REVIEW OF THE INTERSTATE FISHERY MANAGEMENT PLAN FOR ATLANTIC CROAKER
(Micropogonias undulatus)

2005 FISHING YEAR

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I. Status of the Fishery Management Plan

Date of FMP Approval:	Original FMP: October 1987
Amendments:	Amendment 1: November 2005 (implemented January 2006)
Management Areas:	The Atlantic coast distribution of the resource from Florida through New Jersey South-Atlantic Region: Florida through South Carolina North-Atlantic Region: North Carolina through New Jersey
Active Boards/Committees:	South Atlantic State/Federal Fisheries Management Board; Atlantic Croaker Plan Development/Plan Review Team, Technical Committee, Stock Assessment Subcommittee, and Advisory Panel

The *Fishery Management Plan (FMP) for Atlantic Croaker* was adopted in 1987 and included the states from Maryland through Florida. In reviewing the early plans created under the Interstate Fisheries Management Plan process, the Atlantic States Marine Fisheries Commission (ASMFC) determined that the Atlantic croaker plan was in need of review and possible revision. The South Atlantic State/Federal Fisheries Management Board of ASMFC reviewed the status of several plans in order to define the compliance issues to be enforced under the Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA). The Board found recommendations in the Atlantic Croaker FMP to be vague and no longer valid. The Board recommended that an amendment be prepared to the Atlantic Croaker FMP to define management measures necessary to achieve the goals of the FMP. In their final schedule for compliance under the ACFCMA, the Interstate Fisheries Management Program (ISFMP) Policy Board adopted the finding that the current Atlantic Croaker FMP does not contain any management measures that states are required to implement.

In 2002, the Board directed the Atlantic Croaker Technical Committee to conduct the first coastwide stock assessment of the species. The Atlantic Croaker Stock Assessment Subcommittee developed an updated stock assessment in 2003, which was reviewed through the Southeast Data Assessment Review (SEDAR) process in 2003 and 2004. The SEDAR panel approved the assessment for use in management in June 2004 (ASMFC 2005a). The Management Board was presented with this information in August 2004 and initiated the development of Amendment 1 to the Atlantic Croaker FMP. This Amendment was drafted and presented with a summary of public comments to the Management Board in November 2005. The Management Board approved Amendment 1, which was implemented by January 1, 2006 (ASMFC 2005b). State compliance for the 2005 fishing year in this report reflects the requirements of the original FMP; the 2007 report of the 2006 fishing year will be guided by the

requirements of Amendment 1 to the Atlantic Croaker FMP. See section *VI. Status of Management Measures and Issues* for more information on Amendment 1.

II. Status of the Stock

The latest stock assessment was completed in 2004 and reviewed by the SEDAR peer review panel. The stock assessment committee used an Age Structured Production Model. This assessment only accounts for the mid-Atlantic region (North Carolina and north). There is currently not enough data to assess the South Atlantic region (South Carolina through Florida). In this assessment, fishing mortality rates (F) are based on the average population weighted F for ages 1-10+. Fishing mortality rates for Atlantic croaker exhibit a cyclical trend over the time series. From 1977 to 1979, F rose rapidly reaching a maximum of 0.5 in 1979. From 1980 onwards, F rapidly declined reaching its lowest levels in 1992 (Figure 1). Since 1993, F has gradually increased and stabilized in 2002 at around 0.11 (ASMFC 2005a).

For the base mid-Atlantic run, the trend in population abundance indicates a step-wise increase reaching a peak of 974 million fish in 1999. Population estimates from 1999 to 2002 have ranged from 663 to 974 million fish. Spawning stock biomass (SSB) estimates exhibit a cyclical trend over the time series. From the early 1970's to 1983, SSB declined to its lowest level (11,746 MT). Since 1984, SSB has increased in three distinct phases, with estimates reaching a maximum of 96,686 metric tons in 1996 (Figure 2). Between 1997 and 2002, SSB estimates range between 80-91,000 metric tons.

The mid-Atlantic model, which is the core of the population, indicates fishing mortality rates were high in the mid-1970's, abruptly declined, and has been low and stable since the mid 1990's. Between 1973 and 2002 the relationship between the different sources of removals has changed. In particular, estimates of scrap/discards reached their peak in 1979 (3,200 MT) and since then declined to their lowest levels in 2002 (425 MT). Between 1973 and 1995, scrap/discard removals averaged 1,687 MT per year, whereas between 1996-2002 scrap/discards averaged 595 MT per year. It appears that the significant reduction in removals of predominantly age 1 and younger fish may have contributed to relatively stable fishing mortality and spawning stock biomass estimates since the mid 1990's. In relation to the proposed reference points the Atlantic croaker population is not overfished or experiencing overfishing. The commercial and recreational catch-at-age data from recent years also shows an increasing age distribution, with a few fish of 12 years being observed in the commercial landings. Anecdotal evidence from the mid-Atlantic indicates an expansion of the population at the northern part of the range. For example, in Delaware, fishery independent indices indicate a recent increase in abundance of Atlantic croaker in the region (D. Kahn Delaware Div. Fish and Wildl., personal communication). In addition, both commercial and recreational landings from New Jersey and Delaware have increased recently. The population has benefited from good recruitment in recent years, which may also be tied to the regulatory changes that have affected some of the fisheries that indirectly target Atlantic croaker.

