Atlantic States Marine Fisheries Commission

Sciaenids Management Board

August 4, 2022
8:00 – 9:30 a.m.
Hybrid Meeting

Draft Agenda

The times listed are approximate; the order in which these items will be taken is subject to change; other items may be added as necessary.

1. Welcome/Call to Order *(C. Batsavage)* 8:00 a.m.

2. Board Consent 8:00 a.m.
   - Approval of Agenda
   - Approval of Proceedings from May 2022

3. Public Comment 8:05 a.m.

4. Review Traffic Light Analysis for Spot and Atlantic Croaker *(D. Franco/H. Rickabaugh)* **Possible Action** 8:15 a.m.
   - Technical Committee Recommendations
   - Discuss Spot Addendum III Management Measures

5. Review Development of a Spatial Model of Spot Abundance and Mortality (*R. Latour*) 8:55 a.m.

6. Consider Atlantic Croaker and Red Drum Fishery Management Plan Reviews and State Compliance for the 2021 Fishing Year (*T. Bauer*) **Action** 9:05 a.m.

7. Progress Update on 2022 Black Drum Benchmark Stock Assessment *(J. Kipp)* 9:20 a.m.

8. Elect Vice-Chair *(C. Batsavage)* **Action** 9:25 a.m.

9. Other Business/Adjourn 9:30 a.m.

The meeting will be held at The Westin Crystal City (1800 Richmond Highway, Arlington, VA; 703.486.1111) and via webinar; click here for details

MEETING OVERVIEW

Sciaenid Management Board Meeting
Thursday, August 4, 2022
8:00 a.m. – 9:30 a.m.
Hybrid Meeting

Chair: Chris Batsavage (NC) Assumed Chairmanship: 02/22	Technical Committee Chairs: Black Drum: Harry Rickabaugh (MD) Atlantic Croaker: Dawn Franco (GA) Red Drum: Lee Paramore (NC) Spot: Harry Rickabaugh (MD)	Law Enforcement Committee Representative: Capt. Chris Hodge (GA)
Vice Chair: Vacant	Advisory Panel Chair: Craig Freeman (VA)	Previous Board Meeting: May 2, 2022
Voting Members: NJ, DE, MD, PRFC, VA, NC, SC, GA, FL, NMFS (10 votes)		

2. Board Consent

- Approval of Agenda
- Approval of Proceedings from May 2022

3. Public Comment – At the beginning of the meeting public comment will be taken on items not on the agenda. Individuals that wish to speak at this time must sign-in at the beginning of the meeting. For agenda items that have already gone out for public hearing and/or have had a public comment period that has closed, the Board Chair may determine that additional public comment will not provide additional information. In this circumstance the Chair will not allow additional public comment on an issue. For agenda items that the public has not had a chance to provide input, the Board Chair may allow limited opportunity for comment. The Board Chair has the discretion to limit the number of speakers and/or the length of each comment.

4. Review Traffic Light Analysis (TLA) for Spot and Atlantic Croaker (8:15-8:55 a.m.) Possible Action

Background

- The Traffic Light Analyses are updated annually for both spot and Atlantic croaker to assess changes to the population in non-benchmark stock assessment years.
- The 2020 TLA triggered management action at the level of moderate concern. Addendum III states management measures set in response to any trigger will remain in place for at least two years for spot (2021-2022) and three years for Atlantic croaker (2021-2024), after which management will be reevaluated based on the composite regional abundance characteristics. (**Supplemental Materials**). Per the Addendum, spot measures are due to be reevaluated prior to the 2023 fishing year.
- For the second year in a row, multiple surveys had missing data, so not all analyses could be run. The Technical Committee has made recommendations on how to proceed (**Supplemental Materials**).

Presentations

- Review of 2022 Traffic Light Analyses of the 2021 fishing year for Atlantic Croaker and Spot by D. Franco and H. Rickabaugh.

Board actions for consideration at this meeting

- Consider Spot Addendum III management measures

5. Review Development of a Spatial Model of Spot Abundance and Mortality (8:55-9:05 a.m.)

Background

- Drs. Mike Wilberg (Chesapeake Biological Laboratory) and Rob Latour (Virginia Institute of Marine Science) are leading a research project to estimate fish abundance and mortality rates in specific regions using a spatial model.
- The Technical Committee met in May to receive a request from Drs. Wilberg and Latour for spot to be one of the focus species in the project. The TC foresaw no issues with providing the required confidential data from each state to develop the model and expressed support for the project.
- This research project will be separate from but occur in conjunction with the upcoming spot 2024 benchmark stock assessment.

Presentations

- Overview of the Development of a Spatial Model of Spot Abundance and Mortality by R. Latour.

6. Consider Atlantic Croaker and Red Drum Fishery Management Plan Reviews and State Compliance for the 2021 Fishing Year (9:05-9:20 a.m.) Action

Background

- Red Drum state compliance reports are due on July 1. The Red Drum Plan Review Team (PRT) has reviewed state reports and compiled the annual FMP Review. New Jersey and Delaware have requested continued *de minimis* status (**Supplemental Materials**).
- Atlantic Croaker state compliance reports are due on July 1. The Atlantic Croaker Plan Review Team (PRT) has reviewed state reports and compiled the annual FMP Review. New Jersey and Delaware requested *de minimis* status for both their recreational and commercial fisheries, and South Carolina and Georgia requested *de minimis* status for their commercial fisheries (**Supplemental Materials**).

Presentations

- 2021 FMP Reviews for Red Drum and Atlantic Croaker by T. Bauer.

Board actions for consideration at this meeting

- Consider approval of the 2021 FMP Review, state compliance reports, and New Jersey and Delaware's *de minimis* requests for Red Drum.
- Consider approval of the 2021 FMP Review, state compliance reports, and New Jersey, Delaware, South Carolina, and Georgia *de minimis* requests for Atlantic Croaker

7. Progress Update on the Black Drum Benchmark Stock Assessment (9:20-9:25 a.m.)

Background

- At the 2021 Summer Meeting, the Board approved the initiation of a Stock Assessment Subcommittee (SAS) to begin the Benchmark Stock Assessment Process for black drum.
- A black drum SAS was formed and has met several times to develop the benchmark stock assessment. A Data Workshop was held in December 2021 and a Methods Workshop was held in February 2022. The Assessment Workshop was held July 18-21, 2022.

