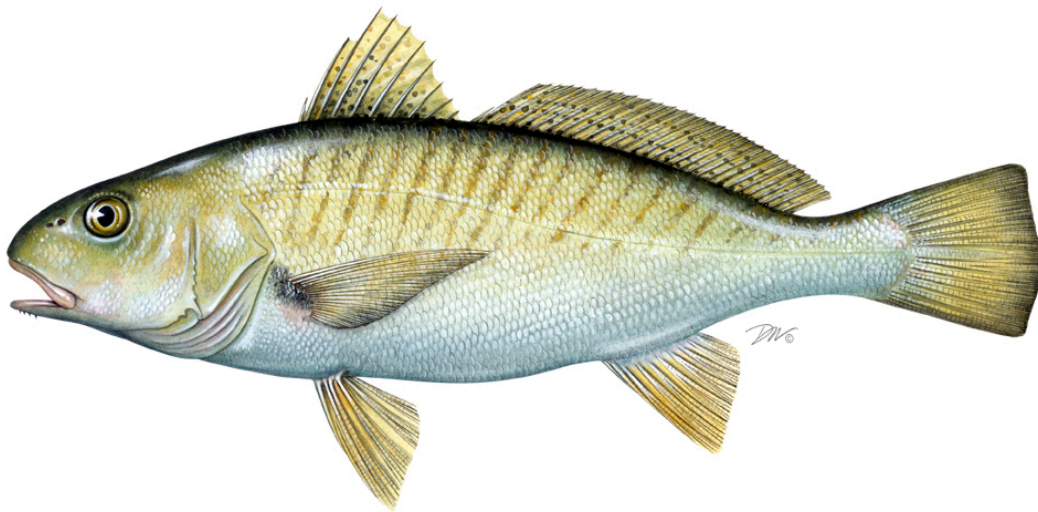


Atlantic States Marine Fisheries Commission

**ADDENDUM III TO AMENDMENT 1 TO THE INTERSTATE FISHERY
MANAGEMENT PLAN FOR ATLANTIC CROAKER**

Revisions to Management using the Traffic Light Approach



Approved February 2020



Sustainable and Cooperative Management of Atlantic Coastal Fisheries

1.0 INTRODUCTION

The Atlantic States Marine Fisheries Commission (ASMFC) is responsible for managing Atlantic croaker (*Micropogonias undulatus*) in state waters (0-3 miles from shore) under the authority of the Atlantic Coastal Fisheries Cooperative Management Act, and has done so through an interstate fishery management plan (FMP) since 1987. Atlantic croaker are currently managed under Amendment 1 to the FMP and Addenda I-II. The states of New Jersey through Florida have a declared interest in the fishery and are responsible for implementing management measures consistent with the interstate FMP as members of the South Atlantic State/Federal Fisheries Management Board (Board).

Addendum II established the Traffic Light Approach (TLA) as a precautionary management framework to evaluate fishery trends and develop management actions. The TLA was originally developed as a management tool for data-poor fisheries, and its application to Atlantic croaker is described in further detail in *Section 2.2.2*. Starting in the late 2000s, there were inconsistent signals in the data used to examine the resource. In addition, the 2017 stock assessment was not recommended for management use. The lack of clear information from the TLA and the assessment made it difficult to provide management advice. Addendum III addresses these issues by modifying the TLA to better reflect stock characteristics and identifying achievable management actions based on stock conditions.

2.0 OVERVIEW

2.1 Statement of the Problem

The TLA has been used since 2014 to monitor the Atlantic croaker population. The lack of a recent assessment approved for management use makes this approach the prominent source of management advice. While strong declines in harvest and reports of poor fishing prompted concern, management action was not triggered through the TLA because similar declines were not observed in abundance indices. These conflicting signals suggested the abundance indices being used in the TLA may not adequately represent coastwide adult abundance and the TLA may not be sensitive enough to trigger management action if declines in the population and fishery occur. Additionally, management lacked specificity in what measures to implement if a trigger did occur and how the fishery should be evaluated following management action. Addendum III incorporates the use of a regional approach to better reflect localized fishery trends and changes the TLA to trigger management action if 3 of the 4 most recent years of characteristics exceed threshold levels. These changes to management allow the TLA to better detect population and fishery declines. Addendum III also defines management responses for the recreational and commercial fisheries and a method for evaluating the population's response to TLA-triggered management measures.

2.2 Background

Atlantic croaker are small sciaenid forage species that support commercial and recreational fisheries in the Mid and South Atlantic regions. Atlantic croaker migrate seasonally along the coast, moving northward and inshore to estuaries and bays during warmer months (spring-fall) and southward and offshore to more oceanic waters in the winter. Atlantic croaker feed on planktonic organisms as post-larvae and young of the year, and as juveniles and adults they prey on bottom dwelling organisms such as worms and crustaceans. Atlantic croaker reach maturity by approximately age two and can live up to 17 years, but more commonly live no longer than 10 years.

2.2.1 Stock Status and Assessment

The most recent stock assessment, conducted in 2017, upon peer review was not recommended for management use. Therefore, current stock status is unknown, although the Peer Review Panel did not indicate problems in the Atlantic croaker fishery that would require immediate management action. The Peer Review Panel did recommend continued evaluation of the fishery using the annual TLA.

