels in New York is related to the fact that New York's adjusted allocation for 2002 is lower than the their 2001 quota (due to overages in 2000) by 81%.

Table 116. Review of revenue impacts under quota Alternative 3, by home port state.

| State | Participating Vessels | Number of Vessels Impacted | Increase in Revenue (number) | No Change in Revenue (number) | Number of Impacted Vessels by Reduction Percentile (percent) |     |       |       |       |       |     |
|-------|-----------------------|----------------------------|------------------------------|-------------------------------|--|-----|-------|-------|-------|-------|-----|
|       |                       |                            |                              |                               | <5   | 5-9 | 10-19 | 20-29 | 30-39 | 40-49 | ≥50 |
| MA    | 227                   | 0                          | 6                            | 213                           | 8  | 0   | 0     | 0     | 0     | 0     | 0   |
| MD    | 13                    | 0                          | 13                           | 0                             | 0  | 0   | 0     | 0     | 0     | 0     | 0   |
| ME    | 4                     | 0                          | 1                            | 3                             | 0  | 0   | 0     | 0     | 0     | 0     | 0   |
| NC    | 87                    | 7                          | 18                           | 0                             | 62   | 5   | 2     | 0     | 0     | 0     | 0   |
| NH    | 27                    | 0                          | 1                            | 23                            | 3  | 0   | 0     | 0     | 0     | 0     | 0   |
| NJ    | 104                   | 0                          | 6                            | 88                            | 10   | 1   | 0     | 0     | 0     | 0     | 0   |
| NY    | 189                   | 36                         | 1                            | 15                            | 137  | 18  | 10    | 3     | 2     | 0     | 3   |
| PA    | 8                     | 0                          | 3                            | 3                             | 2  | 0   | 0     | 0     | 0     | 0     | 0   |

|                        |     |    |    |     |     |    |    |   |   |   |   |
|------------------------|-----|----|----|-----|-----|----|----|---|---|---|---|
| RI                     | 85  | 0  | 0  | 80  | 5   | 0  | 0  | 0 | 0 | 0 | 0 |
| VA                     | 51  | 1  | 35 | 2   | 13  | 1  | 0  | 0 | 0 | 0 | 0 |
| OTHER <sup>a</sup>     | 7   | 0  | 3  | 3   | 1   | 0  | 0  | 0 | 0 | 0 | 0 |
| NOT KNOWN <sup>b</sup> | 27  | 1  | 2  | 128 | 12  | 1  | 0  | 0 | 0 | 0 | 0 |
| Total                  | 829 | 45 | 89 | 442 | 253 | 25 | 12 | 3 | 2 | 0 | 3 |

<sup>a</sup>States with fewer than 4 vessels were aggregated (CT, DE, SC, GA, FL).

<sup>b</sup>Vessels have shown landings of bluefish in 1999, but do not hold any commercial federal permits in 1999. These vessels may be fishing exclusively in state waters fisheries for bluefish, and landings are indicated because of reporting requirements for their other federal permits or they do not hold a federal permit to participate in these fisheries any longer.

State Trip Ticket Report data indicate that 1,088 vessels (412 vessels less than 18 ft; 543 vessels between 19-38 ft; and 133 vessels greater than 39 ft) landed bluefish in North Carolina in 2000. On average these vessels generated 10.12% of their total exvessel revenue from bluefish landings. By vessel size, the contribution of bluefish to total revenue for these vessels was 3.93% for vessel 1-18 ft; 18.07% for vessels 19-38 ft; and 10.14% for vessels greater than 39 ft. It is expected that in North Carolina, on average, vessels would incur a revenue loss as a consequence of this alternative of 2.02%. By vessel size, on average, losses would be 0.71% for vessels 1-18 ft, 2.85% for vessels 19-38 ft, and 1.72% for vessel greater than 39 ft.

If quota allocations were to be transferred from states that do not need to land their entire bluefish quota allocation for 2002, then the number of affected entities described in threshold could considerably decrease without creating economic burden to vessels harvesting bluefish in the states where the allocations were transferred from.

### 5.3.2 Recreational Impacts

Under Alternative 3, the bluefish 2002 recreational harvest limit would be 17.282 million lb. This limit is 70% greater than the 2000 recreational landings. In addition to the recreational landings limit for 2002, the 15 fish possession limit will remain unchanged.

There is very little information available to empirically estimate how sensitive the affected party/charter boat anglers might be to the proposed fishing regulations. However, given the level of the recreational harvest limit for 2002 and recreational landings in recent years it is not anticipated that this management measure will affect the demand for party/charter boat trips. Given that the recreational harvest limit is 70% higher than the 2000 landings, the possession limit is expected to increase angler satisfaction and is not expected to result in landings in excess of the recreational harvest limit.