• A peer review workshop for the black drum benchmark stock assessment is tentatively scheduled for December 2022.
Presentations • Stock assessment update by J. Kipp

8. Elect Vice-Chair (9:25-9:30 a.m.) Action

9. Other Business/Adjourn

Atlantic States Marine Fisheries Commission

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MEMORANDUM

July 25, 2022

To: **Sciaenid Management Board**

From: **Tracey Bauer, FMP Coordinator**

RE: **Discussion of the 2021 fishing year Traffic Light Analysis of spot and Atlantic croaker**

Technical Committee Attendees: Dawn Franco (Atlantic Croaker Chair, GA), Harry Rickabaugh (Spot Chair, MD), Chris McDonough (SC), Stacy VanMorter (NJ), Ingrid Braun (PRFC), Somers Smott (VA), Morgan Paris (NC), Joseph Munyandorero (FL)

Other Attendees: Ethan Simpson, Chris Batsavage

Staff: Tracey Bauer, Jeff Kipp, Kristen Anstead

This memorandum serves as a summary of the joint Spot and Atlantic Croaker Technical Committees (TCs) call on July 18, 2022. The following outlines the TCs' discussions and recommendations for the Board regarding the Traffic Light Analysis (TLA).

Background

Annually, the TLA evaluates a Mid-Atlantic and a South Atlantic harvest metric, which is a combination of commercial and recreational landings in the region. It also evaluates a Mid-Atlantic and South Atlantic adult abundance metric, which is a combination of adult indices of abundance from surveys in each region. Metrics are evaluated using a color proportion of green, yellow, or red based on comparing that year to a 2002-2012 reference period. Addendum III for each species defined 30% red as a moderate concern and 60% red as a significant concern to the fishery. Management action is triggered according to the 30% red and 60% red thresholds if both the adult abundance and harvest thresholds are exceeded in a set number of terminal years. In 2020, the TLA for the 2019 fishing year indicated that both species triggered at the 30% red threshold. State implementation plans for management measures were approved in early 2021 and all new management measures were enacted by the end of 2021. These management measures will remain in place for at least two years for spot and three years for Atlantic croaker to promote consistent measures and allow for sufficient time to evaluate population response, as per Addendum III.

Data Availability Issues

The pandemic directly impacted almost all state and federal fishery independent monitoring programs at some point during 2020. For the TLA, the impact was felt most significantly for the

larger scale regional monitoring surveys, which were not able to sample at all in 2020. The Northeast Fishery Science Center (NEFSC) Multispecies Bottom Trawl Survey did not run in 2020, and is one of two surveys that makes up the Mid-Atlantic abundance index for both species. The South Atlantic abundance indices for both species are based partially on the Southeast Area Monitoring and Assessment Program (SEAMAP), which also did not run in 2020 or spring 2021. The North Carolina Division of Marine Fisheries Pamlico Sound Survey P195 did not complete sampling of all stations in 2020 or 2021.

Another important fishery independent survey to the TLAs for both species is the Chesapeake Bay Multispecies Monitoring and Assessment Program (ChesMMAP). ChesMMAP did not have available data for 2019, 2020, or 2021 due to lack of calibration factors from a vessel and gear change that occurred in 2019. However, it is anticipated that calibrated data should be available by summer 2023 for all impacted years.

Both the Mid-Atlantic and South Atlantic adult abundance composite indices could not be calculated for 2020 and 2021 due to the missing data for both species.

Recommendation

Addendum III states that because management measures enacted would impact the harvest composite indices, only the adult abundance composite indices can be used to either trigger additional management measures or relax measures. However, due to missing data, updated adult abundance composite indices for the Mid-Atlantic and South Atlantic for both species could not be calculated and are undetermined. While the composite harvest metrics could not be used for determining status change, it is noted that there was a little to no reduction in the proportion of red in both regions for spot, and a slight increase in the proportion of red for Atlantic croaker in both regions.

The TCs previously determined 2021 was the first year management measures were in place. The measures must be in place for at least two years for spot (2021-2022) and three years for Atlantic croaker (2021-2023) before management can be reevaluated. Therefore, spot management is due to be reevaluated this year for any potential changes in management in 2023. With both abundance composite indices unknown due to missing data in multiple years, a determination of whether or not the spot TLA in either region exceeded the 60% threshold or fell below the 30% threshold cannot be made. However, the fishery independent indices that were available were examined for any concerning trends. The NEFSC survey, used for the Mid-Atlantic, shows increasing spot abundance in the past few years and no red proportions in the last five years. When the Mid-Atlantic abundance composite was generated using the NEFSC survey and NEAMAP in place of ChesMMAP, there was no red in any of the last three years. In the South Atlantic, the NCDMF P195 survey exceeded the 30% threshold only once in the last three years. Due the missing fishery independent survey data and the lack of concerning trends in the data that were available, the Spot TC recommended that any determination on the spot TLA should wait until 2023 when there is expected to be complete data from all surveys again.

As per Addendum III, Atlantic croaker management measures do not need to be reevaluated for another year. Similar to spot, it is unknown if the adult abundance metrics exceeded the 60% threshold thereby triggering elevated management measures for Atlantic croaker. However, the fishery independent indices that were available were examined for any concerning trends. The NEFSC survey, used for the Mid-Atlantic, shows increasing abundance in the past two years. In the South Atlantic, the SC Trammel survey exceeded the 30% threshold only once in the last six years with increasing abundance in the past two years. Therefore, the TC recommends maintaining management enacted in 2021.

The TCs will be able to revisit the Atlantic croaker and spot composite abundance indices for the 2023 TLA, as all previously disrupted surveys have resumed and ChesMMAP calibrated data are expected to be available for all impacted years.

For more information, please contact Tracey Bauer, Fishery Management Plan Coordinator, at 703.842.0723 or tbauer@asmfc.org.

ATLANTIC STATES MARINE FISHERIES COMMISSION

2022 TRAFFIC LIGHT ANALYSIS REPORT FOR SPOT (*Leiostomus xanthurus)*

2021 Fishing Year

Prepared by the Technical Committee
Drafted July 2022

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

EXECUTIVE SUMMARY

Background

The purpose of this report is to evaluate the current status of spot using the annual Traffic Light Analysis (TLA). Spot is managed under Addendum III (2020) which outlined the population characteristics evaluated, management triggers, and management responses. Annually, the Technical Committee (TC) conducts a TLA to evaluate a Mid-Atlantic and a South Atlantic harvest metric, combining commercial and recreational landings in the region. The TC also evaluates a Mid-Atlantic (NJ-VA) and South Atlantic (NC-FL) abundance metric, combining indices of abundance from surveys in the region. Each metric is evaluated using a color proportion of green, yellow, or red based on comparing that year to a 2002-2012 reference period. Addendum III defined 30% red as a moderate concern and 60% red as a significant concern to the fishery. Management action is triggered according to the 30% red and 60% red thresholds if both the adult abundance and harvest thresholds are exceeded in any two of the three terminal years.