The last benchmark stock assessment for Atlantic croaker recommended for management use by a peer review was conducted in 2010. Unlike previous assessments it evaluated the resource as a single coastwide stock. The assessment indicated that the resource was not experiencing overfishing, biomass had increased, and age-structure had expanded since the late 1980s. However, it could not determine stock status because of uncertain model estimates due to limited data on shrimp trawl discards and fishing mortality. Improvements on estimation of these discards were made in the 2017 assessment, allowing the potential for shrimp trawl discards to be included as supplemental information with the annual TLA. Annual monitoring of shrimp trawl fishery discards is important because these represent a considerable proportion of Atlantic croaker removals, ranging from 7% to 78% annually during 1988-2008, according to the 2010 assessment. Estimates of shrimp trawl discards updated for the 2017 assessment, which were noted by the Peer Review Panel as being derived using current and supported methods, suggest the proportion of removals attributable to this component of the fishery may be higher.

One of the reasons that the 2017 stock assessment was not approved for management use was due to conflicting signals in harvest and abundance characteristics. Theoretically, increases in adult abundance should result in more fish available to be caught by the fishery; thus, fishing would be more efficient (greater catch per unit effort) and harvest would increase in a pattern similar to adult abundance. However, several of the most recent abundance indices have shown increases while harvest has declined to some of the lowest levels on record. One factor that has been identified to contribute to overestimates of adult abundance is an increase in the number of juveniles misclassified as adults in surveys that historically have typically caught adults.

2.2.2 Traffic Light Approach as Applied to Atlantic Croaker

The TLA was originally developed as a precautionary management framework for data poor fisheries whereby reference points could be developed that would allow for some level of evaluation and management of the fishery, particularly in the absence of or between stock assessments. The name comes from assigning a color (red, yellow, or green) to categorize relative levels of different indicators for either a fish population or a fishery. Examples of indicators include growth and reproduction parameters, abundance and stock biomass estimates, recreational harvest, commercial landings, or fishing mortality. Additionally, the indicators can be combined to form composite characteristics within similar categories (e.g. biological, population estimates, or combined fisheries harvest). However, each indicator must be evaluated separately to determine its appropriateness for use in management.

A general practice when applying the TLA, the green/yellow boundary is set at the average for a reference time period and the yellow/red boundary is set at 60% of the reference period average, which would indicate a 40% decline (Halliday et al., 2001). Index values in the intermediate zone can be represented by a mixture of either yellow/green or yellow/red depending on where they fall in the transition zone.

Proportions of green and red for an individual component (e.g. recreational harvest) are calculated based on summary statistics for a predefined reference period. Annual values are compared to the reference period average to determine whether they are higher, lower, or the same. If the value is greater than the reference period average, a linear model is used to estimate the proportion green, such that greater values have a higher proportion green. If the value is less than the average, a linear model estimates the proportion red, such that lesser values have a higher proportion red. Yellow proportions are calculated as one minus the proportion green minus the proportion red and will be 100% yellow if the value equals the reference period average. Since an increasing percentage of red reflects a decreased value (e.g. harvest or abundance) below the reference period average, the proportion red offers a way of determining if any management response is necessary.

The color proportions in a composite index are averages of the color proportions for the individual components combined to make up the composite index. For example, if there are two components (e.g. recreational and commercial harvest) combined for the composite index, the proportion red is the average of the proportion red for both components, the proportion green is the average of the proportion green for both components, and the proportion yellow is the average of the proportion yellow for both components.

As an example of how to interpret TLA figures, consider year 2018 of Figure 1 (*Section 2.2.4*) which depicts the coastwide composite harvest characteristic of the Addendum II TLA. Table 1 lists specific values considered for this characteristic and year. The reference period is 1996-2008, with average annual harvests during this time period being 24.5 million pounds and 14.9 million pounds for the commercial and recreational sectors, respectively. In 2018, commercial harvest was 4.2 million pounds. This value is less than the reference period average. Therefore,

a linear regression was used to calculate the percent red based on how much less the 2018 value is than the reference period average, resulting in 67.2% red, 32.8% yellow, and 0% green. In 2018, recreational harvest was 3.0 million pounds. This value is less than the reference period average. Therefore, a linear regression was used to calculate the percent red based on how much less the 2018 value is than the reference period average, resulting in 64.2% red, 35.8% yellow, and 0% green. Averaging of sector harvest characteristic values for each color results in the final composite characteristic percentages: 65.7% red, 34.3% yellow, and 0% green.

Table 1. Commercial and recreational harvests and Traffic Light Approach (TLA) percentages for the 2018 Atlantic croaker harvest characteristics (commercial, recreational, and composite), using the 1996-2008 reference period.

1996-2008 Coastwide Average Commercial Harvest	24,545,916 pounds
2018 Coastwide Commercial Harvest	4,192,442 pounds
2018 Commercial Harvest TLA Percentages (Red, Yellow, Green)	67.2%, 32.8%, 0%
1996-2008 Coastwide Average Recreational Harvest	14,885,189 pounds
2018 Coastwide Recreational Harvest	3,006,258 pounds
2018 Recreational Harvest TLA Percentages (Red, Yellow, Green)	64.2%, 35.8%, 0%
2018 Composite Harvest TLA Percentages (Red, Yellow, Green)	65.7%, 34.3%, 0%

For Atlantic croaker, the TLA is used to provide management guidance in between stock assessments. It has two components, a harvest characteristic, comprised of commercial landings and recreational harvest data, and an abundance characteristic, comprised of fishery-independent abundance indices. The TC annually runs the TLA and provides the results to the PRT for the annual FMP Review. To utilize the best data available, the TC and PRT are able to modify the TLA as needed through annual reviews and updates.