While this analysis does not capture all of the sources of uncertainty, examination of the effects of alternate weightings of the likelihood components and alternate steepness and natural mortality estimates indicate that reference points derived from the base run are relatively robust. The reference points suggest that there was less than a 10% chance that the population is

overfished or undergoing overfishing. Sensitivity analysis evaluating the inclusion/non-inclusion of shrimp bycatch estimates, indicate that SSB_{msy} estimates are sensitive to the inclusion of Atlantic croaker caught as shrimp bycatch. However, increased SSB_{msy} estimates are also accompanied by higher SSB estimates. The ratio of SSB_{2002}:SSB_{msy} when shrimp bycatch is included indicates that the stock is unlikely to be below the threshold estimates. Of concern would be management goals that define biomass reference points in absolute terms. There appears to be some justification for revising the reference points for the biomass target and threshold to relative terms until a more comprehensive evaluation of Atlantic croaker from shrimp bycatch can be carried out.

The next stock assessment is scheduled for the fall of 2009, an update assessment through the SEDAR process.

III. Status of the Fishery

Atlantic coast commercial landings of croaker have varied from one million pounds in 1970 to 64 million pounds in 1945. Commercial landings increased steadily each year from a low of 3.7 million pounds in 1991 to more than 28 million pounds in 2003 (Table 3). Commercial landings decreased in 2004 to approximately 25.5 million pounds coastwide, and again in 2005 to 22.5 million pounds; however, coastwide commercial landings have remained above 20 million pounds since 1996 (Figure 3). While commercial fishermen from New Hampshire south have landed Atlantic croaker in at least one year since 1960, the majority of landings come from the mid-Atlantic states (New Jersey through North Carolina) and Florida. Commercial landings from the remaining states are small and sporadic or only a recent component. Virginia and North Carolina have dominated the commercial harvest since 1960.

Atlantic croaker is the major component of the North Carolina and Virginia "scrap fishery". A number of regulations instituted by North Carolina, such as banned flynet fishing south of Cape Hatteras, the introduction of BRDs in shrimp trawls, incidental finfish limits taken by shrimp and crab trawls in inside waters, minimum mesh size restrictions in trawls and culling panels in long haul seines may have indirectly reduced catches of juvenile croaker and changed the size and age distributions of the harvest. In the last stock assessment, aggregate, unculled ("scrap") bait fisheries landings data were included for North Carolina and Virginia, and at-sea discard data was included from gill net and trawl fisheries. Scrap landings and discards were combined in the model. Between 1973 and 1995, scrap/discards accounted for an average 20% of removals, and from 1996 to 2002, an average 3% of removals. In Georgia, trawl-caught croaker is sold as unsorted mixed fish along with spot, whiting, and small flounder, therefore, commercial landings are a tenuous measurement of croaker landings there. Small croaker were previously a major part of the bycatch of the south Atlantic shrimp trawl fishery, however the use of TEDs and BRDs has reduced this bycatch.

Recreational landings are from the National Marine Fisheries Service Marine Recreational Fishery Statistics Survey (MRFSS). From 1981-2005, recreational landings of Atlantic croaker (Type A+B1 in numbers) from New Jersey through North Carolina have varied between 1.3 million pounds (1981) and 11 million pounds (2001), with landings showing a strong linear increase over this period (Figure 4). The recreational harvest in 2005 was 11.6 million fish (10.6 million pounds) (Tables 4 and 5). By number of fish, this is the third highest recreational

landings for the time series, and the second highest by pounds. The majority of the landings are from Virginia (~68% by pounds). The increased landings in recent years have been at the northern range of the fishery (New Jersey to Virginia). The number of recreational releases in 2005 was estimated at 13.3 million fish, an increase from 2004 (Table 6, Figure 4).

IV. Status of Assessment Advice

In 2003, the Atlantic Croaker Stock Assessment Subcommittee conducted a stock assessment for Atlantic croaker. This assessment was reviewed by the SEDAR Peer Review Panel in October 2003 (ASMFC 2003). The panel recommended additional data for inclusion in the assessment and for the Technical Committee to evaluate the use of other types of models. The Stock Assessment Subcommittee re-ran the assessment in 2004 with the changes that the SEDAR panel recommended. This assessment was reviewed by the same SEDAR panel in June 2004. The panel approved this assessment for management purposes.

V. Status of Research and Monitoring

Fishery-dependent catch and effort data are collected by state statistics programs. More complete and timely data should be available as the Atlantic Coastal Cooperative Statistics Program is further developed and implemented. The Marine Recreational Fisheries Statistics Survey (MRFSS) is the primary source for recreational catch and effort data. Additional fishery-dependent data collection occurs through several state programs:

- Maryland: Summer Commercial Pound Net Survey: on the water sampling for commercial length, weight, and sex data and otolith collection
- North Carolina DMF: fish house sampling for commercial length and weight data and otolith collection
- South Carolina: state small boat recreational survey
- Georgia: Recreational Carcass Recovery Project

Fishery-independent data come from a number of state and agency programs.

- New Jersey: Ocean Stock Assessment Trawl Survey from Ambrose Channel to Cape Henlopen; Delaware Bay Finfish Trawl Survey from the mouth of the Cohansey River south to the Villas; Delaware River Seine Survey
- Delaware: Adult Finfish Trawl Survey in Delaware Bay; Juvenile Finfish Trawl Survey from Wilmington to lower Delaware Bay
- Maryland: DNR Striped Bass Young-of-Year Survey, Blue Crab & Finfish Survey
- Virginia: VIMS Juvenile Finfish and Blue Crab Trawl Survey; Chesapeake Bay Multispecies Monitoring and Assessment Program
- North Carolina: Young-of-Year Trawl Surveys in internal waters and Pamlico Sound; Adult Fishery Gill Net Survey in Pamlico Sound and the Neuse and Pamlico River system;
- Georgia: sampling at fixed stations in nearshore and outside waters; Young-of-Year Survey
- Florida: FWCC Young-of-Year and Age 1+ Seine Surveys
- SEAMAP: survey from Cape Hatteras to Cape Canaveral
- NMFS: juvenile ingress study at Beaufort, NC
- Northeast Fishery Science Center: Groundfish Survey, southern leg from New Jersey to Cape Hatteras

