2003 FISHERY MANAGEMENT PLAN REVIEW FOR WEAKFISH

(Cynoscion regalis)

Plan Review Team

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I. Status of the Fisheries Management Plan

The Atlantic States Marine Fisheries Commission (ASMFC) approved Amendment 4 to the Weakfish Fishery Management Plan in November 2002. The amendment was implemented for the first time in 2003. This review, however, is of activities of the 2002 fishery and Amendment 3.

The ASMFC adopted its first Fishery Management Plan for Weakfish in 1985. Amendment 1 to the FMP, which superseded the original plan, was adopted in 1992, and Amendment 2 was adopted in October 1994. Weakfish are currently managed under the guidelines contained in Amendment 3, which was approved by the Commission in May 1996 and completely replaced all previous amendments. Amendment 3 and Addendum 1 have been replaced by Amendment 4.

The goals of Amendment 3 were to utilize interstate management so that Atlantic coastal weakfish recover to healthy levels which will maintain commercial and recreational harvest consistent with self-sustaining spawning stock and to provide for restoration and maintenance of essential habitat. The management objectives were: 1) to restore the weakfish population over a 5-year period; 2) to reach and maintain a target fishing mortality rate (F) of 0.5; 3) to restore the expanded age and size structure; 4) to achieve compatible and equitable management measures among jurisdictions; 5.) to promote cooperative interstate research, monitoring and law enforcement; 6) to promote identification and conservation of habitat; and 7) to establish standards and procedures for both the implementation of Amendment #3 and for determination of states' compliance with provisions of the management plan.

Weakfish were managed under this plan as a single stock throughout their coastal range. All states from Massachusetts to Florida and the Potomac River Fisheries Commission have a declared interest in the Weakfish FMP. Responsibility for the FMP is assigned to the Weakfish Management Board, Plan Review Team, Technical Committee, Stock Assessment Sub-Committee and Advisory Panel.

II. Status of the Stock

A weakfish stock assessment of data through 1998 was conducted in 1999 and reviewed by the Stock Assessment Review Committee for peer review at the 30th Northeast Regional Stock Assessment Workshop (NMFS 2000). This report indicated that weakfish were "at a high level of abundance and subject to low fishing mortality rates." This assessment was updated in 2002 with data through 2000. Much of the language below was taken from this updated assessment (Kahn 2002).

Virtual population analysis was used to estimate fishing mortality and stock size (ADAPT VPA in FACT, Northeast Fishery Science Center; Gavaris 1988; Conser and Powers 1990). This is a type of analysis that uses data on the number of fish caught at various ages or lengths to estimate fishing mortality as well as numbers of spawning individuals in a population.

The most recent stock assessment update conducted with data through 2000 indicates that the management measures put in place in Amendment 3 resulted in positive trends for the weakfish population. The absolute magnitude of impact should be viewed with caution given the uncertainty of the fishing mortality and spawning stock biomass estimates for the most recent year of the assessment, which is often the case with these final year estimates. Once more data is added to the assessment the fishing mortality is expected to rise and the spawning stock biomass is expected to decrease.

This assessment indicates that weakfish are at a high level of abundance and fishing mortality appears to be low. Recent history of the coast-wide stock shows that spawning stock biomass (total weight of fish in a stock that are old enough to spawn) estimates were low from 1982 through 1985. High recruitment of age one weakfish in 1985-1987 produced a brief increase in biomass. By 1989, biomass had again declined and remained low through 1993. Since then, biomass has been building to higher levels. While the exact level of bias in the most recent estimates is unknown, the current level of SSB is well above the proposed threshold level in Amendment 4 of 14,400 MT (Figure 1).

Estimates of fishing mortality (the rate fish are being removed by human activity) range from a high in 1994 of 2.52 to a low of in 2000 of 0.12. Since 1995, estimates of F have been below the Amendment 3 target of 0.50. The 2000 estimate of 0.12 could be underestimated. Despite this bias, the corrected value would still be below the fishing mortality target of 0.31 in Amendment 4 and far below the proposed fishing mortality threshold of 0.50 (Figure 2).

One goal of Amendment 3 was to support an increase in the size and age structure. The model results indicate this is happening. In 1982, the estimate of the proportion of age 6+ fish was 1.0% of the total. By 1990, this had shrunk to only 0.3% of the total number of weakfish. This proportion has been increasing in recent years to the level of 6.8% of the total in 2001.

III. Status of the Fishery

The majority of commercially and recreationally caught weakfish are landed from state waters. The dominant commercial gears used include gill nets, pound nets, haul seines, and trawls. The majority of commercial landings occur in the fall and winter months, presumably as the fish congregate to migrate. The recreational fishery catches weakfish using live or cut bait, jigging, trolling and chumming. Recreational harvests typically peak in the warmer months (May through October) when effort tends to be greatest. Typically recreational landings are recorded in numbers and commercial landings are recorded in pounds. However, Figure 3 uses converted recreational landings to pounds in order to compare the landings of the fisheries

Commercial Fishery --

The NMFS compiles commercial weakfish landings. The data are cooperatively collected by the NMFS and state fishery agencies from state mandated trip-tickets, landing weigh-out reports from seafood dealers, federal logbooks, shipboard and portside interviews and biological sampling of catches.