### 5.3.3 Summary of Impacts

In sum, Alternative 3 would result in the same total allowable commercial landings for bluefish in 2002 versus 2001 commercial quota. However, the 2002 allocation for New York and North Carolina is 81% above and 18% below their 2001 adjusted quota, respectively. The 2001 recreational harvest limit is 70% higher than the recreational landings in 2000.

Under this alternative, according to dealer data, a total of 45 of the 829 commercial vessels reporting landings in 2000 (in that data base) were projected to incur revenue losses. The affected entities are mostly smaller vessels that landed bluefish in New York and North Carolina. In addition, given recent Trip Ticket Report data, on average, a total of 1,088 vessels that landed bluefish in North Carolina could potentially incur a revenue loss as a consequence of this alternative of 2.02%. If quota allocations were to be transferred from a state or states that do not need to land their entire bluefish quota allocation for 2002 to New York and North Carolina, then the number of affected entities could potentially decrease.

Recreational landings and the number of fishing trips targeting for this fishery has declined over the past several years (Table 6) even in the absence of recreational harvest limits. This decrease in the recreational fishery landings could be the result of the stock being overfished (See page 3, **1.0 ANNUAL SPECIFICATION PROCESS**). However, it is more likely that party/charter boats may be targeting other species such as striped bass, thus accounting for the decrease in the number of fishing trips in this fishery.

It is important to stress that these changes represent merely the potential, i.e., based on available data. Actual changes in revenue will likely vary. This variation would occur for several reasons, including impacts undetermined for unidentifiable vessels. Since recreational landings from the last several years were much lower than the recreational allocation for 2002, ranging between 8.30 and 14.3 million lb., there will be no revenue decrease to the recreational industry.

## **6.0 OTHER IMPACTS**

### **6.1 County Impacts**

For the reasons specified in Section 3.1 of this PREE, the economic impacts on vessels of a specified h-port were analyzed on a county wide basis. As stated in Section 3.1 of the PREE, this profile of impacted counties was based on impacts under quota Alternative 2 - the most restrictive possible alternative. Counties included in the profile had to meet the following criteria: a) the number of impacted vessels per county was either greater than 4, or b) all impacted vessels in a given state were from the same home county.

The results of these analyses are summarized below. Since the counties have been identified based on the most restrictive impacts under the quota of Alternative 2, the analyses represent the most profound impacts possible for those counties. Consequently, other quota alternatives would result in fewer impacts.

Based on these criteria, a total of 5 counties were identified: Dare County, NC; Ocean County and Cape May Counties, NJ; Suffolk County, NY; Barnstable County, MA. Counties not included in this analysis (e.g., Cartered County, NC; Suffolk, Dukes, and Essex Counties, MA; and Philadelphia County, PA; Monmouth County, NJ; and Nassau County, NY) did not have enough impacted vessels to meet the criteria specified, i.e., there were less than 4 impacted vessels per county, or all impacted vessels in a state were not home ported within the same county. In fact, most of these counties only had one affected vessel. In addition, 14 vessels were affected in the port of New York, however, the county was not specified. Table 117 presents demographic and economic information for these counties.

Table 117. Summary of county information for counties with more than three vessels impacted by Alternative 2

| State | County <sup>a</sup> | Population <sup>b</sup> | Employment <sup>c</sup> | Total Personal                           | Commercial            | Percent of  | Fresh and Frozen                    | Percent of  |
|-------|---------------------|-------------------------|-------------------------|--|-----------------------|---|-------------------------------------|---|
|       |                     |                         |                         | Income <sup>d</sup><br>(million of \$'s) | Fishing<br>Employment | Personal<br>Income Derived<br>from<br>Commercial<br>Fishing | Seafood<br>Processing<br>Employment | Personal<br>Income Derived<br>from<br>Seafood<br>Processing |
| MA    | Barnstable          | 213,221                 | 120,375                 | 3,729.63                                 | 1,105                 | 0.68%   | 32                                  | 0.03%   |
| NY    | Suffolk             | 1,427,096               | 695,522                 | 27,877.06                                | 563                   | 0.03%   | *                                   | *   |
| NJ    | Cape May            | 100,736                 | 52,277                  | 1,497.58                                 | 698                   | 1.09%   | *                                   | *   |
| NJ    | Ocean               | 503,141                 | 173,836                 | 5,677.67                                 | 202                   | 0.10%   | 0                                   | 0   |
| NC    | Dare                | 30,042                  | 23,643                  | 492.549                                  | *                     | *   | 19                                  | 0.05%   |

\* = < 10 observations.

a = Data obtained from the Minnesota IMPLAN Group, Inc., IMPLAN System (data and software), 1725 Tower Drive West, Suite 140, Stillwater, MN 55082, www.implan.com, 1999.

b = Year-round population.

c = Includes both full-time and part-time workers.

d = Includes employee compensation (wage and salary payments and benefits paid by employers) and proprietary income (payments received by self-employed individuals as income).

