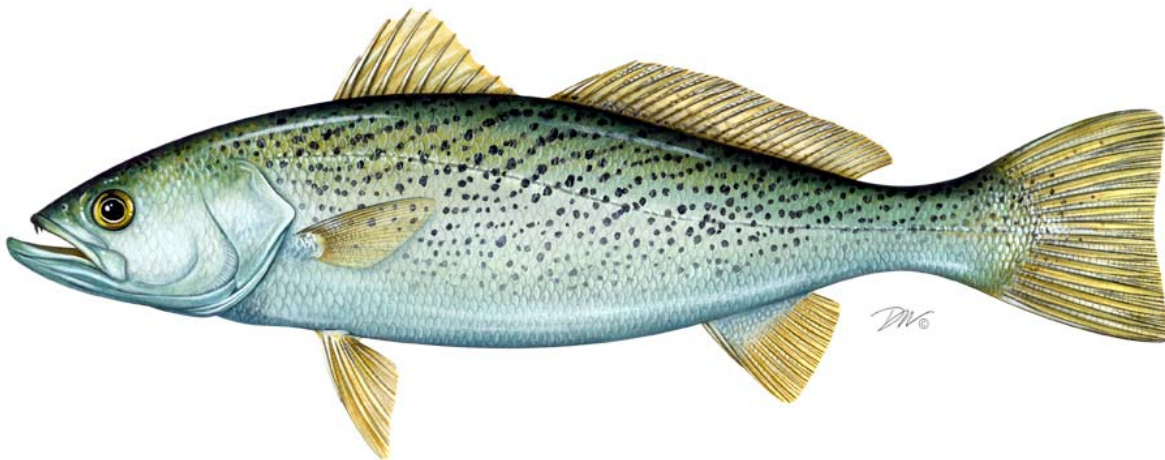


**2009 REVIEW OF THE  
ATLANTIC STATES MARINE FISHERIES COMMISSION  
FISHERY MANAGEMENT PLAN FOR**

**WEAKFISH  
(*Cynoscion regalis*)**

2008 FISHING YEAR



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**Board Approved February 2, 2010**

# 2009 WEAKFISH FMP REVIEW

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## **I. Status of the Fishery Management Plan**

The Atlantic States Marine Fisheries Commission (Commission) adopted its first Fishery Management Plan (FMP) for Weakfish in 1985. Amendment 1 to the FMP (1992) unsuccessfully aimed to improve the status of weakfish. Amendment 2 (1995) resulted in some improvement to the stock, but several signs indicated that further improvement was necessary. Thus, Amendment 3 (1996) was implemented to increase the sustainability of the fishery. Addendum I to Amendment 3 was approved in 2000 in order to extend the management program until the next amendment was implemented.

Amendment 4 was approved in 2002. The goal of Amendment 4 is to utilize interstate management so that Atlantic coastal weakfish recover to healthy levels that will maintain commercial and recreational harvest consistent with a self-sustaining spawning stock and to provide for restoration and maintenance of essential habitat (ASMFC 2002). The management objectives are to:

- 1) establish and maintain an overfishing definition that includes target and threshold fishing mortality rates and a threshold spawning stock biomass to prevent overfishing and maintain a sustainable weakfish population;
- 2) restore the weakfish age and size structure to that necessary for the restoration of the fishery;
- 3) return weakfish to their previous geographic range;
- 4) achieve compatible and equitable management measures among jurisdictions throughout the fishery management unit, including states' waters and the federal EEZ;
- 5) promote cooperative interstate research, monitoring, and law enforcement necessary to support management of weakfish;
- 6) promote identification and conservation of habitat essential for the long term stability in the population of weakfish; and
- 7) establish standards and procedures for both the implementation of Amendment 4 and for determination of states' compliance with provisions of the management plan.

Amendment 4 established target and threshold fishing mortality rates and a threshold spawning stock biomass level to determine overfishing and overfished stock status. The amendment requires states to implement recreational and commercial management measures to achieve annual fishing mortality targets. Some management measures are specified (e.g., minimum size limit, minimum mesh size, bycatch limit), while the amendment provides the states flexibility in implementing other regulations (e.g., trip limits, area or season closures). States may request implementation of alternative management plans with conservationally equivalent measures. States deemed to have insignificant landings were exempt from the recreational and commercial requirements, with the exception of the bycatch reduction device requirements.

The Commission adopted Addendum I to Amendment 4 (2005) to replace the biological sampling program in section 3.0 of Amendment 4. In response to a significant decline in stock abundance and increasing total mortality since 1999, the Commission approved Addendum II to Amendment 4 (2007) to reduce the recreational creel limit and commercial bycatch limit, and set landings levels that when met will trigger a re-evaluation of management measures. Addendum III to Amendment 4 (2007) altered the bycatch reduction device certification requirements in Section 4.2.8 of Amendment 4 for consistency with the South Atlantic Fishery Management

Council's Shrimp FMP. The Commission approved Addendum IV to Amendment 4 in 2009 to respond to the results of the 2009 benchmark stock assessment (additional information is provided in Section VI. Status of Management Measures and Issues).

Weakfish are managed under this plan as a single stock throughout their coastal range. All Atlantic coast states from Massachusetts through Florida and the Potomac River Fisheries Commission have a declared interest in weakfish. See Table 1 for a summary of state-by-state regulations in 2008.

### **II. Status of the Stock**

The weakfish stock is depleted and overfishing is not occurring (NEFSC 2009a, NEFSC 2009b). In general, weakfish biomass has declined to an all time low, total mortality is currently high, and non-fishing mortality has increased in recent years. Given this situation, recent fishery removals (landings and dead discards combined) represent a significant proportion of the remaining biomass and further exacerbate the stock decline.

Between 1982 and 1990, age 1+ weakfish biomass<sup>1</sup> declined drastically from 113.1 million pounds to 17.6 million pounds (Figure 1). Overfishing was the main cause of this decline, with fishing mortality (F) accounting for about 60-90% of total mortality (fishing plus natural mortality) during the period. Fishing mortality<sup>2</sup> peaked at 1.01 in 1989, but with the implementation of management measures in the early to mid-1990s, F declined to 0.24 in 1995 and biomass responded favorably by increasing to a peak of 62.1 million pounds in 1996 (Figure 1). While F remained relatively stable (between 0.26 and 0.58) after that time, the stock began another drastic decline in 2001 to the time-series low of 10.8 million pounds in 2008. However, the contribution of fishing mortality to total mortality was substantially reduced during this period; from 2004-2007 only 10-20% of total mortality is attributed to fishing mortality. Conversely, natural mortality has risen substantially since 1995 (Figure 1), and factors such as predation, competition, and changes in the environment are thus believed to be having a stronger influence on recent weakfish stock dynamics than fishing mortality. Bycatch and under-reported catches would have to be much greater than those estimated, growing from about 3-4 times the estimates in 1996 to 15-20 times in the most recent years, to account for the biomass decline. Thus far, there is no evidence available of an Atlantic coast fishery capable of generating additional unreported weakfish discards of this magnitude.

These estimates of age 1+ biomass are roughly comparable to spawning stock biomass due to the biology of weakfish (most fish are mature at age one). The 2008 estimate of age 1+ biomass is below the Amendment 4 SSB threshold of 31.8 million pounds (and the stock's spawning potential – 3% of an unfished stock – is also below the 20% spawning potential threshold adopted in Addendum IV). While the F estimates above are not comparable to the target and threshold rates in Amendment 4, the trend indicates a stable and modest fishing mortality. Thus, while the stock biomass is depleted, overfishing is not occurring.

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<sup>1</sup> Biomass estimates are for January 1 stock size. All mortality rates are also based on January 1 stock size.

<sup>2</sup> F estimates are based on age 1+ biomass and are therefore affected by partial recruitment and can not be comparable to the F target and threshold in Amendment 4 which are for fully recruited ages only.

Despite the decline in age 1+ biomass, young-of-year relative abundance appears to have remained in a productive pattern; however, 2006 was one of the lowest years on record and 2008 was low relative to the pattern of recruitment since 1996 (Figure 2). While inter-annual variability is common in juvenile indices, fluctuations in the recent time series appear more pronounced than in earlier years. Conflicting trends in age-0 indices and age 1+ biomass suggest the emergence of a demographic bottleneck (strong young-of-year indices do not translate into high biomass).