Recently there is an increasing trend of the recreational fishery accounting for a higher percentage of the catch. Coastwide commercial weakfish landings from 1950 - 2001 fluctuated from 1,397 mt to 16,312 mt (Table 1).

The commercial weakfish fishery occurs during the fall and winter as the species migrates from estuaries to overwintering grounds in the South Atlantic (Hogarth et al. 1995b). Weakfish are taken primarily by trawls, pound nets, gill nets and haul seines. Weakfish landings were dominated by the trawl fishery from the 1950's through the mid -1980's, when gill net landings began to account for the majority of the landings. Gill net landings in the latter half of the 1990's were about double that of the trawl fishery.

New Jersey, North Carolina and Virginia have dominated commercial weakfish landings since 1950. North Carolina has annually landed the most weakfish since 1972 and Virginia has consistently ranked second since 1993. North Carolina has accounted for about half of all the weakfish commercially landed since 1951.

Recreational Fishery -

Recreational catch statistics are collected by the NMFS in the Marine Recreational Fisheries Statistics Survey (MRFSS). Effort data is collected through telephone interviews. Catch expansions are based on angler interviews and biological sampling conducted by trained interviewers stationed at fishing access sites.

Recreational landings by number ranged from about 960,000 fish in 1992 to a high of 9,344,000 fish in 1981. Recreational landings were relatively high from 1983-1988. Recreational landings abruptly fell in 1989. Annual recreational landings have fluctuated between 1 million and 2.8 million fish since 1993. The number of fish released alive by anglers has been relatively high since 1993. For these trends in pounds, please see Table 2.

Recreational landings from the EEZ accounted for only about 13 percent of the coastwide landings since 1981. Over half of the recreational harvest came from inshore saltwater and brackish water bodies such as bays, estuaries, and sounds. Virginia, New Jersey, Maryland and Delaware have accounted for over 85 percent of the coastwide harvest since 1981. New Jersey has accounted for the majority of the recreational harvest since 1994.

IV. Status of Research and Monitoring

Young-of –the-year indices of relative abundance are produced by Rhode Island, New York, Delaware, Maryland (2 different indices), Virginia, North Carolina and Florida. North Carolina also produces an age 1 index, while Connecticut, New Jersey and Delaware produce agestructured indices of relative abundance from research trawl surveys. The National Marine Fisheries Service also produces an age-structured index for the Mid-Atlantic coast, while SEAMAP produces one for the South Atlantic Coast.

The Marine Recreational Fisheries Statistics Survey collects data on recreational landings. North Carolina, Virginia, Maryland and Delaware collect biological data from commercial landings, including age data. There is no biological data from commercial landings north of Delaware.

North Carolina has submitted an exempted fishery request endorsed by the ASMFC Weakfish Board. The National Marine Fisheries Service and North Carolina continue to work together to move this request forward. Georgia is continuing their Bycatch Reduction Device (BRD) testing program as well as the bycatch characterization study.

The Potomac River Fisheries Commission in cooperation with Virginia Institute of Marine Sciences (VIMS) has completed research into the use of escape panels in pound nets. These are currently being used in an incentive-based program on the Potomac River. North Carolina also has completed work exploring bycatch reduction in long haul seines.

Biological sampling of commercial landings is an important component of catch-at-age analysis, such as the virtual population analysis currently used to assess weakfish status. Currently, only four states conduct such sampling: North Carolina, Virginia, Maryland and Delaware. Development of sampling programs for states with significant commercial landings is needed to insure accurate assessments. Recent research suggests there are many separate weakfish spawning stocks. Consequently, assuming the catch composition of northern areas is equivalent to that of southern areas is highly questionable and weakens confidence in assessment results.

V. Research Needs for Weakfish

Biological:

High Priority

Collect catch and effort data including size and age composition of the catch, determine stock mortality throughout the range, and define gear characteristics. In particular, increase length-frequency sampling, particularly in fisheries from Maryland and further north.

Develop latitudinal / seasonal / gear specific age length keys for the Atlantic coast. Increase sample sizes to consider gear specific keys.

Derive estimates of discard mortality rates and the magnitude of discards for all commercial gear types from both directed and non-directed fisheries. In particular, quantify trawl bycatch, refine estimates of mortality for below minimum size fish, and focus on factors such as distance from shore and geographical differences.

Update the scale – otolith comparison for weakfish.

Medium Priority

Define reproductive biology of weakfish, including size at sexual maturity, maturity schedules, fecundity, and spawning periodicity. Continue research on female spawning patterns: what is the seasonal and geographical extent of "batch" spawning; do females exhibit spawning site fidelity?

Conduct hydrophonic studies to delineate weakfish spawning habitat locations and environmental preferences (temperature, depth, substrate, etc.) and enable quantification of spawning habitat.