Researchers at VIMS have conducted studies on temperature tolerance, developed a juvenile recruitment model based on the effect of winter water temperature and offshore wind velocities, and developed population dynamics parameters to evaluate growth overfishing potential. A number of studies from the University of Delaware were published which investigated the link between recruitment and low temperatures, genetic stock identification, and geographic variation in life history traits/population dynamics. A scale-otolith comparison study for aging croaker was completed by NCDMF (NCDMF 2001). Under the ASMFC Northeast Area Monitoring and Assessment Program, VIMS was selected as the contractor for a coordinated, multi-state, near shore long-term trawl survey to provide marine resources data for habitat and fisheries management. The survey will start in the fall of 2006 and Atlantic croaker data will be gathered. New Jersey is starting an ACCSP sampling program in September 2006 to collect 500 Atlantic croaker samples for age-size data.

The Virginia Marine Resources Commission and state of North Carolina have evaluated the use of culling panels in pound nets for the release of small spot and croaker. North Carolina also conducted a study to evaluate the use of culling panels in long hauls and swipe nets (Gearhart 2000). The study proved that shifts occurred in the length frequency distribution of many species including croaker, which resulted in rule changes to begin the use of culling panels in some areas of North Carolina since 1999. A flynet characterization study was concluded in April 2003 in North Carolina. A total of 3 trips out of a permitted 18 trips were completed during the study period (January 15 – April 1, 2003). The purpose of the experiment was to test flynet gear in the closed area using the tailbag mesh size (3 ¾" diamond mesh) required by the ASMFC Weakfish Plan to assess the size and species composition of the catches. The results were to be used by the ASMFC and NMFS to determine whether it would be reasonable to consider partial or seasonal reopening of the area south of Cape Hatteras to harvest legal-sized weakfish without an excessive amount of discards. Because only a limited number of tows were conducted in the 2002-03 season, meaningful tow data results could not be obtained in the first year of testing. Additional data has not yet been collected. Gear research for bycatch reduction in shrimp trawls may continue in the future under interstate and federal sponsorship.

With the implementation of Amendment 1 to the FMP, the Technical Committee will be conducting stock assessments every five years unless prompted by the completion of annual trigger exercises. The primary trigger is based on landings data; however, CPUE will become the premier trigger for determining the necessity of stock assessments as the quality and quantity of data improve. Maryland, Virginia, North Carolina, and Florida are aiming to develop commercial CPUE indices for the next stock assessment. For the landings trigger, Amendment 1 states that a stock assessment will be triggered if the most recent year's commercial or recreational landings are less than 70% of the previous two years' average landings (ASMFC 2005b). Completion of the trigger exercise in 2006 revealed that the 2005 commercial landings of Atlantic croaker did not trigger a stock assessment prior to the scheduled 2009 SEDAR assessment (Table 1).

Table 1. Trigger Exercise Results

Comparison of Commercial and Recreational Atlantic croaker harvests (pounds) from the Mid-Atlantic[1], 2003-2005.			
	2005	**Average 2003-2004**	**Percent Difference**
Commercial	22,530,012	26,950,329	-16.40%
Recreational	9,923,242	8,747,097	13.45%

Comparison of Commercial and Recreational Atlantic croaker harvests (pounds) from the South Atlantic[2], 2003-2005.			
	2005	**Average 2003-2004**	**Percent Difference**
Commercial	16,520	13,990	18.08%
Recreational	194,679	229,856	-15.30%

[1] Includes North Carolina, Virginia, Maryland, Delaware and New Jersey
[2] Includes South Carolina, Georgia and E. Florida

VI. Status of Management Measures and Issues

The FMP for Atlantic croaker identifies the following management measures for implementation:

1. Promote the development and use of bycatch reduction devices through demonstration and application in trawl fisheries.
2. Promote increases in yield per recruit through delaying entry to croaker fisheries to age one and older.

Although the ISFMP Policy Board judged that the FMP management recommendations were too vague and did not furnish objective compliance criteria, progress has been made on developing bycatch reduction devices (BRDs). The October 1993 spot and croaker workshop proceedings summarized experimental bycatch reduction work and examined the population implications of bycatch reduction (ASMFC 1993). It was clear that there were economically viable shrimp gears that reduce finfish bycatch. Several states have chosen to implement regulations that directly affect Atlantic croaker catch (ex. size limits – see Table 7) or indirectly affect Atlantic croaker bycatch.

The states of Florida through North Carolina have promoted and require the use of BRDs (as well as turtle excluder devices, or TEDs) in state waters. Florida has a maximum shrimp trawl size. Atlantic croaker has been a large percentage by weight of the scrapfish landed by North Carolina commercial fishing gears. The state has implemented a minimum mesh size restriction in shrimp trawls in 1991 (1 ½" tailbag), banned finfish trawling in internal waters in 1992, closed ocean waters south of Cape Hatteras to the South Carolina border to flynets in 1991, implemented flynet regulations in 1991, and limited the scrapfish catch to 5,000 pounds per vessel per day (1991). North Carolina experienced a reduction in the average catch of the scrapfish species in the haul seine fishery when several crews began to consistently use escape panels in their nets. Rule changes including culling panels in some areas for NC long haul seines

have been in effect since 1999. Reducing the quantity of sub-adult croaker harvested should increase spawning stock biomass and yield per recruit.

The Potomac River Fisheries Commission encourages large mesh bycatch reduction panels in all pound nets and allows a 2% bycatch tolerance for flounder and weakfish for nets with panels. It is estimated that the panels allow the release of 100% of captured croaker below nine inches.