2.2.3 Changes to the TLA and Management Responses

The following changes are incorporated into the TLA:

1. Incorporation of indices from the Chesapeake Bay Multispecies Monitoring and Assessment Program (ChesMMAP) and the South Carolina Department of Natural Resources (SCDNR) Trammel Net Survey into the adult composite characteristic index, in addition to the currently used indices from the Northeast Fishery Science Center (NEFSC) Multispecies Bottom Trawl Survey and Southeast Area Monitoring and Assessment Program (SEAMAP).
2. Use of revised adult abundance indices from the surveys mentioned above, in which age-length keys and length composition information are used to estimate the number of adult (age 2+) individuals caught by each survey.
3. Use of regional metrics to characterize the fisheries north and south of the Virginia-North Carolina state border. The ChesMMAP and NEFSC surveys will be used to characterize abundance north of the border, and the SCDNR Trammel Net and SEAMAP surveys will be used to characterize abundance south of the border.

4. Change/establish the reference time period for all surveys to be 2002-2012.
5. Change the triggering mechanism to the following: Management action will be triggered according to the current 30% red and 60% red thresholds if both the abundance and harvest thresholds are exceeded in any 3 of the 4 terminal years.

Addendum III retains the TC’s ability to alter the TLA as needed to best represent trends in Atlantic croaker harvest and abundance, including selection of surveys and methods to analyze and evaluate these data. Such changes may be made without an addendum, but Addendum III is necessary because of the change to the management-triggering mechanism.

2.2.4 Population Characteristics

Figures 1 and 2 show composite regional harvest characteristic TLA analyses for Atlantic croaker through 2018, using the updated TLA methods.

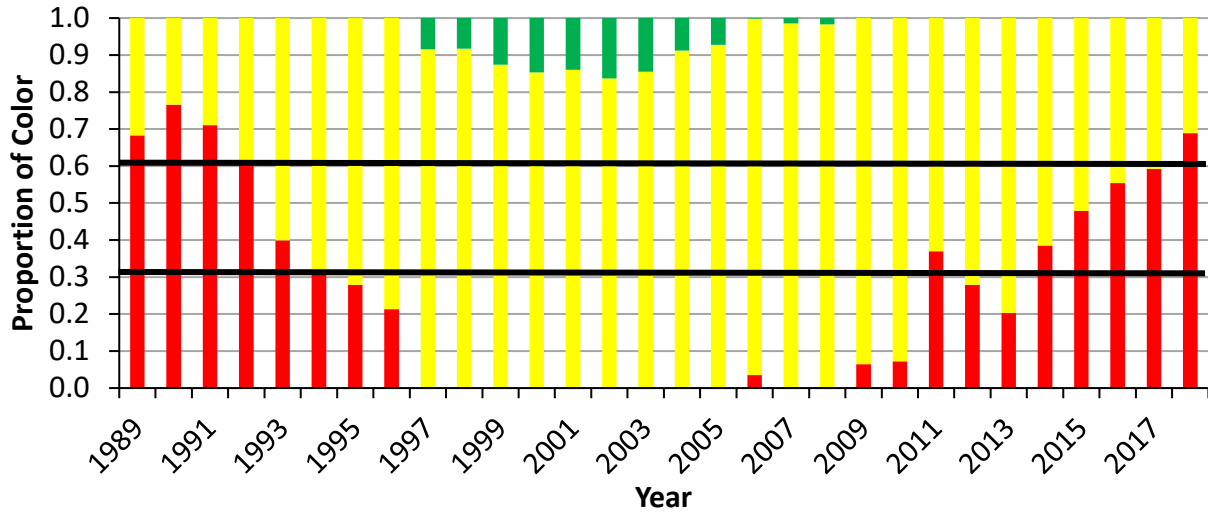


Figure 1. Mid-Atlantic (NJ-VA) Regional Composite TLA analysis using commercial landings and recreational harvest for Atlantic croaker with management thresholds of 30% and 60% proportion red (reference period 2002 – 2012).