Compile existing data on larval and juvenile distribution from existing databases in order to obtain preliminary indications of spawning and nursery habitat location and extent.

Continue studies on mesh-size selectivity; up-to-date (1995) information is available only for North Carolina's gill net fishery. Mesh-size selectivity studies for trawl fisheries are particularly sparse.

Low Priority

Identify stocks and determine coastal movements and the extent of stock mixing, including characterization of stocks in overwintering grounds. (e.g. tagging)

Biological studies should be conducted to better understand migratory aspects and how this relates to observed trends in weight at age.

Continue studies on recreational hook-and-release mortality rates, including factors such as depth, warmer water temperatures, and fish size in the analysis. Studies are needed in deep and warm water conditions. Further consideration of release mortality in both the recreational and commercial fisheries is needed, and methods investigated to improve survival among released fish.

Document the impact of power plants and other water intakes on larval, post larval and juvenile weakfish mortality in spawning and nursery areas, and calculate the resultant impact to adult sock size.

Define restrictions necessary for implementation of projects in spawning and overwintering areas and develop policies on limiting development projects seasonally or spatially.

Develop a coastwide tagging database.

Develop a spawner recruit relationship and examine the relationships between parental stock size and environmental factors on year-class strength.

Social

Assemble socio-demographic-economic data as it becomes available from ACCSP.

Economic

Assemble socio-demographic-economic data as it becomes available from ACCSP.

Detailed information on production activities (e.g., fishing effort and labor used by gear, vessel characteristics, areas fished, etc.) and costs and earnings for the harvesting and processing sectors

Information on retail sales and demand for weakfish in order to estimate the demand and economic benefits of at-home and away-from home consumption of weakfish

Development of bioeconomic models that link the underlying population dynamics to the economic aspects of the commercial and recreational fisheries

Distribution of weakfish to the various markets and across states

Information on the margins of various stages of processing and marketing also need to be obtained; this information is necessary to construct mathematical models that can be used to estimate the economic impacts of management and regulation

A directed data collection program for weakfish including the same variables presently collected by NMFS in support of MRFSS and by the economic add-on. Data collected includes information on travel distance, mode of angling, expenditures, area fished, catch on previous trips, and other information.

Development of commercial decision-making or behavioral models to explain how fishers might respond to various regulations

Estimation and assessment of consumer (net economic benefits to consumers) and producer (net economic benefits or profits to producers) surplus; the sum of consumer and producer surplus is a measure of the net economic value to society of a good or service

Development of input/output models for all states having commercial weakfish activity, or alternatively, full-blown economic impact models, which might consist of input/output models or General Equilibrium models

Determination of the economic value derived from recreational angling including the economic value of a catch and release fishery

Habitat

Conduct hydropohonic studies to delineate weakfish spawning habitat locations and environmental preferences (temperature, depth, substrate, etc) and enable quantification of spawning habitat.

Compile existing data on larval and juvenile distribution from existing databases in order to obtain preliminary indications of spawning and nursery habitat location and extent.

Document the impact of power plants and other water intakes on larval, post larval and juvenile weakfish mortality in spawning and nursery areas, and calculate the resulting impacts on adult stock size.

Define restrictions necessary for implementation of projects in spawning and overwintering areas and develop policies on limiting development projects seasonally or spatially.

VI. Status of Management Measures

Under Amendment 3, each state was required to implement harvest reduction strategies designed to recover weakfish over a 5-year period. Restoration of historic age and size structure, represented currently by the average percentage of fish numbers at each age from 1979 to 1994, is also a plan goal. According to the 26th SAW, the projected fishing mortality for 1996 was achieved and according to the most recent stock assessment fishing mortality is below the Amendment 3 target of 0.50. The most recent update of the stock assessment estimates that the fishing mortality continues to be below the Amendment 4 target of 0.31 with Spawning Stock Biomass above the proposed threshold.

The intent of Amendment 4 is to establish a control rule to accurately categorize the status of the stock by considering both fishing mortality and spawning stock biomass, simultaneously. The control rule is established with targets and thresholds for fishing mortality and a threshold for spawning stock biomass. The use of fishing mortality targets and thresholds and a threshold (spawning stock) biomass provides managers with a series of factors to use when evaluating the status of the stock. Amendment 4 establishes an overfishing definition with a fishing mortality target of $F_{target} = F_{30\%} = 0.31$, a fishing mortality threshold of $F_{threshold} = F_{20\%} = 0.5$, and a spawning stock biomass threshold of $SSB_{threshold} = SSB_{20\%} = 31.8$ million pounds.

To continue current fishing mortality rates that have led to the strong improvements in the weakfish population, Amendment 4 maintains current commercial fishery management measures. However, a new recreational reference period, revised reference points, and a weakfish population, which has changed since the adoption of Amendment 3, lead to changes in the recreational management measures to reduce high creel limits in some states where the limits are no longer appropriate.