SUPPLEMENT TO THE 2002 SPECIFICATIONS FOR THE  
ATLANTIC BLUEFISH FISHERY

INITIAL REGULATORY FLEXIBILITY ANALYSIS (IRFA)

NMFS has prepared this IRFA as a supplement to the Council submission of the 2002 Specifications for the Atlantic Bluefish Fishery. The Council prepared a preliminary regulatory economic evaluation (PREE) as part of its submission. As a result of the PREE, the Council determined that the proposed action would not have a significant economic impact on a substantial number of small entities in accordance with NMFS guidelines on Regulatory Flexibility Act (RFA) analysis and suggested that certification to the Small Business Administration would adequately address requirements of the RFA. The rationale for preparation of this IRFA are: the Council, in part, based its determination on an assumption that may be questionable, and new information consisting of complete 2001 landings and 2001 interstate transfers of quota have become available to the Agency which may affect the results of the Council's analysis. The new information discussed in this IRFA relates to the economic impacts of the proposed action, and does not affect the agency's conclusion in the EA. This IRFA is based on the Council's PREE and an analysis of that new information.

The Council analyzed three alternatives. Analysis of the preferred alternative examined the impacts on industry that would result from a TAL of 26.87 million lb (12.19 million kg), with 10.50 million lb (4.76 million kg) allocated to the commercial sector of the fishery, which represents the maximum allowed under the FMP, and 16.37 million lb (7.42 million kg) allocated to the recreational sector with a 15-fish possession limit. Analysis of Alternative 2 considered a TAL of 26.87 million lb (12.19 million kg) with a commercial allocation of 4.57 million lb (2.07 million kg); 22.30 million lb (10.11 million kg) recreational; and a 15-fish recreational possession limit. Analysis of Alternative 3 considered a TAL of 26.87 million lb (12.19 million kg); 9.58 million lb (4.35 million kg) commercial, which represents the commercial status quo ; 17.28 million lb (7.84 million kg) recreational; and a 15-fish possession limit.

In its analysis, the Council assumed that in the absence of cost data, gross revenue was a sufficient proxy for profitability. Furthermore, the Council identified all participants as small entities, therefore, there are no negative effects on those small businesses from disproportionate competitiveness with large entities. Results of their analysis indicate that based on 2000 landings, on a coastwide basis, the preferred alternative would yield a 1.10 percent increase in revenue to the commercial sector, alternative 2 would yield a 60.79 percent decrease, and alternative 3 would yield an 8.45 percent decrease.

Analysis of the effects of the three alternatives on fishermen in individual states concluded that the

increase in revenues under the preferred alternative and alternative 3 would occur in all states except New York and North Carolina. Under alternative 2, all states would show decreases in revenue. While conducting its analysis, the Council first assumed that preexisting overages in 2001 could force reductions in available quota to the States of New York and North Carolina in 2002 at the rates of 71.86 percent and 10.76 percent, respectively. However, the Council, further indicates that under the preferred alternative and alternative 3, the significantly negative impact to the States of New York and North Carolina could easily be mitigated by a transfer of commercial quota from another state, as allowed under the FMP. This has been accomplished under the FMP for the 2001 fishery. Therefore, the Council determined that economic impacts to these States under the preferred alternative and alternative 3, are negligible, since the 2002 quotas do not have to be adjusted for overages. However, this may be a faulty assumption when considering that these states harvested more in 2001 than they would be allocated for the 2002 fisheries. A comparison of actual 2001 landings and 2002 specifications and a discussion of their impacts is found below. Under Alternative 2, even with transfers of quota, New Jersey, New York, North Carolina, and Massachusetts would show a significant decrease in revenues for a substantial number of vessels according to the PREE.

New information gathered by NMFS has made it possible to more accurately predict economic impacts of the proposed 2002 specifications to New York and North Carolina by comparing actual 2001 landings to proposed 2002 state allocations of the bluefish TAL. The Council did not have complete 2001 landings data at the time it prepared its PREE.

The preferred alternative of 10.50 million lb of bluefish TAL would allocate 1,090,436 lb of bluefish to New York and 3,366,384 lb to North Carolina. Actual 2001 landings amounted to 1,186,843 lb for New York and 3,584,627 lb for North Carolina. All other states landed less in 2001 than their proposed 2002 allocation of the total bluefish TAL, and, therefore, would not be impacted.