Data Availability Issues

There have been several data availability issues in recent years due to the COVID-19 pandemic and other factors. The pandemic caused some data gaps in 2020 which are detailed in the 2021 TLA report. The Mid-Atlantic abundance index is based on the Chesapeake Bay Multispecies Monitoring and Assessment Program (ChesMMAP) and the Northeast Fishery Science Center (NEFSC) Multispecies Bottom Trawl Survey. ChesMMAP has not had available data for 2019-2021 due to lack of calibration factors from a change in survey methodology. NEFSC's survey did not operate in 2020 but did operate in 2021. Because of the missing survey data in the Mid-Atlantic region, the NorthEast Area Monitoring and Assessment Program (NEAMAP) was evaluated for trends in the region despite it not being accepted for use in the TLA due to having a shorter time series (2007-2021) that does not include the reference period (2002-2012). The South Atlantic abundance index is based on the North Carolina Division of Marine Fisheries Pamlico Sound Survey, which was not able to sample all stations in 2020 and 2021, and the Southeast Area Monitoring and Assessment Program (SEAMAP) Coastal Trawl Survey which did not operate in 2020 and the spring of 2021. Therefore, both the Mid-Atlantic and South Atlantic abundance metrics continued to have data availability issues in 2021.

2021 Harvest Metrics

The Mid-Atlantic harvest metric did not exceed the red threshold at 30% in two of the three terminal years in 2021. The South Atlantic harvest metric did exceed the red threshold at 30% in all three terminal years in 2021. The harvest metrics in 2021 cannot be used as a trigger mechanism since they represent a year with catch restrictions in place.

2021 Abundance Metrics

These metrics could not be run due to missing 2020 and 2021 data. For the Mid-Atlantic, the only survey available in 2021 under the current TLA guidelines (2002-2012 reference period) was the NEFSC. The NEFSC survey and the NEAMAP survey, which was also active in 2021, did not exceed the 30% red threshold. For the South Atlantic, survey data for two of the three terminal years were not available and therefore it is unknown if this metric triggered.

Conclusions

Harvest exceeded the 30% threshold in South Atlantic in all three terminal years but only once out of the past three years in the Mid-Atlantic. Harvest restrictions were in place in 2021 and so the harvest metric cannot be used as a trigger mechanism in that year. The abundance composite metrics are unknown for the Mid-Atlantic and South Atlantic due to missing data, and so it could not be determined if further management would be triggered.

Addendum III requires that the management actions taken in 2021 remain in place for a minimum of two years (through and including the 2022 season) before evaluation and that action be re-considered in 2022. However, the continued impacts of missing data make evaluating the effects of the 2021 management actions difficult. Therefore, the TC recommends maintaining management actions in their current state and waiting to evaluate their effects until 2023 when it is anticipated all survey data will be available again.

1 INTRODUCTION

Spot is managed under the Omnibus Amendment for Spot, Spotted Seatrout, and Spanish Mackerel (2011), Addendum II (2014), and Addendum III (2020). The Omnibus Amendment updates all three species plans with requirements of the Atlantic States Marines Fisheries Commission's (ASMFC) Interstate Fisheries Management Program (ISFMP) Charter. The benchmark stock assessment for spot in 2017 was not recommended for management use due to uncertainty in biomass estimates from conflicting signals among abundance indices and catch time series, as well as sensitivity of model results to assumptions and model inputs.

Previously, in the absence of a coastwide stock assessment, the South Atlantic Board (SAB) approved Addendum II to the Spot Fishery Management Plan (FMP) in 2014. The Addendum established the use of a Traffic Light Analysis (TLA), similar to that used for Atlantic croaker, to evaluate fisheries trends and develop state-specified management actions (e.g., bag limits, size restrictions, time and area closures, and gear restrictions) when harvest and abundance thresholds are exceeded for two consecutive years. The TLA is a way to incorporate multiple data sources (both fishery -independent and -dependent) into an easily understood metric for management advice. It is often used for data-poor species, or species which are not assessed on a frequent basis. The name comes from assigning a color (red, yellow, or green) to categorize relative levels of indicators on the condition of the fish population (abundance metric) or fishery (harvest metric). For example, as harvest or abundance increase relative to their long-term mean, the proportion of green in a given year will increase and as harvest or abundance decrease, the amount of red in that year becomes more predominant. The TLA improves the management approach as it illustrates long-term trends in the stock and includes specific management recommendations in response to declines in the stock or fishery. Under Addendum II, state-specific management action would be initiated when the proportion of red exceeds specified thresholds (30% or 60%), for both harvest and abundance, over two consecutive years.

Starting in the late 2000s, there were inconsistent signals in the data used to examine the resource. 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. In February 2020, the SAB approved Addendum III to the Spot FMP. Addendum III addressed these issues by modifying the TLA to better reflect stock characteristics and identify achievable management actions based on stock conditions.

Addendum III incorporated the use of a regional approach to better reflect localized fishery trends and changed the TLA to trigger management action if two of the three most recent years of characteristics exceed threshold levels. These changes allow the TLA to better detect population and fishery declines. Addendum III also defined management responses for the

recreational and commercial fisheries and a method for evaluating the population's response to TLA-triggered management measures.

The following changes were incorporated into the TLA by Addendum III:

- Incorporation of indices from the Chesapeake Bay Multispecies Monitoring and Assessment Program (ChesMMAP) and the North Carolina Division of Marine Fisheries (NCDMF) Pamlico Sound Survey (Program 195) into the adult composite characteristic index, in addition to the currently used indices from the Northeast Fisheries Science Center (NEFSC) Multispecies Bottom Trawl Survey and the South Atlantic component of the Southeast Area Monitoring and Assessment Program (SEAMAP).
- 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 1+) individuals caught by each survey.
- 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 NCDMF Program 195 and SEAMAP surveys will be used to characterize abundance south of the border.
- Change/establish the reference time period for all surveys to be 2002-2012.
- Change the triggering mechanism to the following: Management action will be triggered according to the current 30% and 60% red thresholds if both the abundance and harvest thresholds are exceeded in any two of the three terminal years.

Addendum III also established a Spot Technical Committee (TC) with the ability to alter the TLA as needed to best represent trends in spot 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 was necessary because of the change to the management-triggering mechanism. The TC will evaluate state implementation of management responses triggered through the TLA. Since the implementation of Addendum III, spot management has been moved to the newly formed Sciaenids Management Board.