VII. Current State-by-State Implementation per Compliance Requirements

As of October 2003, all states were in compliance with Amendment 3 to the Weakfish Fishery Management Plan. However, Rhode Island no longer qualifies for *de minimis* status and the Plan Review Team has recommended that Rhode Island implement additional commercial fishery management measures prior to the 2003 fishing year. The states of South Carolina, Georgia and Florida remain *de minimis* states as defined in Amendment 3. Their landings for 2001 and 2002 are well below the standard for *de minimis* of 1% of coastwide commercial and recreational directed landings for 2001 and 2002.

VII. Status of Assessment Advice

Virtual population analysis was used for the most recent assessments (ADAPT VPA in FACT, Northeast Fishery Science Center). This is a type of analysis that uses data on the number of fish caught at various ages or lengths to estimate fishing mortality as well as numbers of spawning individuals in a population. The stock assessment subcommittee is exploring other approaches for future assessments including using a separable virtual population analysis, Integrated Catch at Age (ICA), and relative exploitation. The Plan Review Team supports the continued exploration of these additional approaches in preparation for the 2004 benchmark assessment for weakfish

VIII. Recommendations

The Plan Review Team recommends that:

- All states provide recent information and data about the changes in their commercial fisheries since the 1990-92 or (1989-91) base period to the technical committee so that the closed season strategy targets the significant commercial fisheries. The technical committee should determine what is "significant" and outline to the Board changes in what fisheries should be using the closed season strategy.
- All states implement the commercial and recreational measures, and monitoring requirements and recommendations of Amendment 4.

IX. References

Hogarth, W. T., T. Meyer, P. Perra and R. H. Shaefer. 1995b. Final environmental impact statement and draft regulatory impact review for a regulatory amendment for the Atlantic Coast weakfish fishery in the Exclusive Economic Zone (EEZ). U. S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Fisheries Conservation and Management, Recreational and Interjurisdictional Fisheries Division, Silver Spring, MD. 84 pp.

Northeast Fishery Science Center. 2000. Report of the 30th Northeast Regional Stock Assessment Workshop (30th SAW): Stock Assessment Review Committee (SARC) consensus summary of assessments. Northeast Fish. Sci. Cent. Ref. Doc. 900-03, Woods Hole, MA.

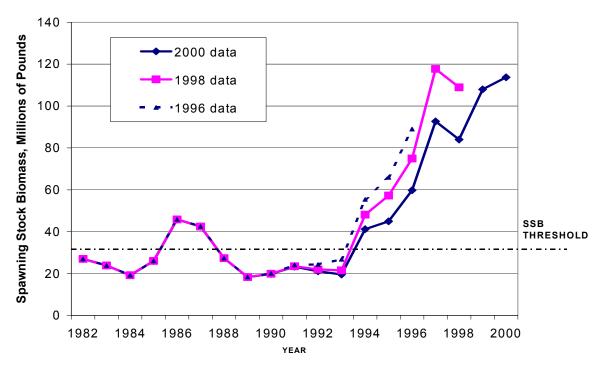


Figure 1: Spawning Stock Biomass - This graph depicts how spawning stock biomass estimates have changed over time based on ASMFC stock assessments. As more data is added to the assessment each year, the estimates of SSB for the most recent years' decreases. This graph also indicates the proposed Amendment 4 SSB Threshold of 31.8 million pounds.

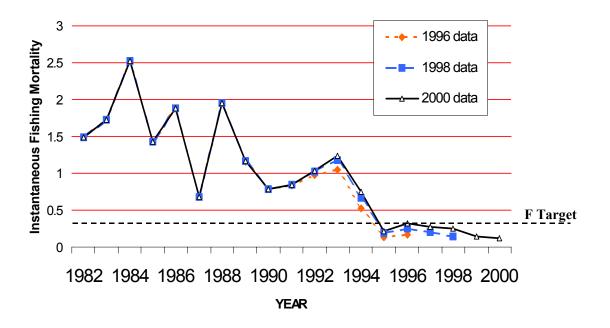


Figure 2: Fishing Mortality - This graph depicts how fishing mortality rates have changed over time based on ASMFC stock assessments. As more data is added to the assessment each year, the estimates of fishing mortality

for the most recent years increase. 0.31.	This graph also includes the proposed Amendment 4 fishing mortality target of

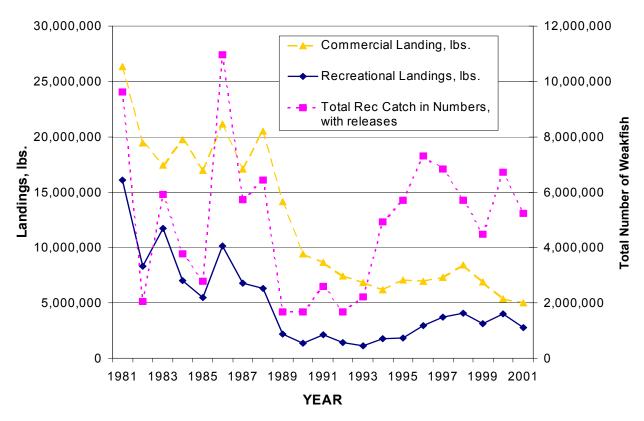


Figure 3: Weakfish landings by fishery. Both the recreational and commercial landings are listed in pounds. However, the total recreational catch with releases is listed in numbers.