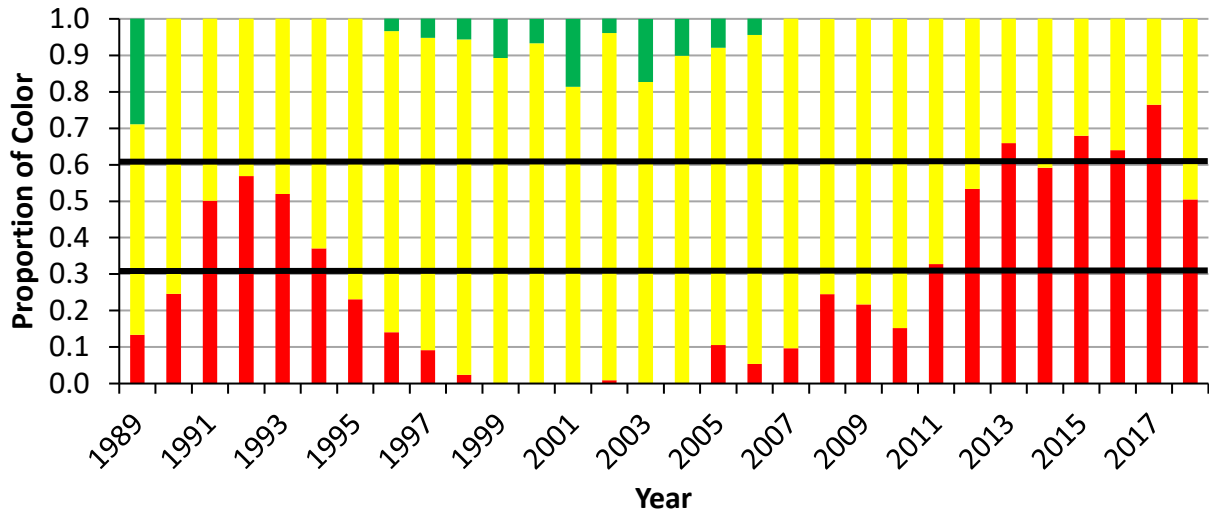


Figure 2. South Atlantic (NC-FL) Regional Composite TLA analysis using commercial landings and recreational harvest for Atlantic croaker with management thresholds of 30% and 60% proportion red (reference period 2002 – 2012).

Figure 3 and 4 show composite regional abundance characteristic TLA analyses for spot through 2018, using the updated TLA methods.

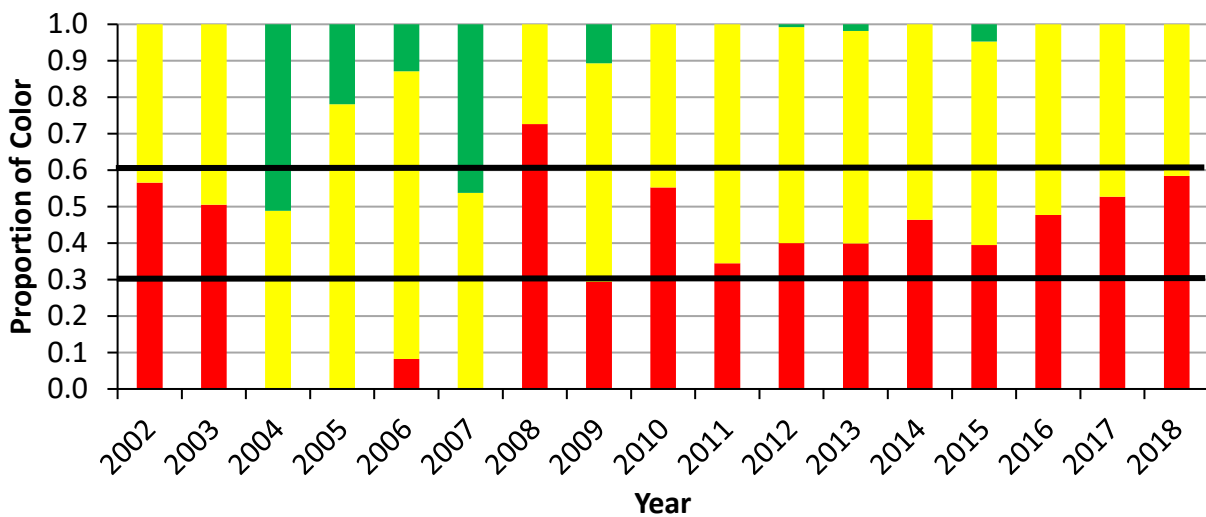


Figure 3. Addendum III Mid-Atlantic (NJ-VA) Regional Composite TLA analysis using age-specified fishery-independent survey indices (NEFSC Trawl Survey and ChesMMAAP) for Atlantic croaker with management thresholds of 30% and 60% proportion red (reference period 2002 – 2012).

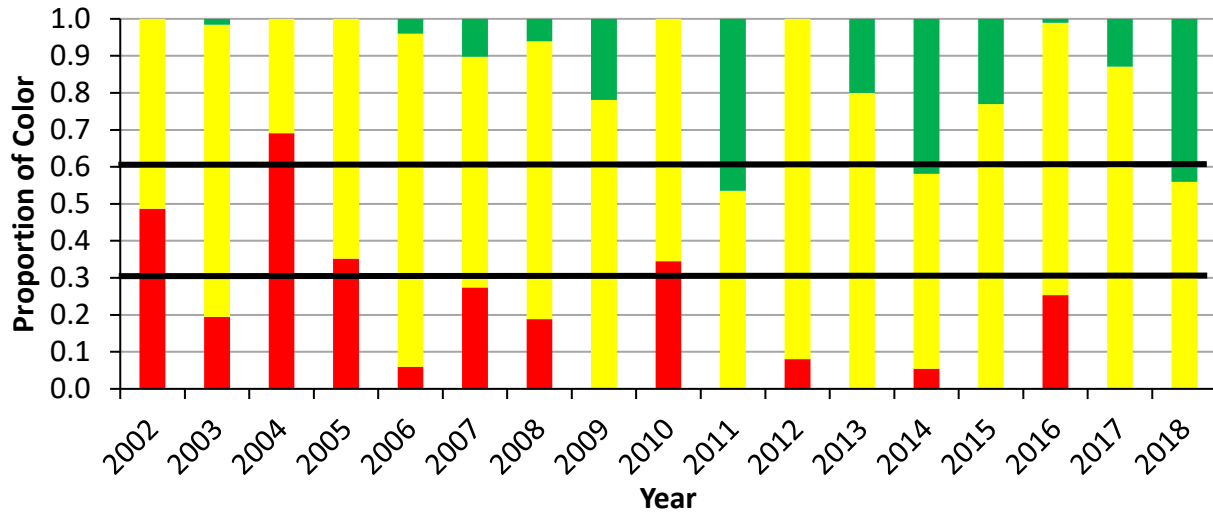


Figure 4. Addendum III South Atlantic (NC-FL) Regional Composite TLA using age-specified fishery-independent survey indices (SEAMAP and SCDNR Trammel Net Survey) for Atlantic croaker with management thresholds of 30% and 60% proportion red (reference period 2002 – 2012).