### **III. Status of the Fishery**

At 1.14 million pounds, the total coastwide landings of weakfish in 2008 are the lowest on record from at least 1982 (Table 2). Total landings dropped 22% from the 2007 landings of 1.46 million pounds, and 80% from the ten-year (1998-2007) average of 5.77 million pounds. The commercial fishery (470,630 pounds) accounts for 41% of the total 2008 landings, and the recreational fishery (665,943 pounds) for 59% (Table 2).

#### *Commercial Fishery*

Commercial data are cooperatively collected and compiled by the National Marine Fisheries Service (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. Landings from the NMFS Fisheries Statistics Division are used within this report unless a state reports alternative values in its compliance report to the Commission, in which case these values are used (see notes for Table 3).

Between 1982 and 2008, coastwide commercial weakfish landings have ranged from the high of 21.1 million pounds in 1986 to the low of 470,630 pounds in 2008 (Table 3). Since 1988, the overall trend is declining except for during the period of 1990-1998 when landings hovered between 6.1 and 9.1 million pounds (Figure 3).

North Carolina (36%), Virginia (36%), and New Jersey (12%) landed the three largest shares of the 2008 coastwide commercial weakfish landings, as they have done since 1982, although not always in the same order (Table 3, Figure 4).

The dominant commercial gears in 2008 were gill nets, haul seines, trawls, and pound nets (about 52%, 15%, 12% and 10% of the total commercial landings, respectively; NMFS 2009). There has been a shift in the dominant source of landings from trawls in the 1950s-1980s to gill nets in the 1990s-present. The majority of commercial landings tend to occur in the fall and winter months, presumably as the fish congregate to migrate to over-wintering grounds in the South Atlantic (Hogarth and others 1995).

#### *Recreational Fishery*

Recreational catch statistics are collected by the NMFS. 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. All recreational data in this report are from the NMFS Fisheries Statistics Division (2009).

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Since 1982, coastwide recreational landings have ranged from the high of 11.4 million pounds in 1983 to the low of 562,613 pounds in 2007 (Table 4). Landings averaged 7.8 million pounds from 1982-1988, before falling to 2.1 million pounds in 1989. Annual recreational landings generally fluctuated between one and four million pounds from 1990 to 2002, before dropping below one million pounds in 2003 (Figure 3). Landings have averaged 892 thousand pounds (or 760 thousand fish) the last five years (Table 5), and are estimated at 665,943 pounds (506,483 fish) in 2008. The number of fish released alive by anglers has remained above 1 million fish since 1993, peaking at over 5 million in 1996, and decreasing to 1.9 million fish in 2008 (Table 6, Figure 5).

New Jersey anglers have nearly consistently harvested the most weakfish by pounds along the coast. In the 1980s and 1990s, anglers in Delaware, Maryland, and Virginia often took the next largest shares of the recreational total largest amount. In the 2000s, New Jersey anglers still lead in the harvest, whereas anglers in Virginia and North Carolina tend to take the second and third largest amounts (Tables 4 and 5). In 2008, New Jersey anglers landed 51% of the coastwide harvest, followed by North Carolina anglers with 21% and New York anglers with 17% (by pounds; Figure 6).

The recreational fishery catches weakfish using live or cut bait, jigging, trolling, and chumming. The vast majority of recreationally harvested weakfish are caught in state waters (97% in 2008 by pounds). In 2008, nearly all recreationally harvested fish were caught from private or rental boats (92%) or from shore (5%). Ninety-seven percent of the harvest occurred May-December.

#### **IV. Status of Assessment Advice**

An assessment was completed in 2009 by the Weakfish Stock Assessment Subcommittee (NEFSC 2009a, NEFSC 2009b) and peer reviewed by the 48<sup>th</sup> Stock Assessment Review Committee (Sullivan et al. 2009) at the 48<sup>th</sup> Northeast Regional Stock Assessment Workshop (SAW). The assessment includes fishery data and survey indices through 2007.

As recommended by previous review panels, an age-structured VPA was used to evaluate trends in population parameters. This model provided reasonable estimates of fishing mortality and biomass from 1981-2001 with estimates converging regardless of the terminal year of the model; however, estimates from 2002 onward were subject to excessive bias when adding additional years of data, making them unusable for analysis. An alternative approach using an index-based model (where relative values are estimated from harvest and survey data and then scaled to absolute values based on results from the early, stable part of the VPA time series) was developed. Two surplus production models were also included in the assessment because these could include additional sources of mortality, such as predation, competition, and environmental factors. The peer review panel endorsed using, on an interim basis, the index-based model for estimating biomass and fishing mortality, weakfish relative spawning stock biomass projections, and a biomass threshold approximating 20% of unfished SSB. The review panel recommended that the SAS develop additional methods to analyze the stocks in the next assessment.

## **V. Status of Research and Monitoring**

### *Fishery-Independent Data*

Young-of-year indices of relative abundance are provided by Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia, North Carolina, and Florida. Connecticut, New Jersey, Delaware, North Carolina, Georgia, and Florida provide age-0+ or 1+ indices of relative abundance. The Northeast Fisheries Science Survey Groundfish Trawl Survey also produces an age-structured index for the Mid-Atlantic coast, while the Southeast Area Monitoring and Assessment Program (SEAMAP) survey produces another for the South Atlantic Coast. The Northeast Area Monitoring and Assessment Program (NEAMAP) began spring and fall surveys between Martha's Vineyard and Cape Hatteras in the fall of 2007, and will provide an index in the future. The Chesapeake Bay Multispecies Monitoring and Assessment Program (ChesMMAP), which began in 2002, collects data on relative abundance, length, weight, age, sex, and trophic interactions in the Bay. See Table 9 for the indices provided in the 2008 compliance reports.

### *Fishery-Dependent Data*

The coastal states and the NMFS collect data on commercial and recreational landings. Addendum I to Amendment 4 requires the collection of otoliths and lengths to characterize the catch; the number of samples required is based on the magnitude of each state's fisheries. Each spring, the states are required to submit biological sampling plans, and each fall, through the compliance reports, the states are required to provide the actual sampling levels completed. See Section VII for more information.

## **VI. Status of Management Measures and Issues**

### *Fishery Management Plan*

No changes were made to the management plan in 2008.

Addendum IV to Amendment 4 was approved in November 2009, and is due to be implemented by May 2010. In response to the 2009 stock assessment results, the addendum's purpose is to implement more appropriate biological reference points given recent stock dynamics and to reduce the level of fishery removals without creating unnecessary bycatch waste, thus poisoning the stock for recovery should natural mortality decrease. Addendum IV requires all states in the management unit (including those that are *de minimis*) to implement a recreational creel limit no greater than 1 fish, commercial trip and bycatch limits no greater than 100 pounds, and a finfish trawl fishery allowance for undersized fish no greater than 100 fish. The addendum adopted threshold and target maximum spawning potential levels of 20% and 30% for determining overfished/depleted stock status. The biological sampling requirements under Addendum I are unchanged, and all regulations previously enacted to protect weakfish and reduce bycatch are to remain effective.

No additional amendments or addenda are under development.

### *Florida Management Area and Landings Data*

In November 2009, the Management Board approved a proposal from Florida to reduce the state's weakfish management area to a small area in northeast Florida where pure weakfish are

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known to occur based on genetics data. The revision is intended to address the misidentification of weakfish, sand seatrout, and their hybrids, and the consequential law enforcement issue. Inside the newly established weakfish management area (likely including Nassau and Duval counties only), any fish that resembles weakfish will be considered weakfish for enforcement purposes, both for commercial and recreational limits. Outside the weakfish management area, all fish that resemble weakfish will be considered sand seatrout.