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	FL	176,203	117,720	125,799	132,291	108,726	123,081	115,124	171,318	137,188	164,925	147,858	144,347	179,582	50,310	4,493	11,720	11,518	17,486	9,345	10,821	5,746
	GA	296	2,749	862	82	75	189			33												
	SC	443							113													
	NC	12,052,232	10,233,734	12,990,726	9,821,188	14,309,372	11,508,389	15,091,878	10,115,747	5,802,159	5,308,574	4,862,551	4,309,249	3,490,002	4,113,310	3,977,671	3,561,099	3,354,060	2,613,727	1,869,073	1,960,380	1,819,360
ounds), by state and year (1982 - 2002).	VA	2,149,200	2,592,900	2,109,000	2,082,186	1,994,100	1,962,800	1,473,200	1,025,200	1,207,560	1,059,679	549,961	1,088,047	1,294,224	1,485,065	1,587,186	1,557,980	1,863,928	1,674,117	1,362,829	1,121,961	1,144,068
and year	MD	249,200	390,000	325,000	316,110	336,700	366,900	832,600	743,800	662,361	328,251	385,426	181,863	140,907	69,417	132,795	192,634	244,467	223,455	208,315	185,815	111,391
ds), by state	DE	1,294,500	901,800	782,400	990,800	723,500	577,800	530,700	530,200	613,000	497,300	362,400	194,700	261,900	281,200	310,849	558,919	552,644	440,295	328,813	187,642	172,810
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Table 1: Atlantic coast commercial fisheries landings (in p	NY	1,257,100	850,000	484,500	386,200	359,900	329,100	124,500	103,500	19,924	111,629	168,087	88,379	99,470	172,567	365,646	336,795	500,183	490,596	341,833	588,914	513,977
mercial fi	CT	25,600	42,800	31,300	28,200	13,700	29,500	2,400	2,300	1,281	21,300	3,500	1,477	11,000	6,431	6,937	10,958	14,482	22,172	7,920	7,167	10,223
coast com	RI	176,800	163,700	167,600	163,100	127,600	78,600	19,400	9,600	24,646	25,009	30,277	9,991	18,155	52,728	43,723	31,211	77,095	126,793	189,362	109,568	122,781
Atlantic (MA	22,900	6,900	4,800	3,100	5,700	1,700	3,800	1,900	1,720	1,912	3,033	1,080		535	98	55	410	2,550	527	231	842
Table 1: [≠]	YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002

Note: Maine reported 5 lbs of weakfish in 1995. SOURCE: National Marine Fisheries Service 2004

Table 2: Atlantic Coast recreational fisheries landings of weakfish (pounds), by state and year (1982-2002).