Amendment 1

In August 2004 the South Atlantic Management Board initiated the development of Amendment 1 to the Atlantic Croaker FMP. Draft Amendment 1 was prepared by the Plan Development Team and underwent a public comment period with hearings in the fall of 2005. In November 2005, the Management Board approved Amendment 1 (ASMFC 2005b).

Amendment 1 was developed with four objectives in mind:

1) Manage the fishing mortality rate for Atlantic croaker to provide adequate spawning potential to sustain long-term abundance of the Atlantic croaker population.
2) Manage the Atlantic croaker stock to maintain the spawning stock biomass above the target biomass levels and restrict fishing mortality to rates below the threshold.
3) Develop a management program for restoring and maintaining essential Atlantic croaker habitat.
4) Develop research priorities that will further refine the Atlantic croaker management program to maximize the biological, social, and economic benefits derived from the Atlantic croaker population.

Consistent with the stock assessment, Amendment 1 defines two management areas: the south-Atlantic region, including the states Florida through South Carolina; and the mid-Atlantic region, including the states North Carolina through New Jersey.

Amendment 1 does not implement any specific management measures restricting the recreational or commercial harvest of Atlantic croaker. Those states with more conservative measures are encouraged to maintain those regulations. Through adaptive management, the Management Board may vary the requirements specified in Amendment 1.

Amendment 1 sets a control rule for Atlantic croaker, with which overfishing and overfished status can be determined (Table 2). The control rule applies only to the mid-Atlantic region; the status of the stock for the south-Atlantic region remains unknown due to a lack of data. Should it be determined that the stock is overfished or that overfishing is occurring, the Management Board will take action to recover the stock to the desired target level or to reduce the fishing mortality on the stock to the desired target level. In such a case, the Board will determine a stock rebuilding target and schedule.

Table 2. Amendment 1 Control Rule*

	FISHING MORTALITY RATE	FEMALE SPAWNING STOCK BIOMASS
TARGET	F = 0.29	63.78 million pounds
THRESHOLD	F = 0.39	44.65 million pounds

* Mid-Atlantic region only

For states to be found in compliance with Amendment 1, they must include management controls on Atlantic croaker consistent with Amendment 1, except that a state may propose an alternative management program, which, if approved by the Management Board to have the same conservation value as the measure contained in Amendment 1, may be implemented as an alternative regulatory requirement for compliance. Beginning in 2007, states are also required to submit an annual compliance report by July 1st of each year that contains commercial and recreational landings as well as results from any monitoring programs that intercept Atlantic croaker. States were required to implement the measures in Amendment 1 by January 1, 2006.

VII. Implementation of FMP Compliance Requirements as of October 1, 2006

There are no regulatory compliance requirements in the 1987 Atlantic Croaker FMP.

VIII. Recommendations of FMP Review Team

Management and Regulatory Recommendations

- Promote the use of BRDs and TEDs and evaluate their effects on the croaker population.
- Promote increases in yield per recruit through delaying entry to croaker fisheries to age one or older.
- Encourage the use of circle hooks to minimize recreational discard mortality.

Research and Monitoring Recommendations

<u>High Priority</u> (Those italicized are the highest priority.)

- *Determine migratory patterns and mixing rates through cooperative, multi-jurisdictional tagging studies, including tagging information from Cape Fear south. Examine otolith microchemistry data available and continue research in this area (partially met: Lankford et al. 1999).*
- *Conduct an ageing workshop to standardize ageing procedures for Atlantic croaker and standardize current age data sets. Comparison study of scales vs. otoliths for ageing.*
- *Collect bio-profile information and conduct studies on growth rates, age structure, and maturity schedule throughout the species range with a standardized protocol.*
- *Produce a general fishery independent index using state survey information, and develop a coastwide and/or regional CPUE index.*
- *Evaluate bycatch and discard estimates from the commercial and recreational fisheries (i.e. shrimp fishery). Characterization of the scrap fishery.*
- *Examine socio-economic aspects of the fishery.*
- Develop age-size data that are representative of all seasons and areas in the fisheries on an annual basis.

- Develop fishery-independent size, age, and sex specific relative abundance estimates to monitor long term changes in croaker abundance.
- Improve catch and effort statistics from the commercial and recreational fisheries.
- Examine reproductive biology of croaker with emphasis on developing maturity schedules and estimates of fecundity across the management unit (partially met: Barbieri et al. 1994).

Medium Priority

- Evaluate hook and release mortality under varying environmental factors and fishery practices and include in updated assessment.
- Evaluate and compile the effects of mandated bycatch reduction devices (BRDs) on croaker catch
- Evaluate the optimum utilization (economic and biological) of a long term fluctuating population such as croaker.
- Identify essential habitat requirements.
- Determine species interactions and predator/prey relationships for croaker (prey) and other more highly valued fisheries (predators).
- Determine the impacts of any dredging activity (i.e. for beach re-nourishment) on all life history stages of croaker.

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Figure 1. Average fishing mortality rates (ages 1 –10) for Atlantic croaker in the mid-Atlantic (ASMFC 2005a, Section C)