As a result of the approved proposal, the commercial and recreational landings data provided in Florida's 2009 compliance report represent the best estimate of pure weakfish landings in the state. Commercial landings data from Florida's trip ticket program and recreational landings from the NMFS's Marine Recreational Fisheries Statistics Survey include only weakfish landed in Nassau and Duval counties, as revised on the basis of the genome proportions within the *Cynoscion*-complex found in the counties (48% weakfish in Nassau County and 17% in Duval County). The landings tables and figures in this report use the landings as reported by Florida.

### *De Minimis Status*

Amendment 4 permits states to request *de minimis* status if, for the last two years, their combined average commercial and recreational landings (by weight) constitute less than 1% of the coastwide commercial and recreational landings for the same two year period. The *de minimis* threshold for 2008, calculated with 2007 and 2008 harvest data, is 12,984 pounds.

Four states requested *de minimis* status in their 2009 compliance reports: Florida, Georgia, Connecticut, and Massachusetts. Each of these states has had a previous *de minimis* request approved and qualify for continued *de minimis* status (Florida 0.21%; Georgia 0.37%, Connecticut 0.11%, and Massachusetts 0%).

Additionally, it should be noted that South Carolina did not request continued *de minimis* status because its contribution to the two-year coastwide average landings is 2.6%. South Carolina has been *de minimis* since 1997, including during 2004-2008 despite having landings above the 1% threshold. *De minimis* status was requested and granted those five years because of uncertainty in recreational harvest estimates and the effect of declining harvest in the northern part of the species range on the state's contribution to the coastwide total.

If any *de minimis* state were to lose its designation as such, the state would be required to implement the regulatory and monitoring requirements from which it were previously exempt. In the case of South Carolina at this particular time, the only new requirements would be the sampling requirements in Addendum I; South Carolina has no commercial weakfish fishery and is required to implement the recreational regulations in Addendum IV regardless of *de minimis* status. The state would be required to submit a monitoring plan to collect 3 otoliths per total metric tons of harvest in 2010. Based on 2008 harvest, the projected requirement is 27 otoliths. Although not required to at the time, South Carolina submitted and initiated a sampling plan in 2009 in anticipation of no longer being granted the *de minimis* exemption.

The Board approved the *de minimis* requests from Florida, Georgia, Connecticut and Massachusetts on February 2, 2010.



*Addendum II Management Triggers*

Addendum II established two management triggers that would require the Board to consider modifying management measures if reached. Commercial management measures are to be re-evaluated if coastwide commercial landings exceed 80% of the mean commercial landings from 2000-2004, or 2.99 million pounds. Commercial and recreational management measures are to be re-evaluated if any single state's landings exceed its five-year mean by more than 25% in any single year.

The 2008 coastwide commercial landings are 470,630 pounds, thus the first trigger has not been exceeded. The second trigger was not met in any state (Table 7). Only New York and Georgia's 2008 landings increased from their 2003-2007 average, but only by 5 and 7%, respectively. The Board determined that it was not necessary to consider changes to the management plan on February 2, 2010.

In 2010, the recreational and commercial management measures in Addendum IV replace those in Addendum II. However, the Plan Review Team will continue to include an evaluation of the two management triggers as they provide perspective on the magnitude of fishery landings (but hitting a trigger will not require Board reconsideration of the management measures).

**VII. Implementation of FMP Compliance Requirements for 2008**

Mandatory compliance elements for 2008 were provided by Amendment 4 and its three addenda.

*Regulatory Requirements*

The management program includes regulatory requirements for non *de minimis* states as follows:

- Recreational management measures including maximum creel limits and minimum size limits (see Addendum II to Amendment 4)
- Commercial management measures including minimum size limits, minimum mesh size limits, trip limits, bycatch limits, closed seasons and areas, and bycatch reduction device requirements (see Section 4.2 of Amendment 4, and Addendum II)

The PRT finds all states to have implemented the plan's compliance requirements. New York failed to reduce its bycatch limit from 300 lbs to 150 lbs as required under Addendum II by October 29, 2007, but did implement this requirement in late 2008. The Management Board was made aware of the delayed implementation date in October 2008 and took no action.

See Table 1 for a summary of state commercial and recreational regulations in 2008. The open season starting dates in Delaware and Maryland changed slightly in 2008 to account for calendar day differences; harvest days are consistent with Amendment 4.

*Monitoring Requirements*

Addendum I implemented monitoring requirements for non *de minimis* states as follows:

- Maintenance of at least the 2005 level of recreational sampling of individual lengths through the Marine Recreational Fisheries Statistics Survey;
- Collection of six individual fish lengths for each metric ton of weakfish landed commercially;

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- Collection of three individual fish ages for each metric ton of total weakfish landed, with a maximum of 1000 ages annually per state.

Table 8 provides the otolith and length collection requirements for 2008. These are based on the best available 2008 landings data provided to the Commission by the NMFS and the states. Table 8 also provides the number of otoliths and lengths collected by the states in 2008. Three states did not fulfill the requirements of Addendum I: Rhode Island (otoliths and lengths), New York (otoliths), and New Jersey (otoliths). The states report funding issues, personnel shortages, and limited landings as the causes for inadequate sample numbers.

Addendum I specifies that if the Board determines that a state has not successfully implemented the required biological sampling program the state will be prohibited from harvesting weakfish until it develops, and the Board approves, a plan to collect the required samples the following year. Each state has submitted a sampling plan for 2009 that has been approved by the Board. The Board may also choose to forward a recommendation of non-compliance to the Policy Board for consideration.

The Board did not recommend finding any states out of compliance on February 2, 2010.

### **VIII. Recommendations of the Plan Review Team**

#### **Management Recommendations**

- That the Board consider the *de minimis* requests from Massachusetts, Connecticut, Georgia, and Florida.
- That the Board consider the compliance of Rhode Island, New York, and New Jersey with the monitoring requirements in 2008.
- That the Technical Committee and Stock Assessment Subcommittee explore alternative assessment methods for the next benchmark stock assessment and continue to compile the input data for the interim assessment model should an update assessment be requested prior to the next benchmark assessment.

#### **Research Recommendations**

##### **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 in fisheries from Maryland north.
- 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.
- Conduct an age validation study.
- Identify stocks and determine coastal movements and the extent of stock mixing, including characterization of stocks in over-wintering grounds (e.g., tagging).
- Conduct spatial and temporal analysis of the fishery independent survey data. The analysis should assess the impact of the variability of the surveys in regards to gear, time of year, and geographic coverage on their (survey) use as stock indicators.

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

### Medium Priority

- Biological studies should be conducted to better understand migratory aspects and how this relates to observed trends in weight at age. Test for individual growth difference and the geospatial pattern, as well as the geospatial pattern of the catch rate surveys.
- 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?
- Continue studies on mesh-size selectivity, particularly for trawl fisheries.
- 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.

### Low Priority

- Develop a coastwide tagging database.

### **Social/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 bio-economic 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

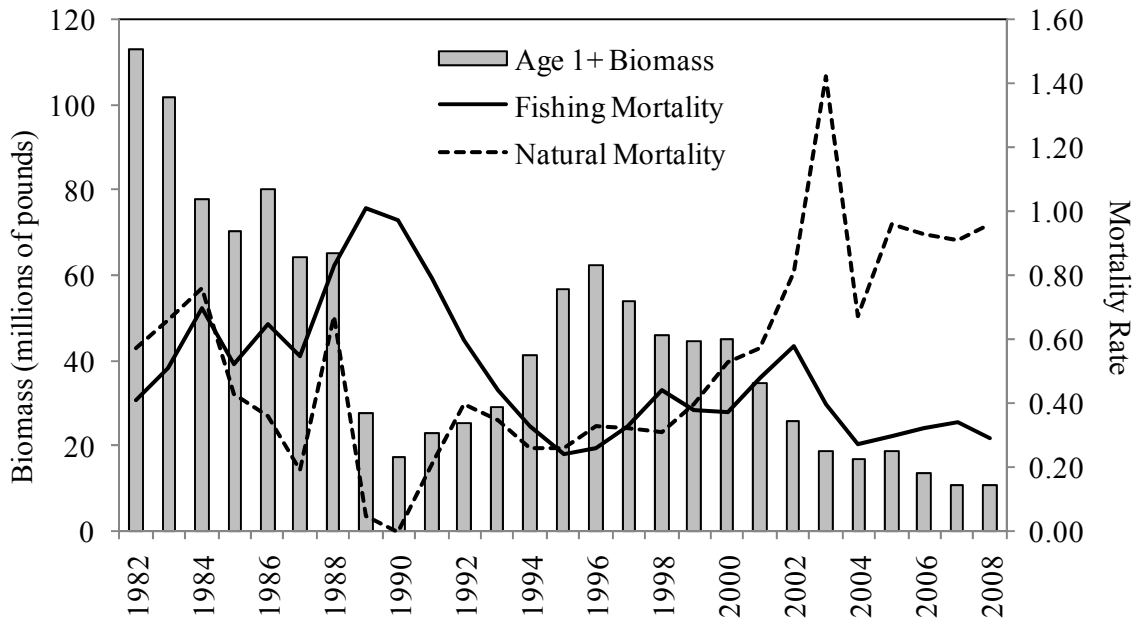
- Conduct hydrophonic studies to delineate weakfish spawning habitat locations and environmental preferences (temperature, depth, substrate, etc.) and enable quantification of spawning habitat.
- Compile existing data on larval and juvenile distribution from existing databases in order to obtain preliminary indications of spawning and nursery habitat location and extent.
- 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.