Vom. NA NB OLD NAD VA NC RE FE Pomoda 1982 1.18460 1.18460 1.25,194 6.613.223 1.330,760 2.127,679 2.994,879 2.76,047 14,786 4.8137 1.848,323 1983 1.6242 5.88,060 18 2.205,140 1.215,376 7.86,71 3.810 3.48,175 1.1134,020 1984 1.6272 1.1188 1.146 3.896,324 1.289,316 1.84185 1.2163 3.422 2.1,907 3.482,02 1.1034,02 1986 1.1188 1.1288 1.140,085 1.896,313 3.849,93 1.295,84 2.406,44 1.141 6.188 1.1141,786 1.141,788 1.141,7	7 21015	· fatianti		cel carlo	101 11311/11/1	rable 2. fridings Coast restention named is an analysis of weaking (pounts); of state and jear (1702-2002);		e de la composición dela composición de la composición dela composición dela composición dela composición de la composición dela compo	state and y	-a/1 (1)	.(2007)			Total
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11,358 11,458 11,464 3,987,542 1,249,594 254,962 880,131 5,169 189,031 5,169 189,031 5,186 189,031 5,186 189,031 5,186 189,031 268,080 184,485 105,113 3,422 21,907 41,142 61,281 24,221 3,184,095 1,598,932 2,406,643 2,023,94 41,7470 44,185 1,621 10,005 23,781 9,491 45,637 10,005 1,841 9,491 45,637 1,008 10,005 23,781 9,491 45,637 11,005 1,841 9,491 45,637 11,005 23,781 9,491 45,637 11,105 10,002 23,781 9,491 45,637 11,105 10,002 23,781 9,491 45,637 11,105 11,105 11,105 11,105 10,002 23,781 9,491 45,637 11,105 11,205 11,205 11,205 11,205 11,205 11,205 11,205 11,205 11,205 11,205 11,205 11	1983	22,452			164,227	6,080,018	2,205,140	1,215,376	738,671	338,100	4,515	12,165	348,175	11,730,620
41,142 61,284 17,269 688,913 1,876,608 1,102,095 898,313 508,980 184,485 105,151 3,422 21,907 41,142 61,281 242,217 3,184,095 1,598,932 2,406,643 2,032,394 41,187 41,185 12,621 100,805 1 4,286 51,830 3,535,362 1,072,198 81,615 647,692 710,002 23,781 9,491 45,637 111,105 897 7,286 5,127 833,198 1,664,477 1,679,702 1,677,694 359,606 1,841 89,004 1,111,05 89,004 1,111,05 89,004 1,111,05 89,004 1,111,05 89,004 1,111,05 89,004 1,111,05 89,004 1,111,05 89,004 1,111,05 89,004 1,111,05 1,111,05 1,111,05 1,111,05 1,111,05 1,111,05 1,111,05 1,111,05 1,111,05 1,111,05 1,111,05 1,111,05 1,111,05 1,111,05 1,111,05 1,111,05 1,111,05 1,111,05	1984	16,272		11,358	51,464	3,987,542	1,279,594	254,962	850,169	189,031	5,150		368,237	7,013,779
41,142 61,281 24,217 3,184,095 1,598,932 2,406,643 2,032,394 417,470 44,185 12,621 100,805 4,286 51,830 3,333,36 1,072,198 831,615 647,692 710,002 23,781 9,491 45,637 8,004 4,286 51,830 3,333,36 1,664,477 1,677,694 359,606 1,841 89,004 8,007 46,133 575,110 51,648 34,4658 424,463 139,979 5,963 8,175 111,105 8,00 4,317 35,8457 207,131 388,662 256,690 63,420 11,186 961 55,538 8,015 1,014 312,834 207,131 388,662 256,690 63,420 11,186 961 55,538 8,015 4,317 35,8457 207,131 388,662 256,690 63,420 11,186 961 55,538 8,015 4,317 35,931 424,463 39,932 78,922 55,121 11,172 <td>1985</td> <td></td> <td>131,884</td> <td></td> <td>638,913</td> <td>1,876,608</td> <td>1,102,095</td> <td>898,313</td> <td>508,980</td> <td>184,485</td> <td>105,151</td> <td>3,422</td> <td>21,907</td> <td>5,489,027</td>	1985		131,884		638,913	1,876,608	1,102,095	898,313	508,980	184,485	105,151	3,422	21,907	5,489,027
4,286 51,830 3,353,362 1,072,198 831,615 647,692 710,002 23,781 9,491 45,637 89 26,127 833,198 1,664,477 1,679,702 1,677,694 359,606 1,841 89,004 897 46,133 575,110 521,648 344,658 424,463 139,97 5,963 8,175 111,105 897 4,517 35,8457 207,131 388,662 256,690 63,420 11,186 961 55,538 9,154 908 19,824 677,811 232,204 121,403 206,710 27,363 40,459 1,014 51,117 10,154 908 19,824 677,811 232,204 121,403 206,710 27,363 40,459 1,014 51,127 10,154 10,188 312,839 291,627 173,952 89,992 78,982 6,929 17,91 10,982 10,102 11,367 20,718 11,514 20,144 30,834 142,152 149,152	1986		41,142		242,217	3,184,095	1,598,932	2,406,643	2,032,394	417,470	44,185	12,621	100,805	10,141,785