In 2020, the TLA for spot had red proportions that exceeded the threshold of 30% for the period of 2017-2019 in both harvest composite characteristics for the Mid-Atlantic and South Atlantic. Exceeding the 30% threshold represents moderate concern to the fishery and initiated a moderate management response. All non-*de minimis* states were required to institute a recreational bag limit of no more than 50 spot. States with more restrictive measures in place were encouraged to maintain those measures. For commercial fisheries, states had to set a regulation that, if applied to the state's 2010-2019 average commercial harvest, would have produced at least a 1% reduction. States established different measures by trip limits or season modifications, as long as measures implemented were quantifiable and are projected to achieve this 1% reduction. All states have submitted state implementation plans to meet required restrictions on recreational and commercial management measures. Addendum III states these management measures must be in place for at minimum two years, after which management will be reevaluated based on the composite regional abundance characteristics.

The current harvest composite index may be affected by these new management measures and thus cannot be considered when determining if management action is necessary.

In addition to triggering management, the COVID-19 pandemic occurred in 2020, which had far reaching impacts including limited or no sampling in state and federal fishery-independent monitoring programs. For the TLA, the impact was felt most significantly for the larger scale regional monitoring surveys (NEFSC groundfish survey and the SEAMAP survey) which were not able sample at all in 2020. In 2021, the only survey that was directly impacted by COVID was SEAMAP which could not complete the spring 2021 cruise, but was able to finish the full summer and fall cruises. Additionally, the ChesMMAP survey has not completed the calibration estimates for converting the index for use over the entire time series due to the vessel and gear change that occurred in 2019, and so data are unavailable from 2019-2021.

This report includes the harvest and abundance composite indices in Sections 2 and 3 which were approved in Addendum III to trigger management action. Individual TLAs for commercial and recreational harvest by region, as well as effort and discards of spot in the South Atlantic Shrimp Trawl Fishery, are described in Section 4. TLAs for each fishery-independent index that go into the abundance composite or juvenile composite are described in Section 5. The discard data and juvenile indices are included as supplementary information to be reviewed by the TC and are not considered in the trigger mechanisms. Supplemental information with NEAMAP incorporated into the Mid-Atlantic composites is provided in Section 6.

2 TRAFFIC LIGHT ANALYSIS (COMPOSITE INDICES)

2.1 Harvest Composite Characteristic Index

- The harvest (recreational and commercial landings) composite characteristic TLA showed a slight decrease in landings in 2021 for both the Mid-Atlantic and South Atlantic (Figure 1 and Figure 2).
- The composite characteristic for the Mid-Atlantic has been below the 30% red threshold for the last two years of the series (Figure 1) with an average red proportion of 23.3%. While 2021 was similar in pattern to 2020, it should not be interpreted as a trigger mechanism since catch restrictions were in place that year.
- The composite characteristic for the South Atlantic has exceeded the 30% red threshold for the last six years (Figure 2). The red proportion in exceeded the 30% threshold again in 2021. The TC cautions that the 2021 harvest composite should not be used as a trigger in the TLA since harvest restrictions were in place that year.

Figure 1. Annual TLA color proportions for harvest composite (commercial and recreational landings) in the Mid-Atlantic coast (NJ-VA) for spot from 1989-2021 using a 2002-2012 reference period.

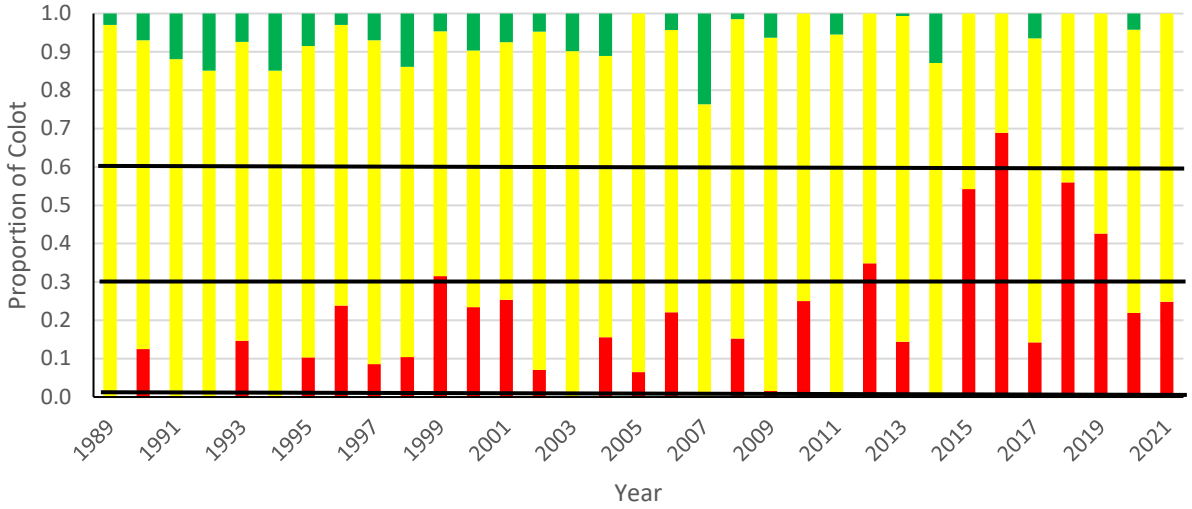
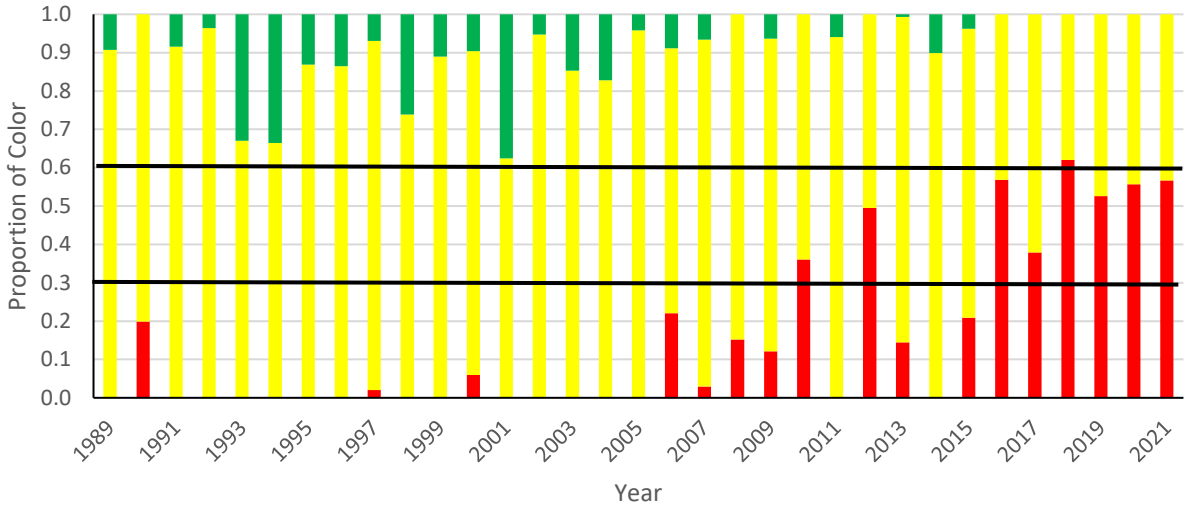


Figure 2. Annual TLA color proportions for harvest composite (commercial and recreational landings) for the South Atlantic coast (NC-FL) for spot from 1989-2021 using a 2002-2012 reference period.