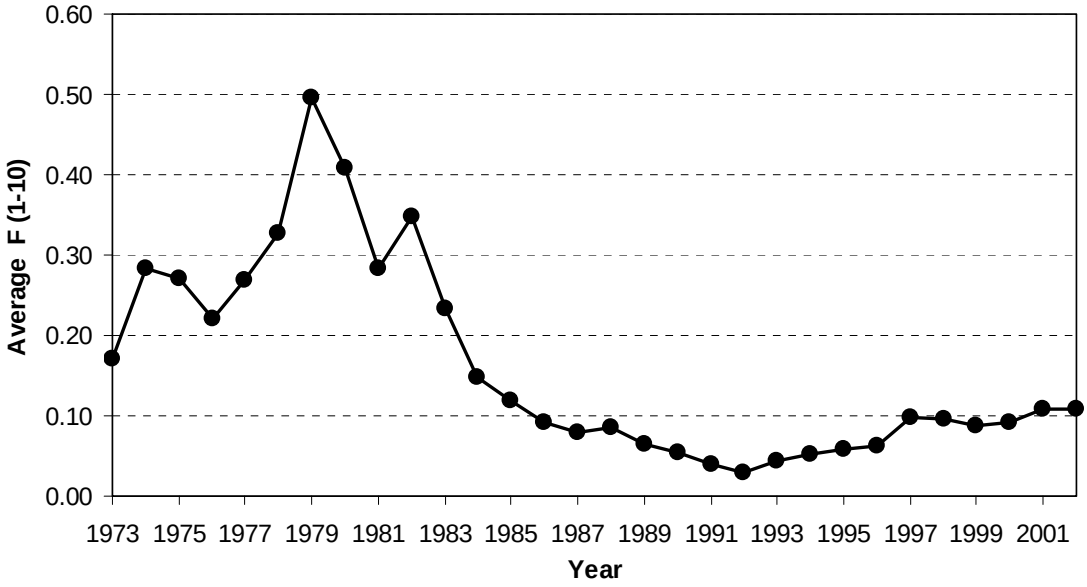

Figure 2. Spawning stock biomass (metric tons) and age 0 recruits (millions of fish) estimates from the base mid-Atlantic model (ASMFC 2005a, Section C)

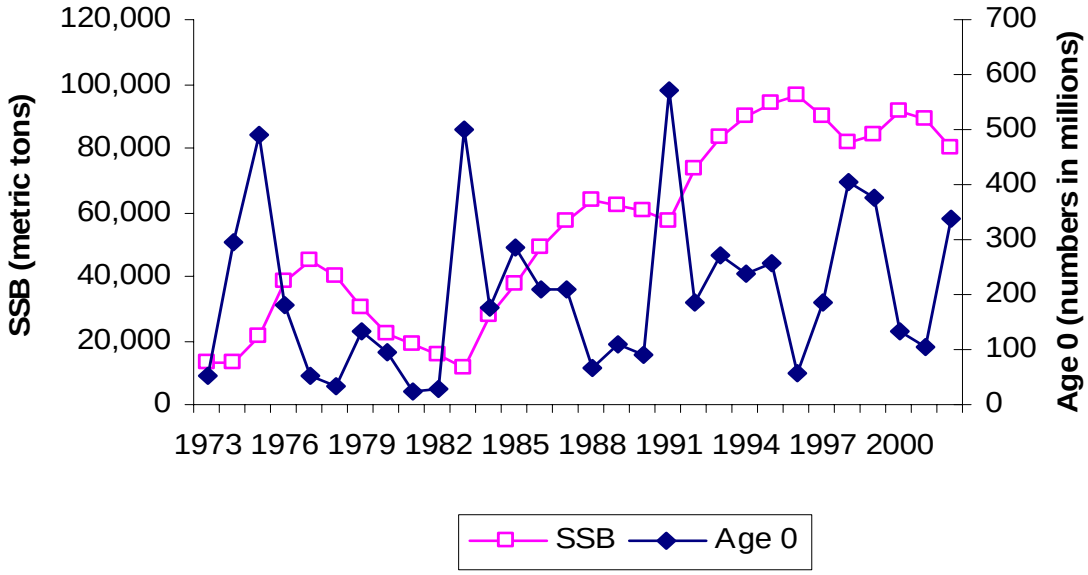

Figure 3. Atlantic croaker commercial and recreational harvest (pounds)
(NMFS Office of Science & Technology 2006; State Fishery Agencies, pers. com. 2006)

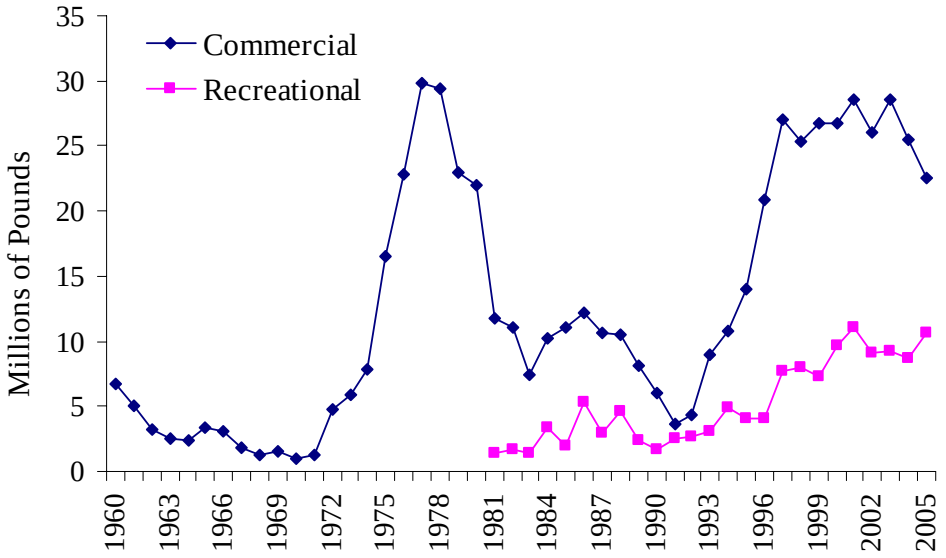

Figure 4. Atlantic croaker recreational harvest (A+B1 fish) and releases (B2 fish), 1981-2005
(NMFS Office of Science & Technology 2006)