3.0 MANAGEMENT PROGRAM

There are no coastwide management requirements for Atlantic croaker through Amendment 1. Additionally, due to the strong association of Atlantic croaker abundance with environmental variables, their exhibition of cyclical abundance trends, and the apparent disconnect between Addendum II harvest and abundance characteristics, a reduction in harvest may not necessarily result in a proportional increase in abundance. Therefore, Addendum III establishes base management measures with the goal of reducing fishing impacts to not exacerbate periods of low abundance. It should also be noted that the use of a regional approach was incorporated to increase survey coverage throughout the stock, but Atlantic croaker are still a single, coastwide stock. Therefore, any management triggers from regional TLAs result in regulatory responses throughout the management unit.

The following management program replaces Section 3.0 of Addendum II to Amendment 1 to the Interstate FMP for Atlantic Croaker.

3.1 Management Trigger Based on Proportion Red

If red proportions for both population characteristics (adult abundance and harvest) in a regional, with both characteristics being for the same region, or a coastwide TLA meet or exceed the proportion of a threshold for any three of the four terminal years, then management action is required.

Threshold proportion red levels are listed below:

30%- this represents moderate concern to the fishery with moderate management response

60%- this represents significant concern to the fishery with elevated management response

3.2 Management Responses to Triggers

If management action has not been triggered according to *Section 3.1*, there are no coastwide management requirements, in accordance with Amendment 1. States regulations restricting Atlantic croaker harvest are encouraged to be maintained.

TLA-triggered management responses were developed to reduce fishing impacts to not exacerbate periods of low abundance. As the TLA does not offer advice on overfished or overfishing status, resulting management responses are not designed to stop overfishing or recover an overfished stock. Such status designations should be evaluated through a stock assessment and responded to accordingly. Additionally, while projected reductions to previous harvests are incorporated into the commercial responses, due to the lack of a coastwide quota and uncertainty of the fisheries' behavioral responses to triggered management measures, it is recognized that projected harvest reductions based on past fishery performance may not be achieved through triggered management measures. Furthermore, due to large numbers of removals from this population as bycatch through the South Atlantic shrimp trawl fishery (the majority of annual total removals), it is also recognized that directed harvest reductions may not result in large increases to abundance. However, these measures will reduce the probability of directed harvest inhibiting growth of the Atlantic croaker stock and provide baseline information for any future consideration of coastwide management measures.

The recreational responses to differing threshold levels are bag limits, while commercial responses are percent reductions to previous harvests through quantifiable measures such as seasons, trip limits, or size limits. In developing these responses, sector differences in gears, fishing behavior, and state regulations already in place were considered.

If management action is triggered according to *Section 3.1*, Addendum III requires states to implement the following coastwide regulations (except where states are noted as exempt or have more conservative measures):

3.2.1 Recreational Management Trigger Response

If the 30% red threshold is met or exceeded, all recreational non-*de minimis* states are required to institute a bag limit of no more than 50 Atlantic croaker per person per day. If the 60% threshold is met or exceeded, all states (including *de minimis*) are required to institute a bag limit of no more than 40 Atlantic croaker per person per day. States are encouraged to maintain any measures already in place that are more restrictive than those required by this addendum.

De minimis states are those in which enforcement actions would be expected to contribute insignificantly to a coastwide conservation plan. Per *Section 4.4.3* of Amendment 1, states may apply for this status if, for the preceding three years for which data are available, their average commercial or recreational Atlantic croaker landings (by weight) constitute less than one percent of the average coastwide commercial or recreational Atlantic croaker landings for the same period. A state that qualifies for *de minimis* based on their commercial landings qualifies for exemptions in their commercial fishery only, and a state that qualifies for *de minimis* based on their recreational landings qualifies for exemptions in their recreational fishery only.

Recreational for-hire vessels may possess live Atlantic croaker for use as bait while triggered measures are in effect. The maximum number of Atlantic croaker allowed to be held onboard for this use prior to beginning a trip, during a trip or after a trip is completed will be the bag limit in effect multiplied by the number of customers allowed on the vessel. During a trip, the number of Atlantic croaker in possession to be harvested may not exceed the bag limit in effect multiplied by number of anglers onboard the vessel during the trip (any additional Atlantic croaker in possession, up to the limit stated above, must be those being used as live bait). In this context, a trip is defined as a period of time in which fishing is conducted, beginning when the vessel leaves port and ending when the vessel returns to port. If no coastwide bag limit is in effect, then this use is not limited by this addendum.

While triggered measures are in effect, recreational private vessels that possess live Atlantic croaker for use as bait will be subject to personal bag limits of anglers on the vessel, with live fish possessed counting towards the bag limits. If no coastwide bag limit is in effect, then this use is not limited by this addendum.

3.2.2 Commercial Management Trigger Response

If the 30% red threshold is met or exceeded, commercial non-*de minimis* states that do not already have a minimum size limit or possession limit are required to institute quantifiable measures (e.g. season, trip limit, or size limit) that reduce commercial harvest by 1% of the average state commercial harvest from the previous 10 years. States may establish differential measures by gear or area, as long as measures implemented are quantifiable and are projected to achieve the required 1% reduction for the entire state commercial harvest.