## XI. References

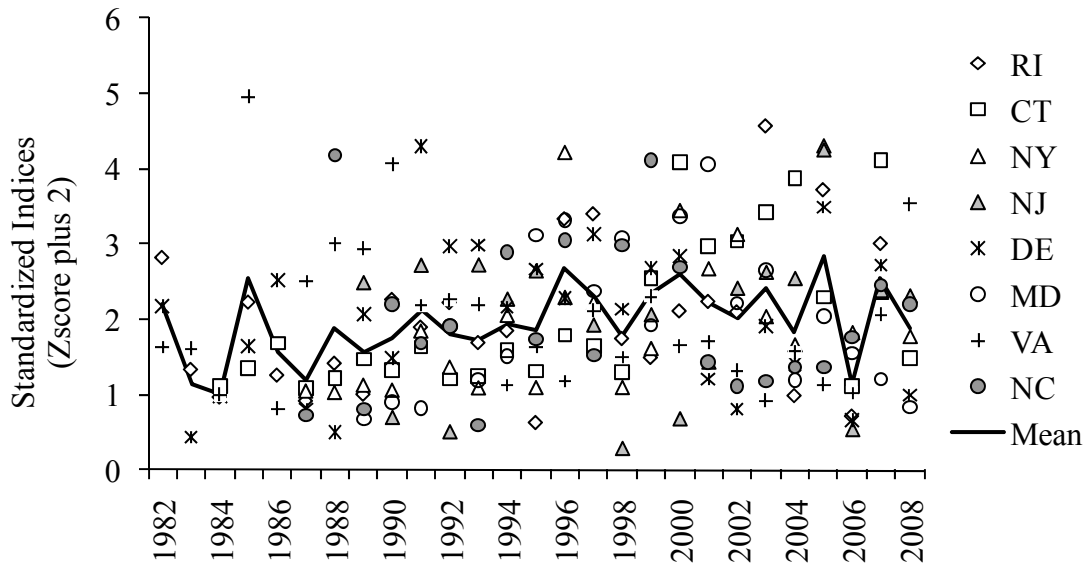
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**X. Figures**

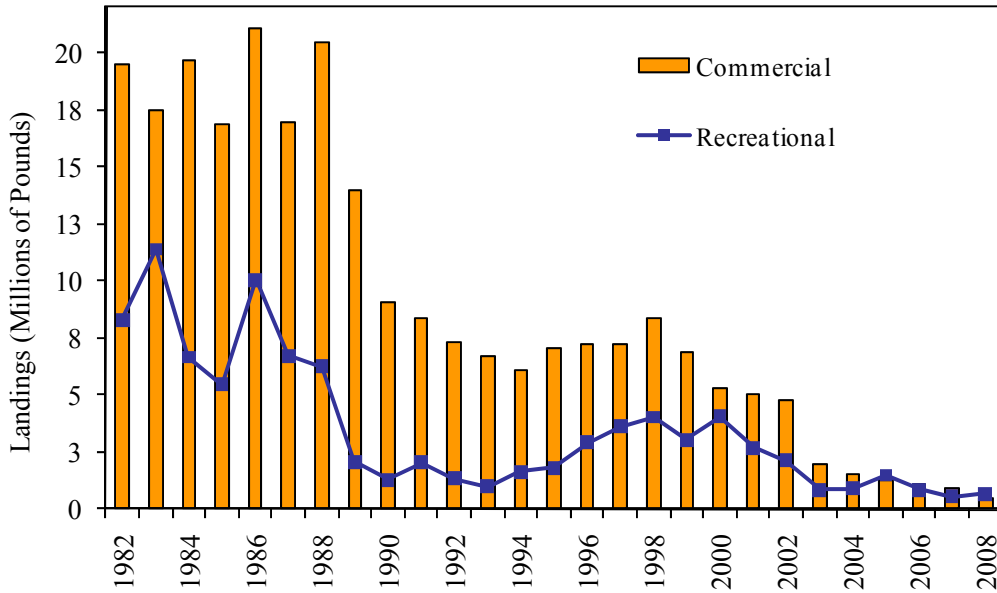
**Figure 1. Estimated weakfish age 1+ biomass, fishing mortality, and natural mortality (NMFS 2009a, NMFS 2009b).**



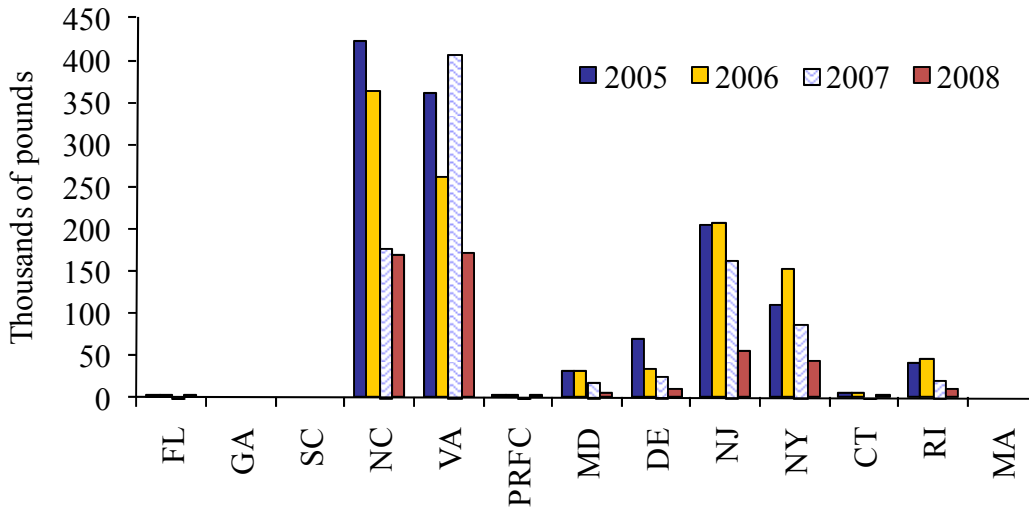
**Figure 2. Age-0 weakfish indices of relative abundance (2009 State Compliance Reports). Indices are standardized into the same units. The solid line represents the mean of the indices; 2008 Rhode Island value missing from mean.**