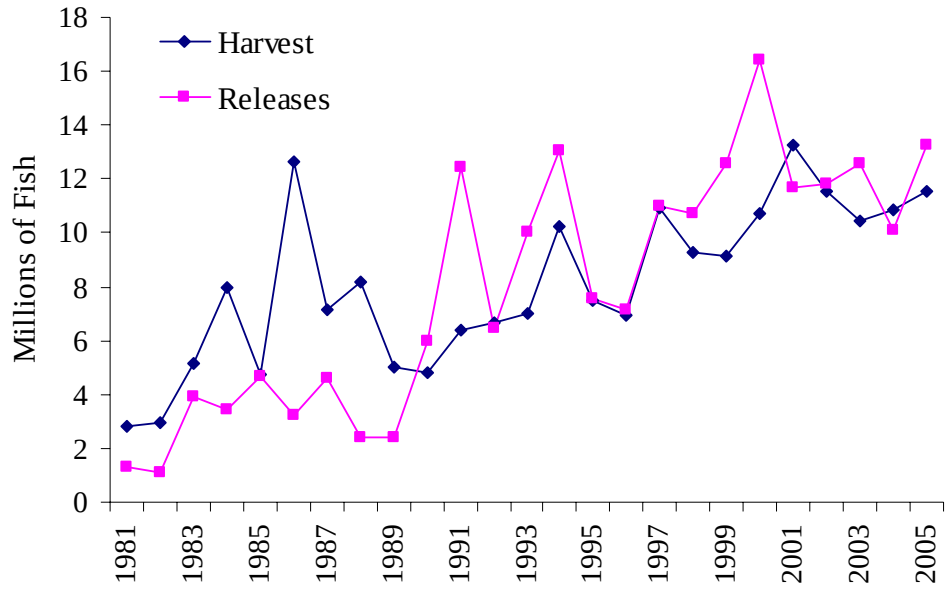

Table 3. Commercial landings (pounds) of Atlantic croaker by state, 1960-2005

(1960-2004 data: NMFS Office of Science and Technology, 2006; 2005 data: Atlantic croaker Technical Committee, personal communication, 2006)

Year	NH	MA	RI	NY	NJ	DE	MD	VA	NC	SC	GA	FLEC	Total
1960					8,100	200	586,000	3,932,700	2,092,800	20,500	300	140,700	6,781,300
1961					56,900		48,900	3,082,300	1,753,500	13,300		142,700	5,097,600
1962					4,300		11,100	1,293,700	1,662,800	33,300	600	161,300	3,167,100
1963							1,500	122,400	2,275,700	36,200	700	113,700	2,550,200
1964							2,400	394,200	1,866,900	10,400	400	101,200	2,375,500
1965							400	1,531,700	1,753,400	3,400	2,100	106,800	3,397,800
1966							800	1,463,200	1,267,000	1,300	5,100	330,700	3,068,100
1967							1,200	323,500	1,282,800		6,000	143,800	1,757,300
1968							100	6,200	1,200,800			70,000	1,277,100
1969							400	63,200	1,368,700	200	1,800	49,900	1,484,200
1970					200		100	127,900	806,800	2,700	9,400	66,900	1,014,000
1971					100		200	264,900	948,200	1,500	500	89,800	1,305,200
1972	17,700				400		500	484,100	4,108,600	400	2,400	101,100	4,715,200
1973				100	37,100		37,300	1,358,300	4,324,100	3,100	14,900	102,900	5,877,800
1974					45,100		120,300	1,501,700	6,081,700	39,900	8,500	65,100	7,862,300
1975					885,100	1,300	639,700	4,721,300	10,251,700	3,500	4,000	61,500	16,568,100
1976		100			700,600	2,600	1,069,100	5,897,600	15,038,000	1,300	13,600	78,400	22,801,300
1977			400		1,478,600	8,900	692,300	8,600,600	18,994,800	600	7,000	49,500	29,832,700
1978			100		654,900	7,300	597,000	8,099,100	19,945,471	730	563	39,470	29,344,634
1979			2,600	6,200	91,000	3,700	97,400	2,136,600	20,558,193	7,082	19,137	38,646	22,960,558
1980				900	12,000		7,100	711,600	21,146,798	5,438	4,721	50,911	21,939,468
1981				200	23,500		2,100	429,800	11,205,342	2,441	1,038	72,112	11,736,533
1982					100		7,000	119,300	10,824,953	386	2,177	95,357	11,049,273
1983		200			200		500	150,400	7,249,680	3,200	1,097	81,737	7,487,014
1984			100	3,000	57,700		27,100	817,700	9,170,160	3,793		131,375	10,210,928
1985		400			48,800	100	9,500	2,171,821	8,695,544	1,256		115,641	11,043,062
1986					106,000	500	137,500	2,367,000	9,424,828	924		177,414	12,214,166
1987					357,600	800	119,300	2,719,500	7,289,191	698	553	217,932	10,705,574
1988					30,100	200	98,700	1,749,200	8,434,415	2,614	304	140,011	10,455,544
1989					137,100		89,500	947,300	6,824,088	1,950		94,909	8,094,847
1990			20		644		3,584	198,195	5,769,512	1,190	32	104,402	6,077,579
1991			10		31,292	700	6,183	164,126	3,436,960			56,761	3,696,032
1992					51,600	800	10,685	1,339,388	2,796,612		210	73,369	4,272,664
1993					183,414	2,500	158,062	5,264,974	3,267,652			51,465	8,928,067
1994					117,256	3,000	218,744	5,773,430	4,615,793			96,018	10,824,241
1995					334,654	13,000	549,716	6,991,044	6,021,332			22,879	13,932,625
1996				1	621,889		810,435	9,442,959	9,961,862			26,045	20,863,191
1997				1,309	1,994,446	10,509	1,455,707	12,790,922	10,711,704			36,572	27,001,169
1998				31	1,029,332	10,368	1,375,646	12,006,988	10,865,928			26,418	25,314,711
1999			4	2	2,071,046	14,729	1,584,412	12,849,954	10,185,535			26,441	26,732,123
2000			40	285	2,130,465	11,121	1,501,655	12,889,406	10,122,634			34,441	26,690,047
2001				315	1,389,837	22,736	2,233,160	12,929,191	12,017,459			14,857	28,607,555
2002			67	224	1,828,484	10,732	1,513,025	12,447,795	10,189,182			17,237	26,006,746
2003				1,837	1,575,735	16,561	1,532,038	10,936,274	14,429,221			16,503	28,508,169
2004		955	1,133	36,004	2,096,305	31,819	1,800,940	9,487,635	11,992,828		3	10,940	25,458,562
2005*					1,844,241	37,492	1,361,179	8,090,421	11,196,679			16,520	22,546,532
Total	17,700	1,655	4,474	50,408	22,036,140	211,667	20,520,171	191,191,523	355,427,856	203,302	107,135	3,862,383	