If the 60% threshold is met or exceeded, all states (including *de minimis*) are required to institute quantifiable measures (e.g. season, trip limit, or size limit) that reduce commercial harvest by 5% of the average state commercial harvest from the previous 10 years.

All measures established as required responses to TLA triggers will be evaluated by the TC to determine if they are both quantifiable and meet the objective reduction and approved by the Board prior to implementation.

3.2.3 Management Alternatives

If the 60% red threshold is met or exceeded, triggering management action, and the Board determines more restrictive actions are necessary than those defined in *Sections 3.2.1* or *Section 3.2.2*, the Board may task the TC to determine an alternative reduction to the recreational or commercial fisheries. The TC will recommend the appropriate percent reduction in harvest needed and state-by-state measures to achieve the harvest reduction for approval by the Board. This allows the states to meet the individual needs of their state's fisheries. The application of an overall harvest percentage reduction may include use of a combination of management tools that include size limits, bag/trip limits, seasonal closures, and gear restrictions.

3.3 Evaluation of Fishery Response to Management Measures

Management measures set in response to any trigger will remain in place for at least three years to promote consistent measures and allow for sufficient time to evaluate population response. Once management action has been taken, the harvest characteristics will no longer be used to trigger management action, as the fishery-dependent data may be influenced by triggered measures. While triggered measures are in effect, a composite regional abundance characteristic, by itself, may trigger action at the next highest level of management response by the proportion red exceeding the next highest threshold in any three of the four terminal years.

After a minimum of three years and after no composite regional abundance characteristics trigger management action at either threshold, triggered measures will no longer be required, and the TC will resume using the harvest characteristics as components of the TLA that are required to trigger management action.

If triggered measures have remained in place for a minimum of four years due to proportions of red above a threshold for either of the composite regional abundance characteristics, the TC will, as part of conducting the annual TLA, evaluate trends in abundance to recommend to the Board whether triggered measures should remain in place or more restrictive measures should be considered.

4.0 COMPLIANCE

The management framework contained in *Section 3.0* is effective immediately.

5.0 LITERATURE CITED

Halliday, R.G., L.P. Fanning, and R.K. Mohn. 2001. Use of the Traffic Light Method in Fishery Management Planning. Canadian Science Advisory Secretariat, Research Document No. 108. 41 p.

6.0 APPENDIX

To aid in public interpretation of TLA figures and results, the following figures depict components of Atlantic croaker TLA characteristics in a linear format with the long-term mean (average) (LTM) of the proposed reference period (2002-2012).

Commercial and Recreational Harvest

Commercial landings show a general declining trend has occurred since the late 1990s.

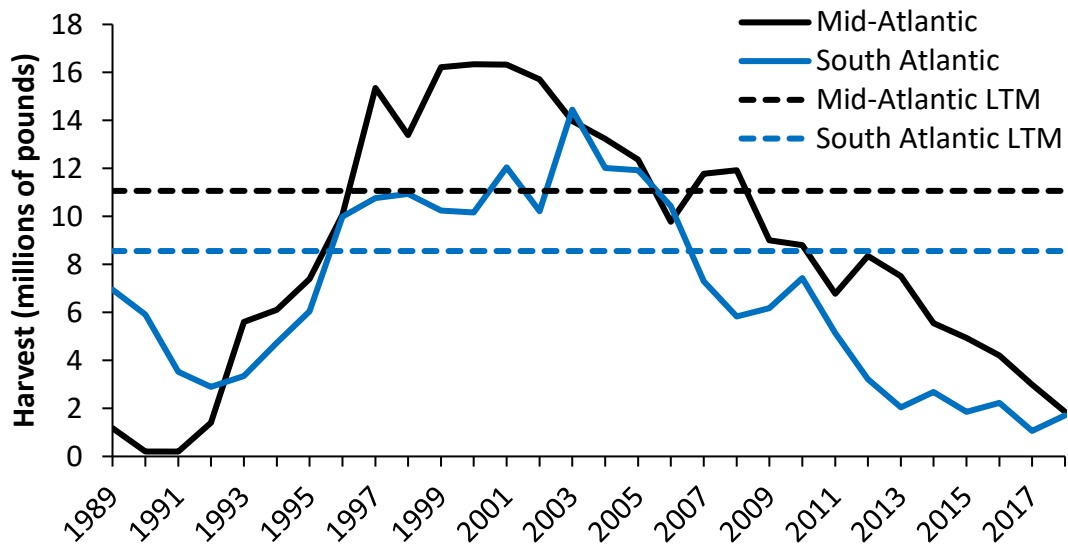


Figure A1. Commercial harvest and the LTM harvest for 2002-2012 in the Mid-Atlantic (NJ-VA) and South Atlantic (NC-FL) regions.

Mid-Atlantic recreational harvest shows an increase to a peak in the early 2000s, followed by a decline with values under its LTM since 2011. South Atlantic recreational harvest declined in the late 1980s and has remained low, varying about its LTM.