2.2 Abundance Composite Characteristic Index

The abundance composite TLA index for spot is broken into two components based on age composition in each region. The adult composite index was generated from the NEFSC and ChesMMAP surveys for the Mid-Atlantic and SEAMAP and NCDMF Program 195 (Pamlico Sound Survey) in the South Atlantic since the majority of spot captured in these surveys were ages 1+. Calculating the abundance indices for the TLA has been challenging since many surveys could

not operate during COVID and ChesMMAP has not provided data since 2018. Neither the NEFSC fall ground fish survey nor the SEAMAP survey were able to complete any sampling cruises/trips in 2020. In 2021, SEAMAP also was not able to complete its spring survey sampling. The ChesMMAP survey has not completed the calibrations necessary to convert the 2019-2021 index values that would allow full use of the entire time series after the vessel and gear changes that occurred in 2019. ChesMMAP was able to sample in 2019, 2020, and 2021, so once calibration exercises are complete, the index data should be available in 2023. Therefore, at this time, ChesMMAP only goes through 2018. The NCDMF Program 195 was not able to sample all stations in 2020 and 2021 due to COVID and staffing issues. Twenty-eight of the 54 stations were sampled in 2020 and 35 of the 54 stations were sampled in 2021.

One additional survey that is available in the Mid-Atlantic is the Northeast Area Monitoring and Assessment Program (NEAMAP) which samples from Block Island Sound south to Cape Hatteras. The NEAMAP survey has been considered for use in the TLA but is currently not used due to the shorter series time frame (2007-2021) compared to all the other surveys. There is a supplemental section at the end of this report that describes the trends in the NEAMAP survey and gives composite characteristics that include NEAMAP for the Mid-Atlantic. Adult and juvenile data are presented as supplementary information only.

Additional potential indices available in the south Atlantic include the SCDNR trammel net survey (adults) and SCDNR electroshock survey (juvenile) if deemed necessary for future consideration.

2.2.1 Mid-Atlantic

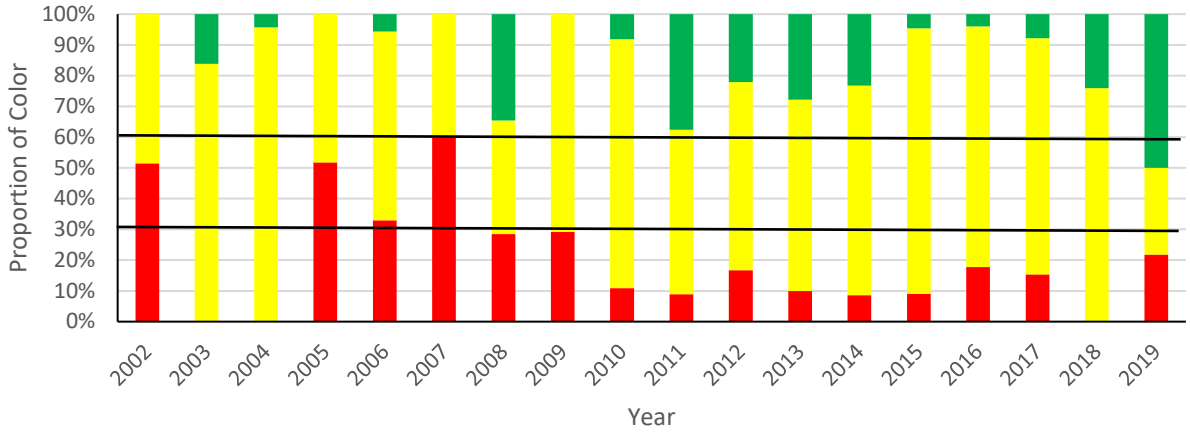
- The TLA composite characteristics for spot abundance (NEFSC and ChesMMAP surveys) in the Mid-Atlantic did not have 2019-2021 data points because the ChesMMAP survey indices were not available (Figure 3).
- While the composite adult index triggered at the 30% threshold because the red proportions in the index have exceed the 30% threshold for the previous five years up to 2018, the recent years cannot be included since the ChesMMAP data was unavailable (Figure 3). The NEFSC survey did have green proportions in 2021 (see Section 5.1) indicating increasing abundance. However, in the last few years when both surveys are available (2017-2018), NEFSC showed green proportions while ChesMMAP showed high red proportions. These contrasting conditions make it difficult to infer about the composite characteristic in recent years when ChesMMAP data are unavailable.
- Results of the TLA for the Mid-Atlantic abundance are inconclusive due to missing data.

Figure 3. Annual TLA for adult (age 1+) spot for composite characteristic of adult fishery independent surveys in the Mid-Atlantic (NJ-VA) (NEFSC and ChesMMAP) from 2002-2018 using a 2002-2012 reference period.

2.2.2 South Atlantic

- Since SEAMAP spring cruise data was not available for 2020 or 2021, the TLA composite only goes through 2019. However, the NCDMF Program 195 data was available for 2020-2021 (see Section 5.4) and did not trigger at the 30% threshold for two out of the last three years. The results of the NCDMF Program 195 data analysis should be treated with caution however, as not all stations were sampled due to COVID and staffing issues. Twenty-eight of the 54 stations were sampled in 2020 and 35 of the 54 stations were sampled in 2021.
- The South Atlantic adult abundance composite characteristic did not trigger in 2019 since none of the red proportions in recent years have exceeded the 30% red threshold (Figure 4). There has been a bit of conflict in the index with both red and green proportions in the same years. This has been due to the NCDMF Program 195 index having higher red proportions and SEAMAP having relatively high green proportions in recent years.
- Results of the TLA for the South Atlantic abundance are inconclusive due to missing data.

Figure 4. Annual TLA composite characteristic for adult spot (age 1+) in the South Atlantic (SEAMAP and NCDMF Program 195) from 2002-2019 using a 2002-2012 reference period.