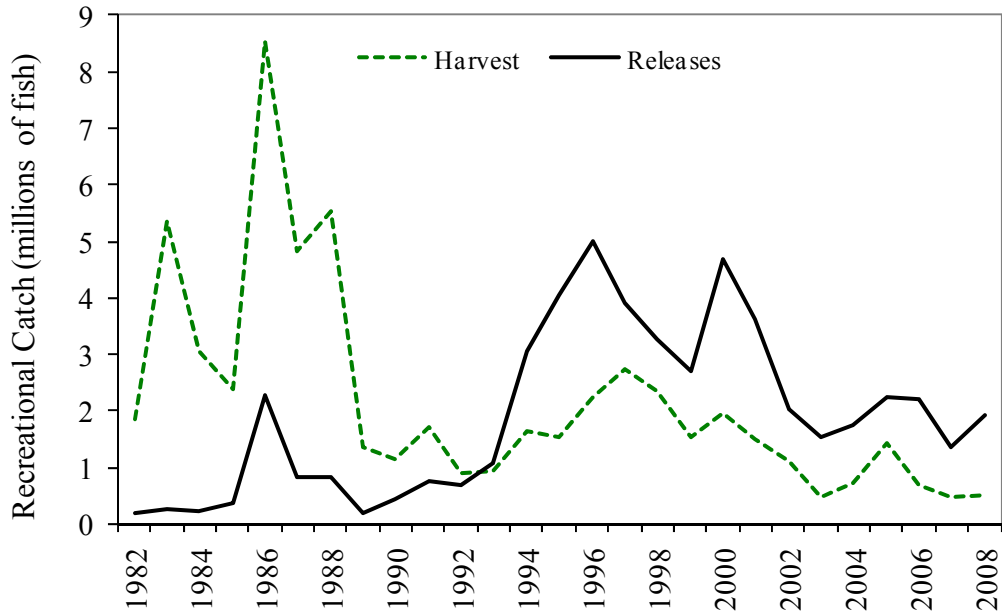
**Figure 3. Commercial and recreational weakfish harvest (pounds), 1982-2008** (see Tables 3 and 4 for source information and values)



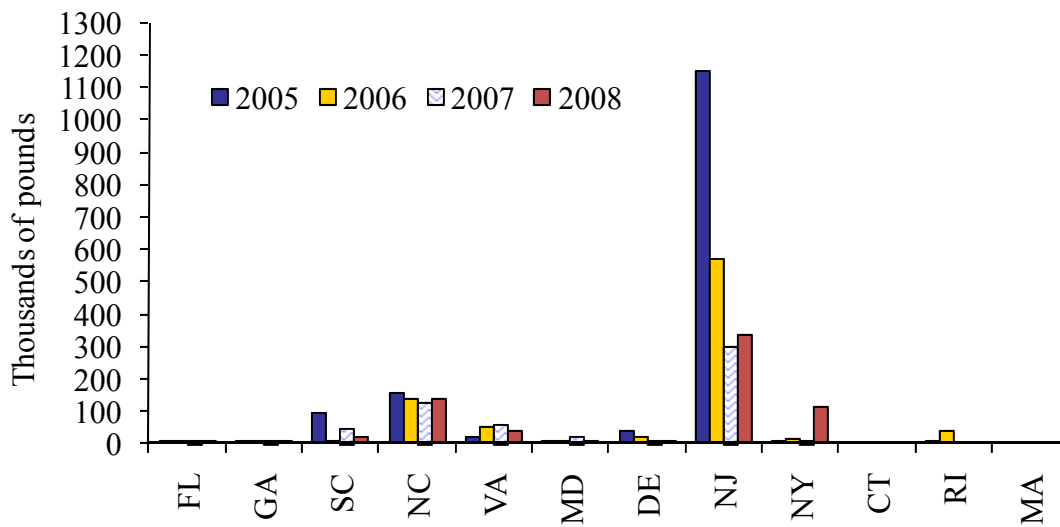
**Figure 4. Commercial weakfish landings (pounds) by state, 2005-2008** (see Table 3 for source information and values)



**Figure 5. Recreational weakfish harvest and releases (number of fish), 1982-2008** (see Tables 5 and 6 for source information and values)



**Figure 6. Recreational weakfish landings (pounds) by state, 2005-2008** (See Table 4 for source information and values)



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## XI. Tables

Table 1. Summary of state regulations for weakfish in 2008

State	Commercial	Recreational
MA	16"; open 1/1-12/31.	16", 6 fish
RI	16"; open 6/1-6/30 & 8/7-11/8. Trawl: codend mesh $\geq$ 4.5" diamond or 4.0" square. 150 lb bycatch limit & 50% bycatch rule (except hook and line: 0 lb bycatch).	16", 6 fish
CT	16"; open 1/1-12/31.	16", 6 fish
NY	16" (12" dressed & 10" filleted); open 4/1-6/24 & 8/28-11/15. Trawl: codend mesh size $\geq$ 4.5" diamond or 4.0" square. Gill & trammel net: mesh $\geq$ 3.5" stretched. 150 lb bycatch limit & 50% rule (except hook & line: 0 lb bycatch).	16" (12" dressed, 10" fillet), 6 fish
NJ	Gill net: 13"; open 1/1-5/20 & 9/3-10/19 & 10/27-12/31; mesh $\geq$ 3.25" stretched except 2.75 - 3.25" allowed within 2nm for permitted fishermen doing monthly reporting. Otter trawl: 13" 1/1-8/31 & 12" 9/1-12/31; open 1/1-7/31 & 10/13-12/31; mesh $\geq$ 3.75" diamond or 3.375 square. Pound net: 13"; open 1/1-6/6 & 7/1-12/31. 150 lb bycatch limit & 50% rule. Hook & line: 13", 6 fish, open 1/1-12/31.	13", 6 fish
DE	Gill net: 12"; only nets with stretch mesh $\geq$ 3.125" allowed in water 4/1-6/30, none permitted weekends and legal holidays 5/10-9/30. Drift gill net: open 1/1-12/31 except 34 specified days of gear out of water in May and June. Anchor gill net: open 1/1-5/9 and 10/1-12/31, otherwise gear out of water. Hook & line: 13"; unlimited possession 4 days/week during 5/1-10/31, 6 fish creel limit all other times.	13", 6 fish
MD	12". Ocean trawl: open 10/17-12/29 except Saturdays & Sundays. Ocean other gears: open 3/26-4/25 & 9/3-11/14 except Sundays. Chesapeake Bay all gears: open 8/5-9/30. Gillnet: mesh $\geq$ 3.0" stretched. Trawl: mesh $\geq$ 3.375" square or 3.75" diamond. 150 lb bycatch limit & 50% rule (except hook & line: 0 lb bycatch)	13", 6 fish
PRFC	12"; open 7/28-12/31; 150 lb bycatch limit & 50% rule for certified pound nets with approved cull panels, and 0 lb bycatch for all other gears. Pound net: limited entry.	12", 6 fish
VA	Gill net: 12"; open 3/16-5/13 & 10/21-12/30. Pound net: no minimum size; limited entry; open 4/1-4/30 & 5/23-9/12 unless exempted by license forfeit. Haul seine: no minimum size; open 4/16-6/10 & 8/21-9/24. Out of state trawl: 12" except 300 undersized fish allowed; open 4/1-9/25; codend mesh $\geq$ 3.0". Hook & line: 12"; open 1/1-12/31. 150 lb bycatch limit (per licensee, 450 lb per vessel maximum), 50% rule.	12", 6 fish
NC	12" except 10" for long haul seines & pound nets in internal waters 4/1-11/15; open 1/1-12/31. Gill net: mesh $\geq$ 2.875" stretch. Flynet: gear requirements & area closure south of Cape Hatteras. Long haul seine: culling panel requirement south of Bluff Shoal. 150 lb bycatch limit & 50% rule. BRDs in shrimp trawls. Hook & line: 6 fish.	12", 6 fish
SC	12", 10 fish. BRDs in shrimp trawls.	12", 10 fish
GA	13", 6 fish. BRDs in shrimp trawls.	13", 6 fish
FL	12". BRDs in shrimp trawls.	12", 4 fish



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**Table 2. Comparison of commercial and recreational Atlantic coast weakfish landings** (see Tables 3 and 4 for source information and state-specific landings)