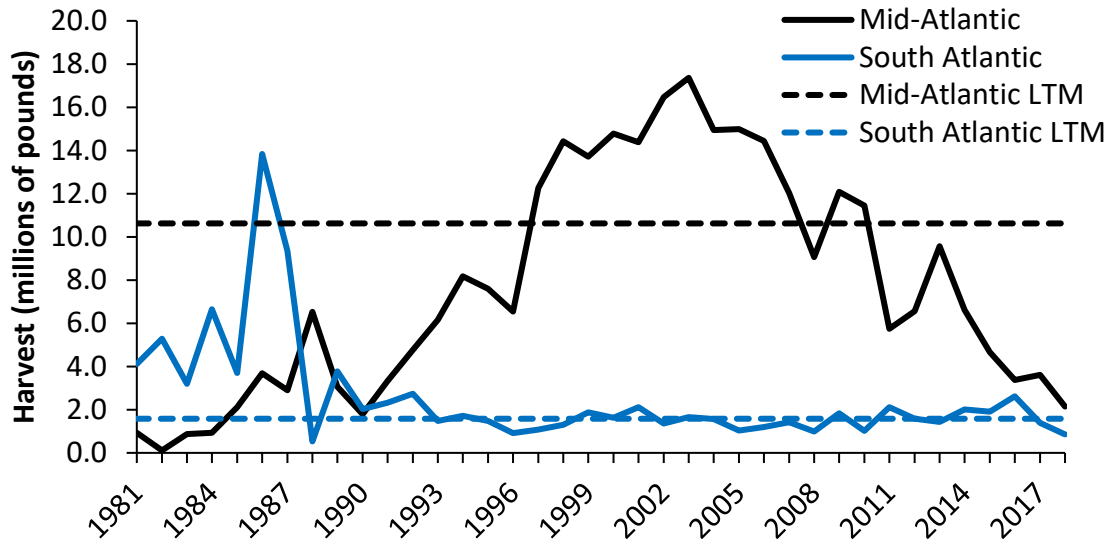


Figure A2. Recreational harvest and the LTM harvest for 2002-2012 in the Mid-Atlantic (NJ-VA) and South Atlantic (NC-FL) regions.

Abundance Indices

Mid-Atlantic

The Northeast Fishery Science Center (NEFSC) Multispecies Bottom Trawl Survey adult index has declined from its peak years (2007-2009), and general index levels have been below the LTM for the last three years.

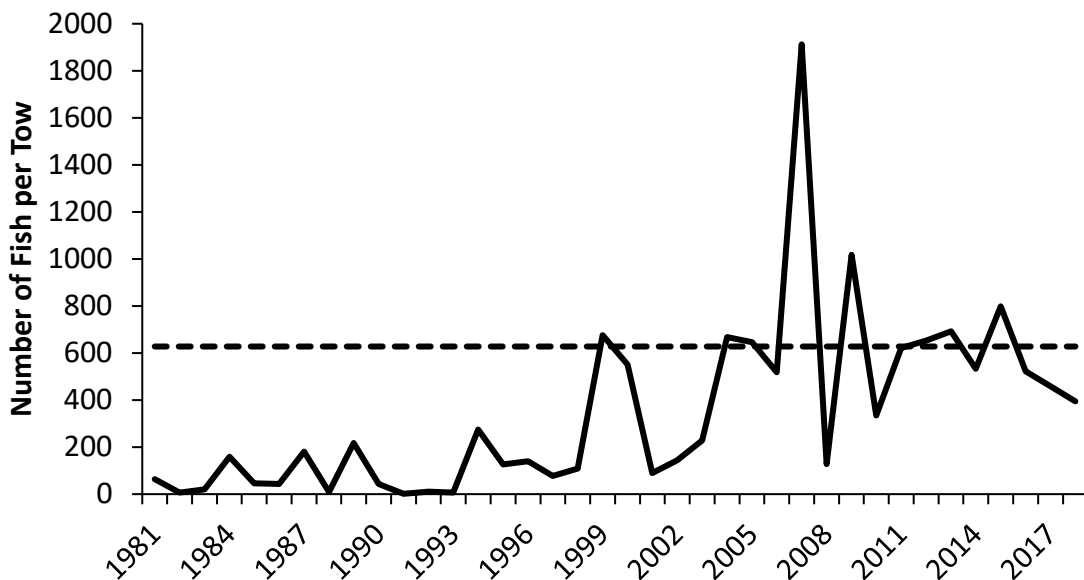


Figure A3. NEFSC adult index (solid line) and the LTM adult index for 2002-2012 (dashed line).

The Chesapeake Bay Multispecies Monitoring and Assessment Program (ChesMMAP) adult index shows a general long-term decline since the series peak in 2004.