3 SUMMARY

- The harvest composite TLA for spot exceeded the 30% threshold in the South Atlantic but not in the Mid-Atlantic in 2021. However, 2021 had catch restrictions in place and so the TLA harvest composite should not be interpreted as a trigger year.
- The Mid-Atlantic abundance composite characteristic did not have 2019-2021 data points, so no determination could be made.
- The South Atlantic abundance composite characteristic did not trigger at 30% in 2019. However, data from 2020 or 2021 were not complete, so no determination can be made.
- With both abundance composite TLAs unknown due to missing data, a determination of whether or not the TLA triggered in 2021 cannot be made. Any determination on the TLA should wait until 2023 when there is complete data from all surveys again.

Table 1. Traffic light metrics for the Mid- and South Atlantic regions with known and unknown values, given missing 2020 and 2021 data. Management action is triggered according to the current 30% red and 60% red thresholds if both the adult abundance and harvest thresholds are exceeded in any three of the four terminal years.

TLA Metric	Spot		
	2019	2020	2021
Mid-Atlantic Harvest	43% red	22% red	15% red*
South Atlantic Harvest	52% red	22% red	47% red*
Mid-Atlantic Adult Index	Unknown	Unknown	Unknown
South Atlantic Adult Index	50% green	Unknown	Unknown
2021 TLA Status	Status Unknown		

*Harvest metrics should not be interpreted as a trigger mechanism in the TLA since catch restrictions to lower harvest were in place for these years

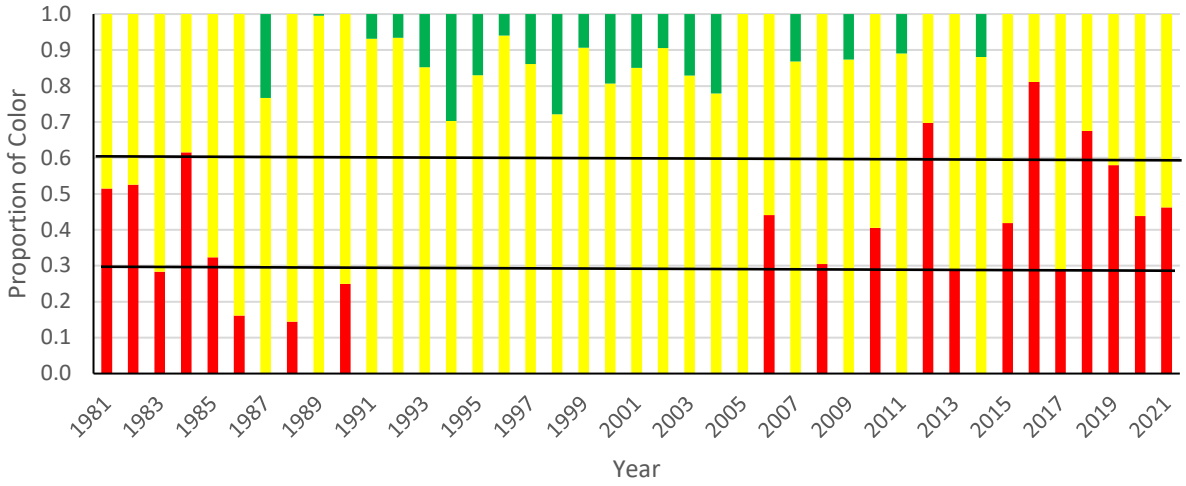
4 TRAFFIC LIGHT ANALYSIS (FISHERY-DEPENDENT)

4.1 Commercial Landings

4.1.1 Mid-Atlantic

- Commercial landings of spot on the Atlantic coast decreased 5.3% in 2021 from 2020. Long-term commercial landings are still relatively low, a trend that has been occurring since 2003.
- The proportion of red for commercial landings in the Mid-Atlantic peaked in the 1990s and early 2000s (Figure 5). Total annual landings in the Mid-Atlantic have declined 69.7% from 2004 to 2021, although there is some year-to-year variability between red and green proportions. In the last seven years the red proportion has been above the 30% threshold in all but one year.
- The commercial index's proportion of red was above the 30% threshold level in 2021 and represents the fourth year above this threshold. Several states implemented more restrictive management measures in 2021 as required by Addendum III, which may have impacted harvest.

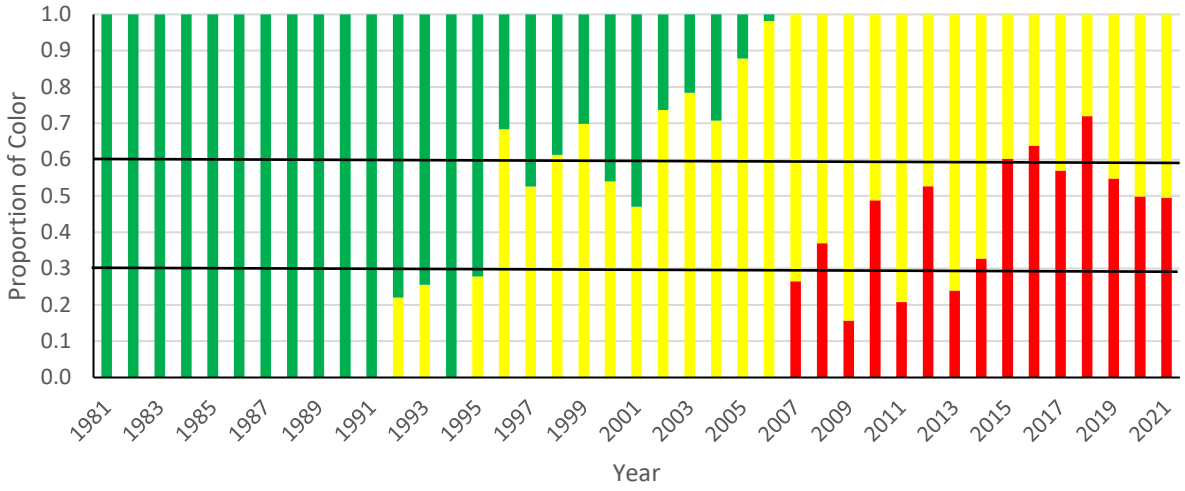
Figure 5. Annual TLA color proportions using 2002-2012 reference period for spot from commercial landings for the Mid-Atlantic (NJ-VA) coast of the US from 1981-2021.



4.1.2 South Atlantic

- In the South Atlantic, commercial spot landings were high from the 1980s through the mid-2000s (Figure 6). Commercial spot landings began to decline steadily from 2005 onward and red proportion levels have been above the 30% threshold for most years since 2010. Commercial spot landings in the south Atlantic decreased only slightly (0.97%) in 2021, but red proportion was still above the 30% threshold. Several states implemented more restrictive management measures in 2021 as required by Addendum III, which may have impacted harvest.
- The continued decline in commercial landings may be due to changes in effort in some other fisheries so it is difficult to determine the exact cause of the general decline in commercial landings in the South Atlantic. However, this trend is similar to what has been observed in the South Atlantic recreational fishery.