<b>Year</b>	<b>Recreational Landings (lbs)</b>	<b>Commercial Landings (lbs)</b>	<b>Total Landings (lbs)</b>	<b>% Commercial</b>
1982	8,285,323	19,493,321	27,778,644	70%
1983	11,391,635	17,485,501	28,877,136	61%
1984	6,655,261	19,652,279	26,307,540	75%
1985	5,467,698	16,833,896	22,301,594	75%
1986	10,043,641	21,097,068	31,140,709	68%
1987	6,705,462	16,947,925	23,653,387	72%
1988	6,244,994	20,431,283	26,676,277	77%
1989	2,069,062	14,018,067	16,087,129	87%
1990	1,293,187	9,087,481	10,380,668	88%
1991	2,051,533	8,381,774	10,433,307	80%
1992	1,349,200	7,332,282	8,681,482	84%
1993	995,410	6,689,118	7,684,528	87%
1994	1,650,411	6,120,441	7,770,852	79%
1995	1,813,279	7,060,567	8,873,846	80%
1996	2,908,627	7,216,860	10,125,487	71%
1997	3,628,760	7,237,666	10,866,426	67%
1998	4,026,244	8,400,173	12,426,417	68%
1999	3,047,216	6,863,765	9,910,981	69%
2000	4,046,525	5,345,618	9,392,143	57%
2001	2,684,146	5,007,329	7,691,475	65%
2002	2,135,034	4,770,229	6,905,263	69%
2003	843,357	1,983,239	2,826,596	70%
2004	891,399	1,540,456	2,431,855	63%
2005	1,490,205	1,250,239	2,740,444	46%
2006	848,282	1,104,031	1,952,313	57%
2007	562,613	897,531	1,460,144	61%
2008	665,943	470,630	1,136,573	41%

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**Table 3. Commercial landings (pounds) of weakfish by state, 1982-2008** (Source: NMFS 2009, except as noted below table)

Year	FL	GA	SC	NC	VA	PRFC	MD	DE	NJ	NY	CT	RI	MA	Total
1982	176,203	596	443	12,052,232	1,856,920	307,230	249,297	1,294,500	2,073,500	1,257,100	25,600	176,800	22,900	19,493,321
1983	117,720	2,749		10,233,734	2,483,777	119,394	390,227	901,800	2,172,700	850,000	42,800	163,700	6,900	17,485,501
1984	923	862		12,990,726	2,022,123	90,166	325,279	782,400	2,751,600	484,500	31,300	167,600	4,800	19,652,279
1985	7,747	82		9,821,188	2,014,376	72,666	316,320	990,817	3,030,100	386,200	28,200	163,100	3,100	16,833,896
1986	9,162	75		14,309,372	1,886,254	116,197	337,064	723,444	3,208,600	359,900	13,700	127,600	5,700	21,097,068
1987	11,719	189		11,508,389	1,722,441	265,942	328,510	577,735	2,094,100	329,100	29,500	78,600	1,700	16,947,925
1988	13,283			15,091,878	1,383,218	96,765	832,636	530,603	2,332,800	124,500	2,400	19,400	3,800	20,431,283
1989	21,376		113	10,115,747	1,001,324	28,653	731,313	543,741	1,458,500	103,500	2,300	9,600	1,900	14,018,067
1990	17,433	33		5,802,159	1,192,321	18,510	416,130	625,006	968,318	19,924	1,281	24,646	1,720	9,087,481
1991	21,344			5,308,574	1,047,106	13,798	153,632	503,289	1,174,181	111,629	21,300	25,009	1,912	8,381,774
1992	24,655			4,862,551	532,482	19,961	384,999	362,042	940,695	168,087	3,500	30,277	3,033	7,332,282
1993	19,580			4,309,249	1,049,946	37,828	141,926	195,216	834,446	88,379	1,477	9,991	1,080	6,689,118
1994	27,835			3,489,929	1,264,263	28,958	223,288	262,263	695,280	99,470	11,000	18,155		6,120,441
1995	5,609			4,113,260	1,448,372	38,138	64,829	291,010	867,262	172,431	6,431	52,690	535	7,060,567
1996	387			3,977,633	1,487,069	99,493	97,068	317,317	822,041	365,307	6,937	43,522	86	7,216,860
1997	875			3,561,060	1,521,517	35,239	144,659	558,910	1,036,470	336,752	10,958	31,171	55	7,237,666
1998	952			3,354,008	1,796,487	81,744	221,048	552,947	1,804,618	496,403	14,482	77,074	410	8,400,173
1999	779			2,617,580	1,610,484	68,749	192,750	441,176	1,291,319	489,935	22,172	126,271	2,550	6,863,765
2000	448			1,869,042	1,311,298	68,574	145,918	328,269	1,071,428	352,832	7,920	189,362	527	5,345,618
2001	1,201			1,960,324	1,124,707	44,219	153,865	190,093	837,550	578,797	6,774	109,568	231	5,007,329
2002	394			1,828,150	1,129,158	57,818	79,734	164,064	863,088	513,977	10,223	122,781	842	4,770,229
2003	288			848,822	454,841	5,273	31,215	91,195	340,269	144,416	3,059	63,337	524	1,983,239
2004	192			685,463	325,832	1,986	50,519	48,905	204,587	178,414	6,206	38,284	68	1,540,456
2005	553			421,779	361,874	1,004	30,983	70,788	205,692	109,861	6,118	41,587		1,250,239
2006	337			363,078	261,619	689	32,417	34,429	206,450	152,867	7,012	45,133		1,104,031
2007	888			175,579	406,392	20	18,060	24,570	162,656	86,656	1,910	20,800		897,531
2008	996			170,469	171,153	74	5,815	11,185	55,949	44,275	1,012	9,702		470,630

**Notes:** FL: state-reported landings 1984-present (NMFS-reported landings limited to Nassau and Duval Counties and adjusted on the basis of the genome proportions of weakfish within the Cynoscion-complex in those counties' waters). NC: state-reported landings 1994-present. VA: NMFS-reported landings minus the PRFC-reported harvest landed in VA 1982-1992; state reported landings 1993-present (exclude Potomac River harvest). PRFC: agency-reported landings 1982-present (fish caught in Potomac River and landed in MD and VA). MD: state-reported landings 1982-present (exclude Potomac River harvest). DE: state-reported landings 1985-present. NJ: state-reported landings 2005-present. CT: state-reported landings 1995-present. RI: SAFIS landings 2005-present.

The 2008 and 2007 FMP Reviews include a 2006 estimate of 8,501 lbs in MA; these landings were misidentified as weakfish.

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**Table 4. Recreational landings (pounds) of weakfish by state, 1982-2008** (NMFS 2009, except as noted below table)

Year	FL	GA	SC	NC	VA	MD	DE	NJ	NY	CT	RI	MA	Total
1982	48,137		14,786	276,047	2,994,879	2,127,679	1,330,769	613,223	725,194		154,609		8,285,323
1983	9,190	12,165	4,515	338,100	738,671	1,215,376	2,205,140	6,080,018	164,227	12,976	588,805	22,452	11,391,635
1984	9,719		5,150	189,031	850,169	254,962	1,279,594	3,987,542	51,464	11,358		16,272	6,655,261
1985	578	3,422	105,151	184,485	508,980	898,313	1,102,095	1,876,608	638,913	17,269	131,884		5,467,698
1986	2,661	12,621	44,185	417,470	2,032,394	2,406,643	1,598,932	3,184,095	242,217	61,281	41,142		10,043,641
1987	1,205	9,491	23,781	710,002	647,692	831,615	1,072,198	3,353,362	51,830	4,286			6,705,462
1988	2,349		1,841	359,606	1,677,694	1,679,702	1,664,477	833,198	26,127				6,244,994
1989	2,933	8,175	5,963	139,979	424,463	344,658	521,648	575,110	46,133				2,069,062
1990	1,466	961	11,186	63,420	256,690	388,662	207,131	358,457	4,317		897		1,293,187
1991	2,142	5,597	25,210	99,824	280,075	278,176	427,778	896,800	35,931				2,051,533
1992	1,350	1,014	40,459	27,363	206,710	121,403	232,204	677,811	19,824	908	20,154		1,349,200
1993	2,899	12,791	6,929	78,982	89,992	173,952	291,627	312,839	18,889	6,510			995,410
1994	3,934	783	25,163	149,159	142,265	300,831	319,491	706,206	2,579				1,650,411
1995	1,146	21,283	22,875	72,412	211,494	141,511	419,527	898,564	24,467				1,813,279
1996	454	5,060	4,980	79,317	194,485	185,074	690,121	1,730,055	19,081				2,908,627
1997	1,734	34,356	1,728	165,032	463,652	188,339	734,800	1,817,034	220,718	1,367			3,628,760
1998	508	690	11,288	192,210	839,245	377,820	616,422	1,910,868	63,298	9,808		4,087	4,026,244
1999	2,245	1,614	4,383	161,291	399,588	544,474	484,157	1,374,169	63,058	6,371	5,866		3,047,216
2000	2,943	3,503	6,312	87,926	496,205	696,662	635,339	1,916,093	164,525	35,095	1,922		4,046,525
2001	1,323	2,983		158,423	373,206	567,625	172,969	1,251,150	151,584	4,883			2,684,146
2002	1,576	683	50,141	82,747	295,397	174,064	243,156	1,213,557	58,627	11,285	3,801		2,135,034
2003	580	1,327	4,306	161,474	215,522	24,698	57,866	333,690	37,106	3,536	2,379	873	843,357
2004	948	11,153	118,352	273,683	102,629	43,576	6,726	315,101	19,231				891,399
2005	2,719	7,659	94,205	157,977	20,439	8,814	39,438	1,149,891	606		8,457		1,490,205
2006	2,075	3,305	8,014	139,392	51,749	575	19,292	571,589	13,766		38,525		848,282
2007	2,706	3,847	46,103	125,459	55,580	19,434	4,204	297,138	8,142				562,613
2008	961	5,853	21,296	139,368	39,293	2,194	4,054	338,913	114,011				665,943