897 26,127 833,198 1,664,477 1,679,702 1,677,694 359,606 1,841 89,004 897 46,133 575,110 521,648 344,658 424,463 139,979 5,963 8,175 111,105 20,154 46,133 575,110 521,648 344,658 424,463 139,979 5,963 8,173 111,105 20,154 908 19,824 677,811 232,204 121,403 206,710 27,363 40,459 1,014 51,173 20,154 908 19,824 677,811 232,204 121,403 206,710 27,363 40,459 1,014 51,173 20,154 1,8889 312,839 291,627 173,952 89,992 78,982 6,929 12,014 51,127 20,156 1,8889 312,839 291,627 173,952 89,922 78,982 6,929 13,913 20,178 1,817,34 41,527 141,511 211,494 72,412 22,875 1,223 <td< td=""><td>1987</td><td></td><td></td><td>4,286</td><td>51,830</td><td>3,353,362</td><td>1,072,198</td><td>831,615</td><td>647,692</td><td>710,002</td><td>23,781</td><td>9,491</td><td>45,637</td><td>6,749,894</td></td<>	1987			4,286	51,830	3,353,362	1,072,198	831,615	647,692	710,002	23,781	9,491	45,637	6,749,894
897 46,133 575,110 521,648 344,658 424,463 139,979 5,963 8,175 111,105 897 4,317 358,457 207,131 388,662 256,690 634,20 11,186 961 55,538 20,154 90,824 27,713 388,662 256,690 634,20 11,186 961 55,538 20,154 90,824 27,718 278,176 280,075 99,824 25,210 5,597 81,173 20,154 90,824 427,778 278,176 280,075 99,824 40,459 1,014 51,127 20,154 18,889 312,839 291,627 173,952 89,992 78,926 6,929 12,791 109,88 4,087 2,579 706,206 319,491 300,831 142,452 72,412 22,875 149,038 4,087 1,367 220,718 1,310,035 690,121 185,074 194,488 79,11 4,988 43,413 4,087 5,866	1988				26,127	833,198	1,664,477	1,679,702	1,677,694	359,606	1,841		89,004	6,331,649
897 4,317 358,457 207,131 388,662 256,690 63,420 11,186 961 55,538 20,154 908 19,824 27,778 278,176 280,075 99,824 25,210 5,597 81,173 20,154 908 19,824 677,811 232,204 121,403 206,710 27,363 40,459 1,014 51,127 20,154 908 19,824 677,811 232,204 121,403 206,710 27,363 40,459 1,014 51,127 20,154 28,81 312,839 291,627 173,952 89,992 78,982 6,929 12,791 109,827 20,11 2,579 706,206 319,491 300,831 142,265 149,159 25,163 43,413 20,11 19,081 1,730,055 690,121 185,074 194,485 79,317 4,980 5,060 17,218 4,087 5,866 6,371 1,817,034 734,800 188,339 463,652 165,032	1989				46,133	575,110	521,648	344,658	424,463	139,979	5,963	8,175	111,105	2,177,234
20,154 908 19,824 677,778 278,176 280,075 99,824 25,210 5,597 81,173 20,154 908 19,824 677,811 232,204 121,403 206,710 27,363 40,459 1,014 51,127 1 6,510 18,889 312,839 291,627 173,952 89,992 78,982 6,929 12,791 100,827 1 2,579 706,206 319,491 300,831 142,265 149,139 78,112 149,139 149,038 1 2,4,467 898,564 419,527 141,511 21,449 72,412 22,875 21,283 43,413 4,087 1,367 220,718 1,817,034 734,800 188,339 463,652 165,032 1,728 65,090 17,218 4,087 5,866 6,379 1,910,868 616,422 377,820 839,245 192,210 11,288 690 19,237 1,922 35,866 6,371 63,58 1,916,093	1990		897		4,317	358,457	207,131	388,662	256,690	63,420	11,186	961	55,538	1,347,259
20,154 908 19,824 677,811 232,204 121,403 206,710 27,363 40,459 1,014 51,127 6,510 18,889 312,839 291,627 173,952 89,992 78,982 6,929 12,791 109,827 10,81 2,579 706,206 319,491 300,831 142,165 25,163 783 149,038 10,81 1,9081 1,730,055 690,121 188,339 463,652 165,032 1,728 34,366 65,690 4,087 2,866 6,371 63,058 1,910,868 616,422 377,820 839,245 192,210 11,288 690 19,237 4,087 6,371 63,058 1,910,868 616,422 377,820 839,245 192,210 11,288 690 19,237 1,922 35,095 1,916,993 635,339 696,662 496,205 87,926 6,312 3,39,806 1,1288 38,01 11,288 11,251,150 172,969 567,625 <	1991				35,931	896,800	427,778	278,176	280,075	99,824	25,210	5,597	81,173	2,130,564
6,510 18,889 312,839 291,627 173,952 89,992 78,982 6,929 12,791 109,827 1,2,71 2,579 706,206 319,491 300,831 142,265 149,159 25,163 783 149,038 1,2,27 24,467 898,564 419,527 141,511 211,494 72,412 22,875 21,283 43,413 1,367 220,718 1,730,055 690,121 188,339 463,652 165,032 1,728 65,690 4,087 9,808 63,298 1,910,868 616,422 377,820 839,245 19,2210 11,288 690 19,237 4,087 6,371 63,058 1,910,808 616,422 377,820 839,245 161,291 4,385 1,614 98,457 1,922 35,095 164,525 1,916,093 635,339 696,662 496,205 87,926 6,312 3,503 111,211 3,801 11,285 58,627 1,21,064 295,397 82,747	1992		20,154		19,824	677,811	232,204	121,403	206,710	27,363	40,459	1,014	51,127	1,398,977