Figure 6. Annual TLA color proportions using a 2002-2012 reference period for spot from commercial landings from 1981-2021 for the South Atlantic (NC-FL) coast of the US.



4.2 Commercial Discards

4.2.1 South Atlantic

- Discard estimates of spot in the South Atlantic Shrimp Trawl Fishery are informed by catch rates observed during the SEAMAP survey and South Atlantic Shrimp Trawl Fishery Observer Program, and total effort of the South Atlantic Shrimp Trawl Fishery. Increases in discards could be an indicator of higher abundance of juveniles in the region, an increase in effort by the fishery, or a combination of both.
- Total effort (net hours) in the South Atlantic Shrimp Trawl Fishery declined from a time series high in 1991 to a time series low in 2005 (Figure 7). Effort then varied around an increasing trend through 2017 and was variable and lower through 2020. Effort declined slightly from 786,172 net hours in 2020 to 780,515 net hours in 2021.
- Total discards of spot in the South Atlantic Shrimp Trawl Fishery were highest during the late 1980s and early 1990s, declined to relatively low levels in the 2000s, and then increased to slightly higher levels in the 2010s (Figure 7; right). Discards were highly variable just prior to the terminal year, decreasing from one of the highest estimates in 2019 to one of the lowest estimates in 2020. Discards increased slightly from 42 million fish in 2020 to 53 million fish in 2021 and remain near time series lows.
- There were no SEAMAP tows conducted in 2020, so the estimated trend for the 2020 discard estimate relative to previous years is solely informed by South Atlantic Shrimp Trawl Fishery Observer catch rates. The observer catch rates of spot declined in 2020 relative to 2019 (Figure 8), and this decline can't by verified by SEAMAP catch rates. The SEAMAP survey did not sample in spring 2021, but began operations again during the peak of the shrimping season in July. The 2021 catch rates from both data sets show

similar declines relative to 2019. As in all years, the magnitude of the 2020 and 2021 discard estimates is informed by the observer data (magnitude of catch rates) and shrimp trawl effort data (expansion factor to expand catch rates to total discards).

- For additional information on the South Atlantic Shrimp Trawl Fishery discard estimation, please see Appendix 1 of the 2020 TLA Update Report.

Figure 7. Total net hours fished (left) and discards of spot (right) in the South Atlantic Shrimp Trawl Fishery.

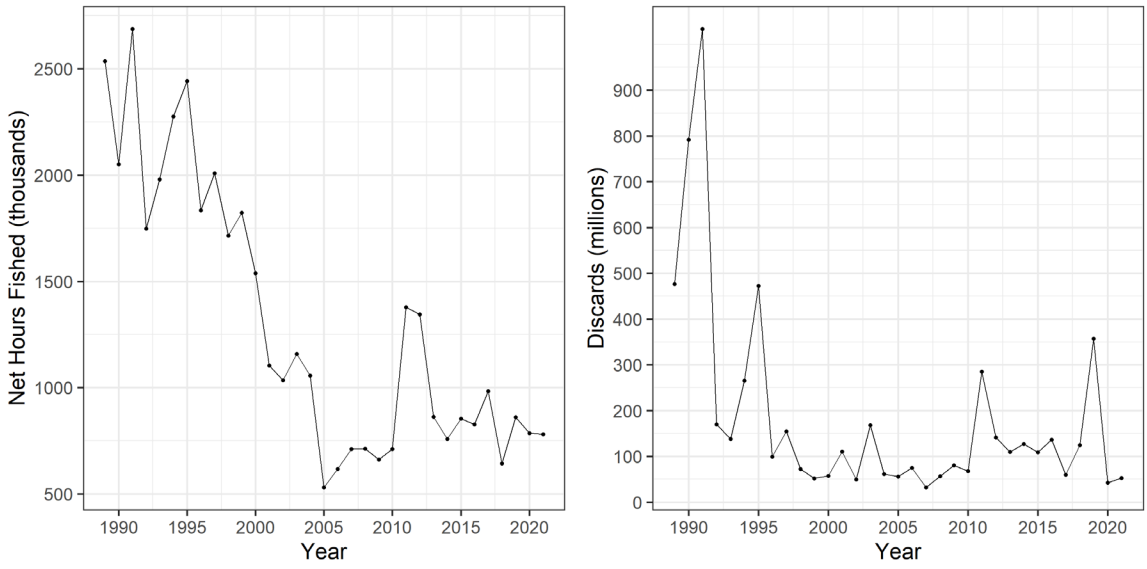
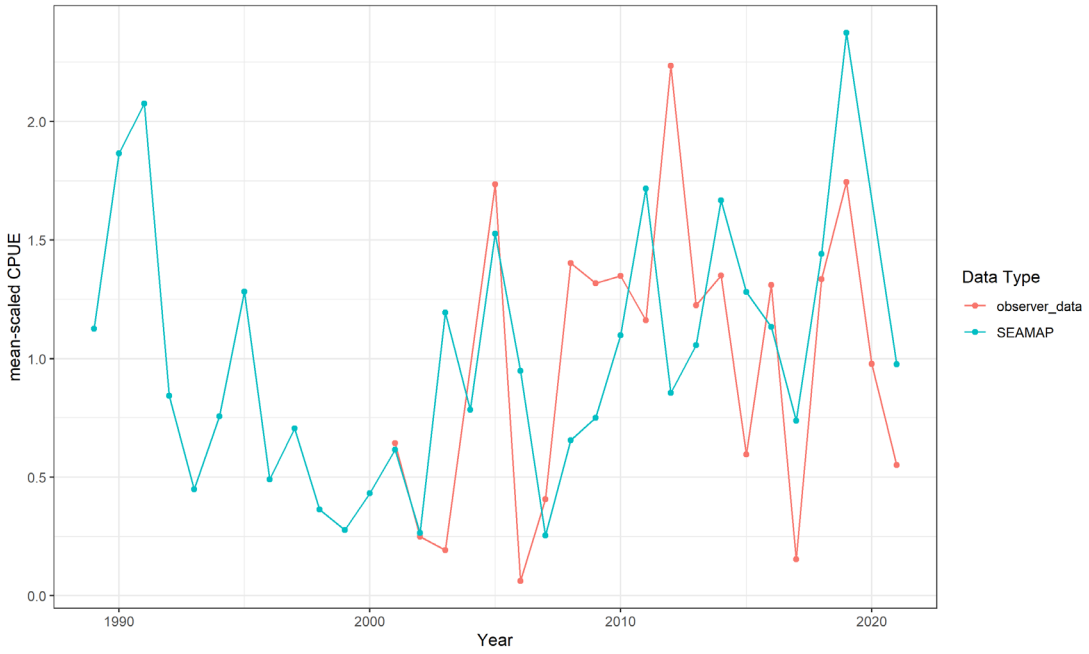