**Notes:** FL: state-reported landings 1983-present (NMFS-reported estimates limited to Nassau and Duval Counties and adjusted on the basis of the genome proportions of weakfish within the Cynoscion-complex found in those counties' waters).

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**Table 5. Recreational landings (numbers) of weakfish by state, 1982-2008** (NMFS 2009, except as noted below table)

Year	FL	GA	SC	NC	VA	MD	DE	NJ	NY	CT	RI	MA	Total
1982	40,161		17,342	200,045	715,892	440,146	217,821	104,066	88,234	11,769	18,614		1,854,090
1983	7,742	17,209	6,807	387,871	354,846	595,286	1,009,899	2,857,093	36,934	6,363	74,608	2,732	5,357,390
1984	13,026		7,836	489,468	782,848	104,057	593,107	1,026,043	20,133	1,561		2,237	3,040,316
1985	959	4,811	61,788	217,671	505,223	305,799	365,693	812,839	89,538	2,874	17,092		2,384,287
1986	3,412	18,130	78,315	611,363	2,418,046	1,947,394	914,489	2,500,622	34,582	7,315	4,595		8,538,263
1987	1,696	10,802	18,841	624,160	1,015,413	824,883	638,342	1,666,619	7,447	777			4,808,980
1988	2,521		1,834	438,148	2,297,053	1,163,766	974,712	642,032	13,215				5,533,281
1989	3,745	8,245	6,810	190,193	357,864	226,505	254,170	303,289	6,436				1,357,257
1990	1,953	2,273	8,027	91,300	286,458	370,528	179,837	216,385	3,057		407		1,160,225
1991	3,041	4,954	19,616	140,826	351,947	221,242	366,464	545,665	28,072	18,695			1,700,522
1992	1,820	1,751	23,501	35,490	265,645	137,260	100,561	311,659	5,282	434	9,624		893,027
1993	3,932	14,752	7,360	106,737	108,392	238,768	235,312	203,915	12,610	2,460			934,238
1994	5,403	718	46,858	177,965	169,740	332,846	300,211	591,571	1,872				1,627,184
1995	1,463	22,437	29,897	62,475	226,682	88,695	406,730	671,850	22,310		1,568		1,534,107
1996	944	5,413	5,695	90,704	193,861	183,408	633,920	1,104,251	16,320				2,234,516
1997	1,926	44,202	2,039	184,954	557,809	162,900	647,529	1,028,334	112,986	517	1,415		2,744,611
1998	651	718	15,838	191,181	463,525	290,051	455,603	920,558	21,392	2,183		618	2,362,318
1999	2,714	1,679	3,941	127,163	229,209	340,096	224,307	583,883	18,347	1,606	2,296		1,535,241
2000	3,276	4,181	5,585	71,247	286,752	475,348	311,553	760,279	42,406	7,342	712		1,968,681
2001	1,542	3,316		158,605	175,872	302,719	72,451	736,069	28,126	715	2,301		1,481,716
2002	1,842	852	90,245	90,170	178,110	100,467	121,884	492,876	24,962	1,796	1,420		1,104,624
2003	774	1,573	4,162	153,753	86,112	41,048	20,124	151,101	9,234	443	298	109	468,731
2004	1,195	9,815	153,589	237,395	103,181	29,645	6,967	183,649	7,596				733,032
2005	2,151	5,764	129,575	163,265	30,346	22,164	19,031	1,053,005	359		1,009		1,426,669
2006	2,272	3,501	7,123	153,696	58,814	470	11,158	417,527	9,123		3,297		666,981
2007	2,425	4,712	71,230	114,332	44,624	10,316	4,182	209,310	7,120				468,251
2008	997	5,909	25,794	137,564	29,016	2,590	4,212	269,858	30,543				506,483

Notes: FL: state-reported landings 1983-present (NMFS-reported estimates limited to Nassau and Duval Counties and adjusted on the basis of the genome proportions of weakfish within the Cynoscion-complex found in those counties' waters).

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**Table 6. Recreational releases (numbers) of weakfish by state, 1982-2008** (NMFS 2009, except as noted below table)

Year	FL	GA	SC	NC	VA	MD	DE	NJ	NY	CT	RI	MA	Total
1982	3,387			44,134	126,514	2,139	12,712	1,695					190,581
1983	567	173		10,560	45,565	15,642	8,912	155,116	15,870				252,405
1984	177		1,561	17,381	202,791	8,934	1,163	4,464			5,214		241,685
1985	212	152	3,279	2,138	82,071	12,114	2,085	246,284					348,335
1986	606		2,873	354,095	692,462	327,841	9,637	895,044	4,556				2,287,114
1987	384	89		71,659	233,441	299,172	46,064	182,019	1,266				834,094
1988	17	4,196		109,489	484,782	155,255	59,980	5,144		634			819,497
1989			1,019	34,074	52,191	53,148	13,924	22,841	1,980				179,177
1990	71			20,669	198,948	142,055	41,765	32,863	570				436,941
1991	943			11,457	361,768	40,349	65,685	238,646	33,046	2,108			754,002
1992	1,045	362	4,598	27,052	244,817	71,040	61,886	249,846	8,362		98		669,106
1993	1,493	840	267	52,468	245,211	225,510	255,968	281,450	20,995				1,084,202
1994	1,007	21,588		147,616	652,571	583,059	560,999	1,051,931	45,537	1,013			3,065,321
1995	1,355	572		154,008	939,970	178,937	1,088,353	1,613,831	81,236		98		4,058,360
1996	780	307		188,263	814,573	492,402	1,567,046	1,859,049	84,990		780		5,008,190
1997	2,958		2,938	209,122	1,404,092	323,653	897,625	975,280	90,549	1,213	163		3,907,593
1998	1,251	1,468	329	131,537	1,244,949	461,518	613,544	778,180	29,836	360	1,921		3,264,893
1999	2,818		13,616	149,377	818,959	753,266	372,479	551,283	35,459		8,436		2,705,693
2000	5,551	12,895	15,869	346,212	935,594	1,209,290	465,496	1,605,024	68,531	1,285	931		4,666,678
2001	2,541	13,537		886,943	633,443	737,240	227,214	1,064,609	69,123		358		3,635,008
2002	2,113	9,540	1,019	336,709	888,337	286,182	101,282	350,810	62,803		1,932		2,040,727
2003	1,556	21,212	1,966	153,563	504,129	180,827	39,314	631,438	7,286	1,233			1,542,524
2004	3,530	12,249	107,177	240,298	528,200	132,087	79,238	607,393	40,254	5,470	248		1,756,144
2005	3,009	29,623	56,663	241,674	266,879	55,270	110,717	1,279,930	193,556				2,237,321
2006	6,084	6,149	21,917	295,415	456,270	57,394	120,930	1,231,102	11,732				2,206,993
2007	1,794	19,890	90,224	148,938	172,068	106,308	18,811	581,435	200,574		1,574		1,341,616
2008	520	13,229	105,401	127,333	314,118	30,260	61,364	1,254,625	26,851				1,933,701

Notes: FL: state-reported landings 1983-present (NMFS-reported estimates limited to Nassau and Duval Counties and adjusted on the basis of the genome proportions of weakfish within the Cynoscion-complex found in those counties' waters).