* Preliminary data

Table 4. Recreational landings (numbers of A + B1 fish) of Atlantic croaker by state, 1981-2005

(NMFS Office of Science & Technology, 2006)

Year	MA	NJ	DE	MD	VA	NC	SC	GA	FLEC	Total
1981		1,054	3,003	0	964,013	1,043,240	165,742	35,591	598,896	2,811,539
1982				10,452	273,039	596,493	193,554	169,749	1,682,619	2,925,906
1983				108,355	2,154,133	1,620,909	60,811	75,173	1,148,227	5,167,608
1984				211,035	2,047,720	2,147,871	588,114	202,364	2,781,742	7,978,846
1985				21,276	2,284,334	723,933	260,265	144,341	1,306,955	4,741,104
1986			4,694	123,578	6,384,966	356,742	599,442	69,887	5,118,552	12,657,861
1987		0	0	208,488	3,234,224	904,030	166,978	44,783	2,580,727	7,139,230
1988			1,186	1,005,452	4,048,690	2,256,128	144,057	64,093	685,778	8,205,384
1989			478	22,871	2,203,504	2,131,763	217,023	72,598	359,417	5,007,654
1990			281	100,673	2,374,679	1,063,452	346,631	585,380	304,064	4,775,160
1991		16,235	37,500	288,471	4,298,542	434,067	100,816	184,435	1,030,115	6,390,181
1992		0	9,854	117,427	4,524,040	723,823	74,051	440,185	754,595	6,643,975
1993		2,552	19,352	805,560	4,990,098	755,998	32,700	89,734	304,067	7,000,061
1994		1,567	5,718	1,633,581	6,494,691	1,179,735	188,520	102,974	599,032	10,205,818
1995		15,184	136,865	827,183	5,029,708	850,606	75,422	100,826	438,076	7,473,870
1996		35,037	235,389	775,115	4,997,021	662,240	37,464	61,957	116,575	6,920,798
1997		342,089	385,586	1,053,232	8,066,926	661,116	118,428	64,050	235,430	10,926,857
1998	1,477	143,404	391,231	1,126,058	6,730,181	387,427	170,528	64,953	234,360	9,249,619
1999		357,261	662,724	1,209,572	5,881,671	442,185	54,761	104,438	403,982	9,116,594
2000		1,023,442	517,886	2,674,880	5,486,159	391,056	32,332	128,922	455,870	10,710,547
2001		1,177,813	312,005	1,319,928	9,335,313	635,552	19,802	21,503	426,264	13,248,180
2002		253,472	261,634	1,223,385	9,129,060	408,944	66,409	36,497	177,751	11,557,152
2003		692,391	341,174	1,619,766	6,695,192	490,399	198,339	248,853	165,459	10,451,573
2004		1,101,792	466,413	866,933	7,283,076	472,393	135,688	45,966	493,703	10,865,964
2005		1,271,349	976,865	825,578	7,701,019	290,780	134,259	40,171	330,317	11,570,338
Total	1,477	6,434,642	4,769,838	18,178,849	122,611,999	21,630,882	4,182,136	3,199,423	22,732,573	

Table 5. Recreational landings (pounds of A + B1 fish) of Atlantic croaker by state, 1981-2005

(NMSF Office of Science & Technology, 2006)

Year	MA	NJ	DE	MD	VA	NC	SC	GA	FLEC	Total
1981		582	2,317		535,297	426,240	67,284	9,665	305,547	1,346,932
1982				70,276	455,250	264,607	67,015	45,161	754,956	1,657,265
1983				32,053	486,006	395,402	14,158	25,412	510,599	1,463,630
1984				86,462	634,870	584,660	161,661	80,684	1,856,599	3,404,936
1985				17,169	843,414	278,214	72,780	40,421	684,449	1,936,447
1986			2,595	116,542	2,034,337	126,888	173,028	21,504	2,783,651	5,258,545
1987				191,628	1,306,814	352,346	64,696	14,947	1,005,053	2,935,484
1988			827	926,399	2,390,573	935,460	54,313	20,313	316,900	4,644,785
1989			284	19,189	1,329,680	658,567	80,580	21,138	268,335	2,377,773
1990			112	37,873	875,427	347,183	123,795	205,352	127,525	1,717,267
1991		4,264	10,972	117,210	1,728,021	157,660	16,173	54,116	460,453	2,548,869
1992			3,291	53,556	1,768,962	233,533	28,512	132,596	407,672	2,628,122
1993		844	9,641	476,866	1,993,915	282,910	18,005	55,604	180,517	3,018,302
1994		818	2,892	991,166	3,024,118	351,230	128,306	34,048	337,474	4,870,052
1995		9,515	82,864	567,149	2,675,381	326,135	25,386	20,862	301,918	4,009,210
1996		39,099	205,526	702,037	2,716,759	346,501	14,480	21,797	50,038	4,096,237
1997		278,758	340,198	1,117,999	5,522,195	309,457	53,863	26,272	113,096	7,761,838
1998	1,790	135,733	293,560	1,150,459	5,920,436	161,117	76,821	30,966	141,756	7,912,638
1999		301,957	522,201	1,024,398	4,969,283	212,991	26,356	32,375	231,692	7,321,253
2000		1,125,730	483,963	2,672,996	4,888,910	201,306	13,457	62,390	242,912	9,691,664
2001		1,132,214	304,127	1,278,699	7,674,759	355,009	10,750	7,844	320,487	11,083,889
2002		268,423	250,899	1,162,278	7,075,130	242,184	29,343	10,622	117,880	9,156,759
2003		682,698	262,114	2,069,176	5,674,111	317,606	59,399	71,881	79,396	9,216,381
2004		1,084,066	331,069	1,002,504	5,803,616	267,233	53,417	18,250	177,369	8,737,524
2005		1,240,416	884,298	955,551	7,155,708	143,436	42,068	13,940	141,350	10,576,767
Total	1,790	6,305,117	3,993,750	16,839,635	79,482,972	8,277,875	1,475,646	1,078,160	11,917,624	