Under the assumption that 2002 allocations for New York and North Carolina represent harvest constraints to those fisheries, and bluefish abundance and harvesting capacity would allow those states to harvest an amount equal to their 2001 landings, there would be an 8 percent reduction in bluefish revenues in New York and a 6 percent reduction in North Carolina associated with the preferred alternative when compared to 2001 landings, 16 and 14 percent reductions associated with alternative 3, and 60 and 59 percent reductions associated with alternative 2. Implicit in this assumption is that when a state's quota is reached and the fishery is closed, it will not be able to take advantage of a transfer provision under the FMP which allows states that have a surplus quota to transfer a portion or all of that quota to a state that has or will reach its quota. The transfer provision was implemented by Amendment 1 to the FMP as a tool to mitigate the adverse economic effects of prematurely closing a fishery when surplus quota exists.

The Council, in its analysis, was correct in assuming that it is highly unlikely that reductions in revenues would occur since allocations to the states are not hard quotas and can be adjusted inseason through transfers. Based on historical evidence, under the 2000 and 2001 bluefish fisheries, and, prior to 2000, under the Interstate Management Plan for Atlantic Bluefish, states have been very cooperative in transferring

commercial bluefish quota when needed by states running a deficit. In fact, to harvest more than their allotted quota, New York and North Carolina received 200,000 and 1,134,000 lb of quota in 2001, respectively, from states that had surpluses. Given that commercial coastwide landings have averaged 7.685 million for the years 1998 through 2001, and the 2002 proposed TAL is 10.50 million, the Council has a strong basis to assume that transfers will again take place in 2002, thus, reducing impacts to vessels in New York and North Carolina or other states that may require additional quota to avoid a closure.

For all 3 alternatives, the Council notes that there is very little information available to empirically estimate how sensitive the affected party/charter boat anglers might be to the proposed fishing regulations. However, since the 2002 harvest limits are 61, 120, and 70 percent greater than 2000 recreational harvest, it can be assumed that there would be no negative impacts on party/charterboats from the 2002 specifications.

#### Description of the Reasons Why Action by the Agency is Being Considered

A description of reasons this action is being considered appears in the introduction to the Environmental Assessment of the 2002 Specifications for Atlantic Bluefish (EA).

#### The Objectives and Legal Basis for the Proposed Rule

The objectives and legal basis for the proposed rule are also found in the introduction to the EA.

#### Estimate of the Number of Small Entities

An active participant in the commercial sector was defined as being any vessel that reported having landed one or more pounds of bluefish in the Dealer data during calendar year 2000. This data covers activity by unique vessels. Of the active vessels that reported in 2000, 829 vessels landed bluefish from Maine to North Carolina. The Dealer data does not cover vessel activity in the South Atlantic. The Dealer data indicate that 126 federally permitted vessels landed bluefish in North Carolina in 2000. However, the North Carolina landings data for bluefish may be incomplete in this data system. Trip Ticket Report data indicate that 1,088 vessels landed bluefish in North Carolina in 2000 (Lees Sabo, NC Division of Marine Fisheries, pers. comm., 2001). Some of these vessels may be included in the 126 vessels identified as landing bluefish in the Dealer data. As such, double counting is possible. In addition, 136 vessels landed bluefish in Florida's east coast in 1999. Bluefish landings in South Carolina and Georgia are negligible compared to the total bluefish landing along the Atlantic coast in 2000. As such, it was assumed there was no vessel activity for those two states. In addition, it was estimated that in recent years approximately 2,063 party/charter vessels may have been active and/or caught bluefish.

#### Alternatives which Minimize any Significant Economic Impact of the Proposed Rule on Small Entities

The Council and NMFS included a provision in the FMP that would minimize economic impacts to vessels in



states that faced closure by allowing a transfer of quota within the coastwide allocation. However, under certain circumstances where state surplus quotas are not available, there are no alternatives to mitigate significant economic impact. It is more likely that this scenario would occur under Alternative 2 where the coastwide and state quotas are less than half the proposed quotas. The preferred alternative provides a commercial coastwide quota that would not put constraints on total landings based on previous years' total landings, thus, allowing for transfers to take place. Also, the preferred alternative provides a recreational harvest limit that exceeds previous years' recreational harvest. As such, the preferred alternative offers the best opportunity for minimizing any negative impact on small entities.

This action is not controversial. It does not contain any collection-of-information, reporting, or recordkeeping requirements. It will not duplicate, overlap, or conflict with any other Federal rules.