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**Table 7. Evaluation of the Coastwide Management Trigger** (Section 3.3.1 of Addendum II to Amendment 4): percent change of each state’s 2008 total landings to its five-year (2003-2007) mean total landings

	FL	GA	SC	NC	VA	PRFC	MD	DE	NJ	NY	CT	RI	MA
2003-2007	2,257	5,458	54,196	670,541	451,295	1,794	52,058	79,483	757,413	150,213	5,568	51,700	293
2008	1,957	5,853	21,296	309,837	210,446	74	8,009	15,239	394,862	158,286	1,012	9,702	0
% change	-13%	7%	-61%	-54%	-53%	-96%	-85%	-81%	-48%	5%	-82%	-81%	-100%

**Table 8. Biological sampling of weakfish in 2008, Massachusetts-Florida** (Sampling requirements are based on Addendum I to Amendment 4 and 2008 landings data; values in the “samples completed” column in red, bold font do not meet sampling requirement)

	Samples Required		Samples Completed		Fisheries Sampled
	Otoliths	Lengths	Otoliths	Lengths	
MA*	0	0	0	0	NA
RI	13	26	<b>0</b>	<b>0</b>	NA
CT*	1	3	0	0	NA
NY	215	120	<b>119</b>	486	commercial (GN, TR, PN)
NJ	537	152	<b>430</b>	938	commercial (GN, H&L, PN, TR), otolith count includes samples from TR survey
DE	21	30	159	409	commercial (GN, H&L); additional 669 otoliths available from TR survey
MD	11	16	94	135	commercial (PN, TR)
PRFC	0	0	0	0	NA
VA	286	466	366	1,944	commercial (GN, PN, HS, TR, additional 334 otoliths not aged); additional otoliths available from TR survey
NC	422	464	483	3,275	commercial (HS, GN, TR, PN, BS), otolith count includes samples from recreational and GN/TR surveys
SC*	29	0	0	0	NA; otoliths available from TR surveys; voluntarily submitted 2009 sampling plan, intend to collect recreational otoliths
GA*	8	0	6	6	recreational (not aged)
FL*	3	3	0	9	commercial

\* *de minimis* in 2008; not required to conduct sampling; sample numbers provided to show from what states were exempt  
 NA=not applicable, GN= gill net, TR=trawl, PN=pound net, H&L=hook and line, HS=haul seine, BS=beach seine

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**Table 9. Indices of relative weakfish abundance reported in the 2008 state compliance reports**

Yr	RI Tr	CT Tr	CT Tr	NY Tr	NJ Tr	NJ Tr	DE Tr	DE Tr	DE Tr	MD Tr	MD Tr	VA Tr	NC Tr	NC Gn	GA Tr	FL Tr	FL Tr
	Coast	LIS	LIS	Coast	DE Bay	Ocean	DE Bay	Inland	DE Bay	ChesBay	Coast	ChesBay	Pamlico	Pamlico	Coast	Jax	IR&Jax
	YOY	YOY	1+	YOY	YOY	1+	YOY	YOY	1+	YOY	YOY	YOY	YOY	1+	0+	YOY	1+
	#/tow	GM#/tow	GM#/tow	AM#/tow	GM#/tow	GM#/tow	GM#/tow	GM#/tow	GM#/tow	#/nm	GM#/tow	GM#/ha	GM#/tow	#/tow	#/set	#/obs hr	med/tow
1980	17.16	*	*	*	*	*	4.15	*	*	*	*	*	*	*	*	*	*
1981	36.44	*	*	*	*	*	5.98	*	*	*	*	*	*	*	*	*	*
1982	19.55	*	*	*	*	*	11.49	*	*	*	*	*	*	*	*	*	*
1983	3.13	*	*	*	*	*	4.47	*	*	*	*	*	*	*	*	*	*
1984	5.03	1.00	0.55	*	*	*	6.67	*	*	*	*	*	*	*	*	*	*
1985	19.18	6.19	0.24	*	*	*	9.25	*	*	*	*	*	*	*	*	*	*
1986	2.00	13.17	0.24	*	*	*	12.79	1.14	*	*	*	*	*	*	*	*	*
1987	1.31	0.63	0.11	1.50	*	*	5.82	1.26	*	*	*	*	12.14	*	*	*	*
1988	10.86	2.90	0.06	0.20	*	*	4.73	0.81	*	*	*	8.13	101.50	*	*	*	*
1989	1.17	8.69	0.02	6.90	*	1.64	11.11	2.20	*	0.44	0.87	11.74	14.20	*	*	*	*
1990	25.53	5.56	0.08	2.30	*	1.19	8.73	2.95	*	0.95	1.72	4.46	50.20	*	*	*	*
1991	25.41	11.95	0.31	56.50	2.20	1.42	20.07	5.87	31.43	0.78	1.89	3.16	36.96	*	*	*	*
1992	14.51	3.03	0.18	23.40	3.40	1.39	14.72	2.51	23.83	3.24	1.81	6.78	42.71	*	*	*	*
1993	7.50	4.08	0.12	4.40	2.85	1.25	14.79	0.63	80.10	1.59	0.91	5.81	8.70	*	*	*	*
1994	15.17	11.19	0.06	70.90	2.86	2.62	11.47	1.47	206.50	2.33	1.84	2.51	68.06	*	*	*	*
1995	0.26	5.21	0.70	4.70	4.10	2.90	13.49	4.24	150.00	5.95	4.44	5.95	38.21	*	*	*	*
1996	124.67	15.23	0.56	220.40	7.39	2.30	12.13	1.18	233.80	6.40	3.18	7.26	72.07	*	*	*	*
1997	88.83	12.38	0.89	82.40	15.66	2.53	15.40	2.07	110.40	4.28	3.06	6.81	32.79	*	*	*	*
1998	13.51	5.02	0.28	4.80	6.89	0.76	11.35	1.35	102.07	5.87	2.80	7.60	70.44	*	*	*	*
1999	3.68	30.93	0.39	40.50	24.92	1.45	13.51	1.99	92.56	3.26	2.76	6.78	99.90	*	*	*	*
2000	9.38	63.31	0.30	167.10	7.10	1.86	14.14	1.64	179.12	6.54	2.34	8.35	62.99	*	*	*	*
2001	19.33	40.09	0.52	113.70	15.05	0.93	7.56	1.53	80.70	8.10	2.56	5.09	30.30	1.42	*	0.29	0.01
2002	8.40	41.35	0.16	145.20	19.70	1.84	5.96	1.31	144.98	3.92	0.61	6.93	22.00	1.40	*	0.69	0.03
2003	198.00	49.41	0.07	69.80	3.10	0.09	10.44	2.44	65.78	4.89	5.64	9.23	23.93	1.22	105.44	1.03	0.03
2004	1.88	58.98	0.21	43.90	8.42	1.58	8.39	3.32	48.88	1.62	3.39	6.66	28.75	1.32	94.42	1.63	0.04
2005	128.93	25.86	0.12	226.50	21.22	1.49	16.82	3.84	29.00	3.55	4.98	5.69	28.76	1.24	32.08	1.34	0.04
2006	0.36	1.05	0.29	55.10	12.25	0.42	5.35	1.60	106.31	2.41	1.50	6.34	39.09	0.92	79.96	0.40	0.03
2007	36.10	63.93	0.06	92.12	25.54	1.52	13.7	2.98	43.16	1.60	2.32	5.35	56.8	0.43	159.64	0.24	0.03
2008	0.55	9.07	0.08	51.5	7.86	1.57	6.74	1.02	45.94	0.79	0.23	5.77	50.3	0.49	75.55	0.79	0.02