Table 6. Recreational releases (number of B2 fish) of Atlantic croaker by state, 1981-2005

(NMFS Office of Science & Technology, 2006)

Year	MA	RI	NY	NJ	DE	MD	VA	NC	SC	GA	FLEC	Total
1981		246	4,369			16,233	324,238	704,259	128,192	13,481	85,740	1,276,758
1982							77,756	641,327	107,340	111,630	188,277	1,126,330
1983						1,507,184	1,410,151	424,562	119,036	70,499	379,021	3,910,453
1984						70,192	673,080	1,701,418	746,905	37,573	236,432	3,465,600
1985						13,132	1,616,052	1,596,901	238,678	66,649	1,146,582	4,677,994
1986					1,757	43,399	2,578,268	137,841	84,335	40,623	318,511	3,204,734
1987				1,374	861	32,074	2,056,580	560,853	108,366	76,908	1,770,697	4,607,713
1988					582	273,231	832,284	984,219	112,271	20,021	200,630	2,423,238
1989					1,307	41,822	1,342,169	891,926	58,642	17,632	72,822	2,426,320
1990					1,268	88,688	3,922,564	1,351,152	111,085	317,497	168,144	5,960,398
1991				91,633	75,319	3,352,190	7,418,045	669,385	25,168	140,402	647,824	12,419,966
1992				4,103	43,583	856,292	4,167,137	954,494	26,729	178,267	251,343	6,481,948
1993				5,799	13,194	2,504,362	5,795,479	1,499,217	16,949	83,203	138,875	10,057,078
1994				17,253	14,069	1,628,824	7,676,780	3,110,528	141,513	99,026	331,736	13,019,729
1995				31,019	41,574	496,046	5,494,289	1,172,716	108,345	89,609	141,732	7,575,330
1996				17,585	76,851	403,776	5,151,206	1,218,799	64,494	60,282	126,300	7,119,293
1997				111,468	384,233	1,497,670	7,275,160	1,443,568	138,107	25,630	116,276	10,992,112
1998	10,422			221,324	839,932	3,021,780	4,990,541	1,060,928	266,068	159,928	152,744	10,723,667
1999				860,325	1,017,499	2,483,800	5,668,925	1,368,478	116,826	57,567	967,894	12,541,314
2000				688,746	694,813	4,967,856	7,811,048	1,569,385	96,402	169,903	428,131	16,426,284
2001				853,621	285,123	1,585,806	7,086,706	1,256,807	115,284	192,362	282,461	11,658,170
2002				369,003	361,355	2,523,276	7,107,656	925,806	92,498	194,474	217,054	11,791,122
2003				833,508	654,697	1,393,224	6,543,524	1,552,315	440,446	965,496	192,487	12,575,697
2004				834,223	476,192	787,842	5,783,473	1,343,583	441,475	166,019	238,187	10,070,994
2005				1,284,592	799,714	946,746	8,071,464	1,284,251	342,003	267,366	264,771	13,260,907
Total	10,422	246	4,369	6,225,576	5,783,923	30,535,445	110,874,575	29,424,718	4,247,157	3,622,047	9,064,671	

Table 7. Summary of current state regulations for Atlantic croaker

State/Agency	Recreational	Commercial	Other
New York	none	none	
New Jersey	none	none	Trawling prohibited from 0-2 mi from shore. Commercial weakfish regulations effect harvest of croaker.
Delaware	8" min	none	Gill net prohibitions and closed seasons.
Maryland	9" min, 25 fish	9" min	Trawling restricted in Chesapeake Bay. Commercial weakfish regulations effect harvest of croaker.
PRFC	25 fish	none	Voluntary use of large mesh bycatch reduction panels in pound nets.
Virginia	none	none	Trawling prohibited in state waters. Limited entry into pound net fishery. Closures for weakfish fishing. Pound net prohibitions.
North Carolina	none	none	Flynets excluded south of C. Hatteras and mesh size restrictions; culling panels required in long haul seines/pounds nets; TEDs required in flounder trawls in most state waters; TED/BRD requirements and min. mesh restrictions in shrimp trawls.
South Carolina	none	none	Gear-related restrictions; TED/BRD requirements; license to land/sell.
Georgia	8" min, 25 fish	8" min	No trawling in sounds, trawl closed season, TED/BRD requirement. No gill netting for croaker.
Florida	none	none	Net ban in state waters. TED/BRD requirement. Maximum shrimp trawl size.