4,087 9,808 6,207 19,491 300,831 142,265 149,159 25,163 783 149,038 4,087 24,467 898,564 419,527 141,511 211,494 72,412 22,875 21,283 43,413 4,087 1,367 220,718 1,730,055 690,121 185,074 194,485 79,317 4,980 5,060 17,218 4,087 1,367 220,718 1,910,868 616,422 377,820 839,245 192,210 11,288 690 19,237 4,087 5,866 6,371 63,058 1,910,868 616,422 377,820 839,245 192,210 11,288 690 19,237 1,922 35,095 164,525 1,916,093 635,339 696,662 496,205 87,926 6,312 3,503 111,211 4,883 151,584 1,251,150 172,969 567,625 373,206 158,423 3,503 39,806 4,880 11,285 58,627 1,213,557 <	1993			6,510	18,889	312,839	291,627	173,952	89,992	78,982	6,929	12,791	109,827	1,102,338
4,087 24,467 898,564 419,527 141,511 211,494 72,412 22,875 21,283 43,413 4,087 1,367 220,718 1,730,055 690,121 188,339 463,652 165,032 1,728 34,356 65,690 4,087 9,808 63,298 1,910,868 616,422 377,820 839,245 192,210 11,288 690 19,237 1,922 35,095 164,525 1,916,093 635,339 696,662 496,205 87,926 6,312 3,503 111,211 4,883 151,584 1,251,150 172,969 567,625 373,206 158,423 39,806 3.801 11,285 58,627 1,213,557 243,156 174,064 295,397 82,747 50,141 683 39,485	1994				2,579	706,206	319,491	300,831	142,265	149,159	25,163	783	149,038	1,795,515
4,087 19,081 1,730,055 690,121 185,074 194,485 79,317 4,980 5,060 17,218 4,087 1,367 220,718 1,817,034 734,800 188,339 463,652 165,032 1,728 65,690 17,218 4,087 9,808 63,298 1,910,868 616,422 377,820 839,245 192,210 11,288 690 19,237 1,922 35,866 6,371 63,058 1,374,169 484,157 544,474 399,588 161,291 4,383 1,614 98,457 1,922 35,095 164,525 1,916,093 635,339 696,662 496,205 87,926 6,312 3,503 111,211 4,883 151,584 1,251,150 172,969 567,625 373,206 158,423 2,983 39,806 3,801 11,285 58,627 1,213,557 243,156 174,064 295,397 82,747 50,141 683 59,145	1995				24,467	898,564	419,527	141,511	211,494	72,412	22,875	21,283	43,413	1,855,546
4,087 1,367 220,718 1,817,034 734,800 188,339 463,652 1,65,032 1,728 34,356 65,690 4,087 9,808 63,298 1,910,868 616,422 377,820 839,245 192,210 11,288 690 19,237 5,866 6,371 63,058 1,374,169 484,157 544,474 399,588 161,291 4,383 1,614 98,457 1,922 35,095 164,525 1,916,093 635,339 696,662 496,205 87,926 6,312 3,503 111,211 4,883 151,584 1,251,150 172,969 567,625 373,206 158,423 2,983 39,806 3.801 11,285 58,627 1,213,557 243,156 174,064 295,397 82,747 50,141 683 59,145	9661				19,081	1,730,055	690,121	185,074	194,485	79,317	4,980	5,060	17,218	2,925,391
4,087 9,808 63,298 1,910,868 616,422 377,820 839,245 192,210 11,288 690 19,237 1,922 5,866 6,371 63,058 1,374,169 484,157 544,474 399,588 161,291 4,383 1,614 98,457 1,922 35,095 164,525 1,916,093 635,339 696,662 496,205 87,926 6,312 3,503 111,211 4,883 151,584 1,251,150 172,969 567,625 373,206 158,423 2,983 39,806 3.801 11,285 58,627 1,213,557 243,156 174,064 295,397 82,747 50,141 683 59,145	1997			1,367	220,718	1,817,034	734,800	188,339	463,652	165,032	1,728	34,356	65,690	3,692,716
5,866 6,371 63,058 1,374,169 484,157 544,474 399,588 161,291 4,383 1,614 98,457 1,922 35,095 164,525 1,916,093 635,339 696,662 496,205 87,926 6,312 3,503 111,211 4,883 151,584 1,251,150 172,969 567,625 373,206 158,423 2,983 39,806 3.801 11,285 58,627 1,213,557 243,156 174,064 295,397 82,747 50,141 683 59,145	8661	4,087		808'6	63,298	1,910,868	616,422	377,820	839,245	192,210	11,288	069	19,237	4,044,973
1,922 35,095 164,525 1,916,093 635,339 696,662 496,205 87,926 6,312 3,503 111,211 4,883 151,584 1,251,150 172,969 567,625 373,206 158,423 2,983 39,806 3.801 11,285 58,627 1,213,557 243,156 174,064 295,397 82,747 50,141 683 59,145	1999		5,866		63,058	1,374,169	484,157	544,474	399,588	161,291	4,383	1,614	98,457	3,143,428
4,883 151,584 1,251,150 172,969 567,625 373,206 158,423 2,983 39,806 3.801 11,285 58,627 1,213,557 243,156 174,064 295,397 82,747 50,141 683 59,145	2000		1,922		164,525	1,916,093	635,339	696,662	496,205	87,926	6,312	3,503	111,211	4,154,793
3.801 11,285 58,627 1,213,557 243,156 174,064 295,397 82,747 50,141 683 59,145	2001			4,883	151,584	1,251,150	172,969	567,625	373,206	158,423		2,983	39,806	2,722,629
	2002		3.801	11,285	58,627	1,213,557	243,156	174,064	295,397	82,747	50,141	683	59,145	2,188,806

SOURCE: National Marine Fisheries Service 2004