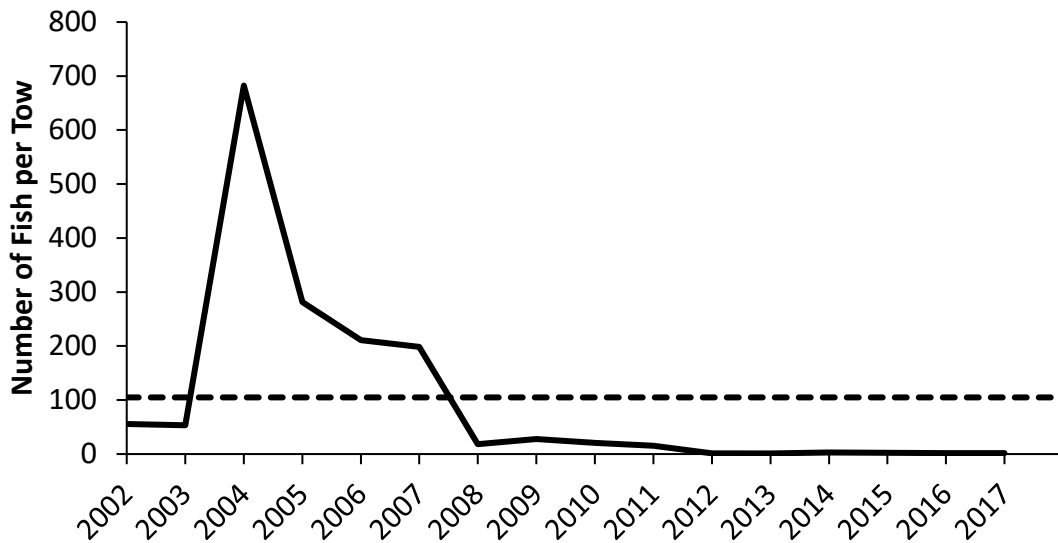


Figure A4. ChesMMAP adult index (solid line) and the LTM adult index for 2002-2012 (dashed line).

South Atlantic

The Southeast Area Monitoring and Assessment Program (SEAMAP) adult index shows a general increasing trend since the early 2000s.

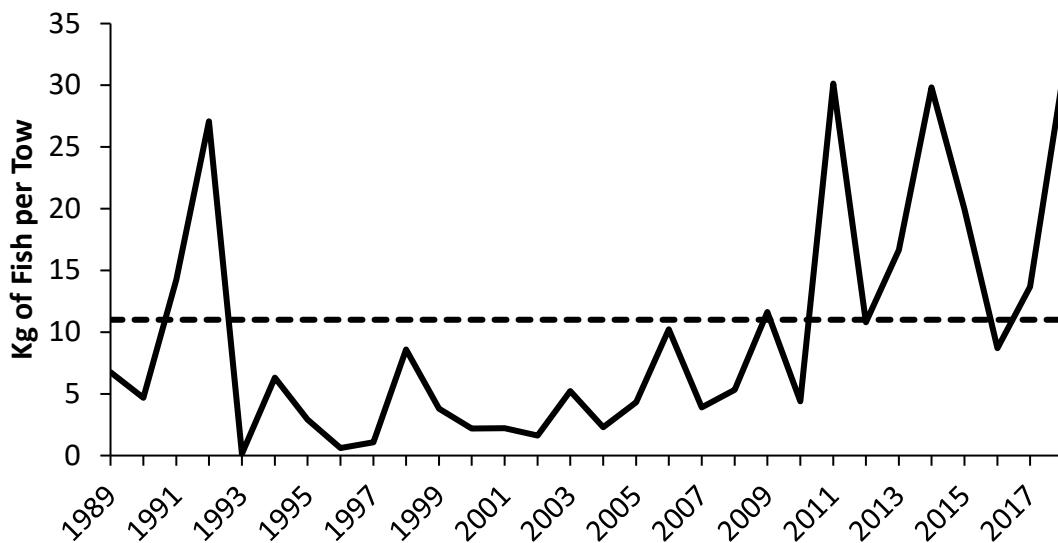


Figure A5. SEAMAP adult index (solid line) and the LTM adult index for 2002-2012 (dashed line).

The South Carolina Department of Natural Resources (SCDNR) Trammel Net Survey index shows a general declining trend since 2009 with annual values above and below the LTM.

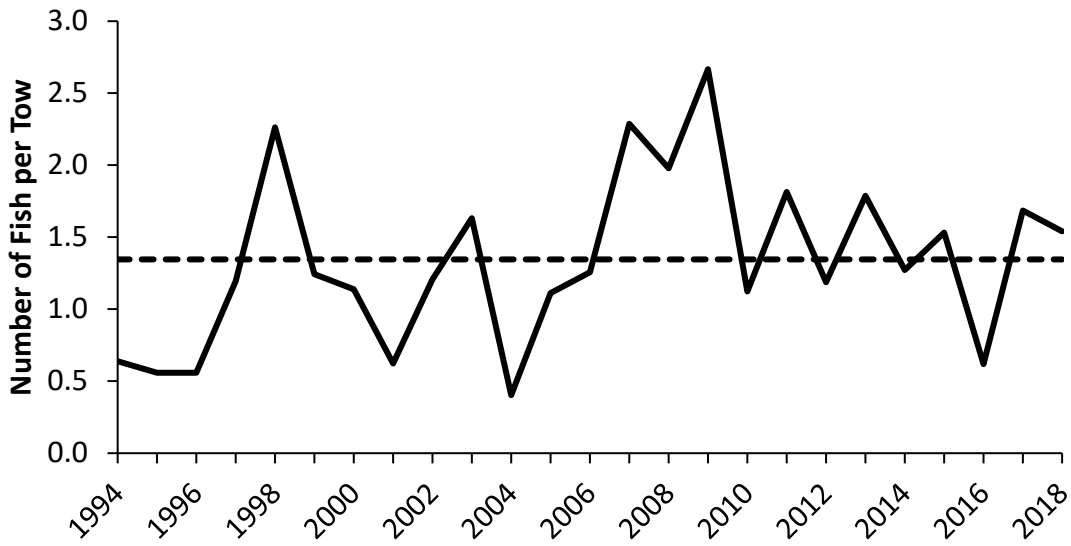


Figure A6. SCDNR adult index (solid line) and the LTM adult index for 2002-2012 (dashed line).