Figure 8. Comparison of spot mean-scaled catch-per-unit-effort from SEAMAP Coastal Trawl Survey data and South Atlantic Shrimp Trawl Fishery Observer data



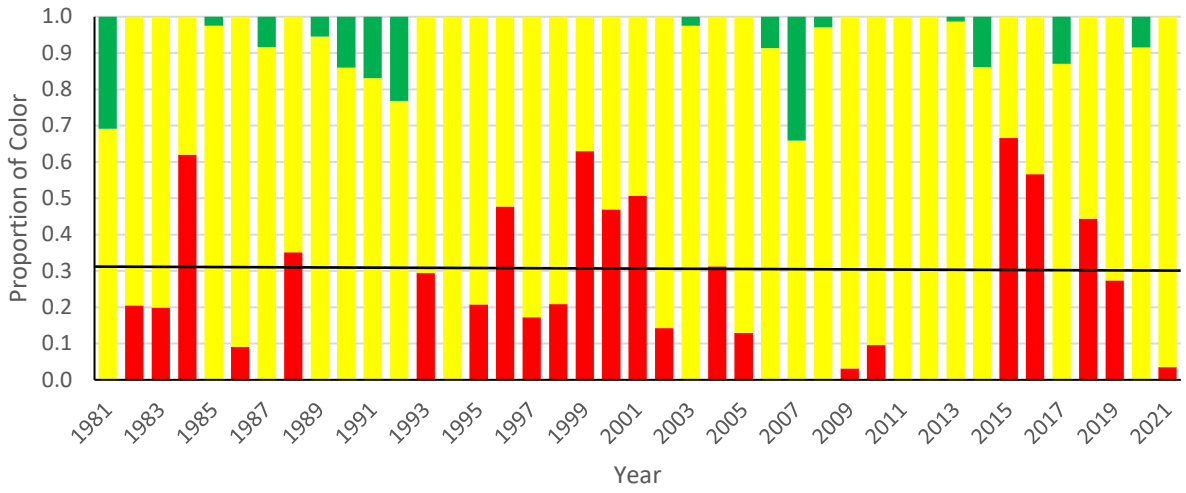
4.3 Recreational

In July 2018, the Marine Recreational Information Program transitioned from the catch estimates based on effort information from the Coastal Household Telephone Survey (CHTS) to effort information from the mail-based Fishing Effort Survey (FES). FES estimates are used in this and future reports, so recreational estimates and analyses may be different from previous years that used CHTS estimates.

4.3.1 Mid-Atlantic

- The recreational harvest of spot on the Mid-Atlantic coast decreased 23.3% in 2021 from 2020, with values of 4,235,086 pounds and 5,814,976 pounds, respectively (Figure 9). Several states implemented more restrictive management measures in 2021 as required by Addendum III, which may have impacted harvest.
- There was no red in the TLA in 2020 and a green proportion of 11.2%. The recreational TLA only exceed the 30% threshold in one of the last three years (2018; Figure 9).

Figure 9. Annual color proportions for the Mid-Atlantic (NJ-VA) coast of the US for recreationally harvested spot from 1981-2021 using a 2002-2012 reference period.



4.3.2 South Atlantic

- In the South Atlantic, recreational harvest increased 2.4% in 2021 (692,950 lbs) from 2020 (676,727 lbs). Several states implemented more restrictive management measures in 2021 as required by Addendum III, which may have impacted harvest.
- Red proportions have been above the 30% threshold since 2016 for recreational harvest (Figure 10).

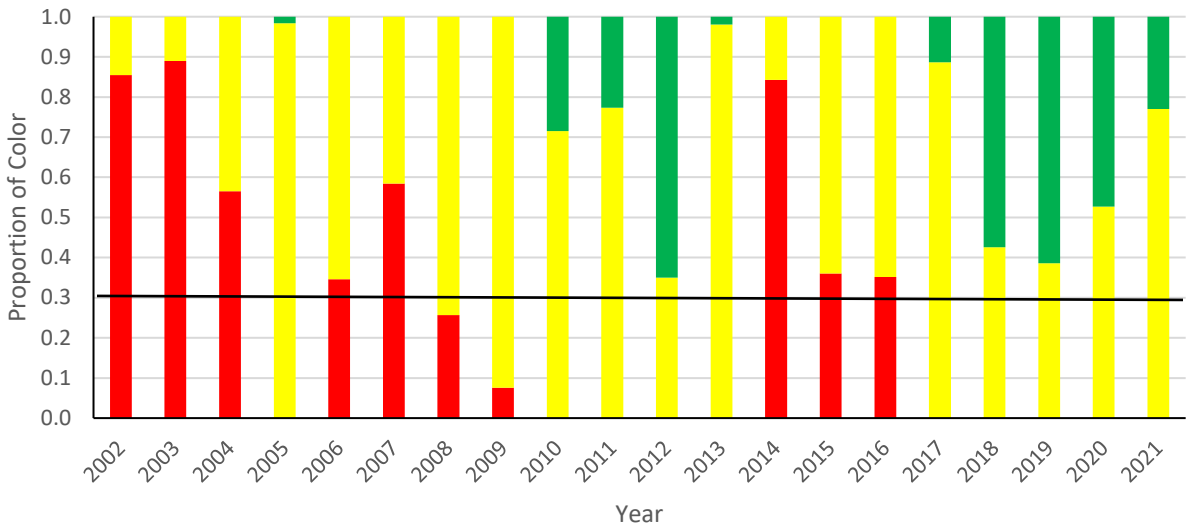
Figure 10. Annual color proportions for the South-Atlantic (NC-FL) coast of the US for recreationally harvested spot from 1981-2021 using a 2002-2012 reference period.

5 TRAFFIC LIGHT ANALYSIS (FISHERY-INDEPENDENT)

5.1 NEFSC Fall Groundfish Trawl Survey

- Since there was no sampling carried out in 2020 for the NEFSC survey, an intermediary placeholder value was estimated for 2020 (as the mean of 2018-2019 and 2021). Changes in the index are made as comparison to 2019 since that was the last year of the survey with data.
- There was no red in the TLA index for 2021, so this index did not exceed the 30% threshold (Figure 11).

Figure 11. Annual TLA color proportions for adult spot (age 1+) from Mid-Atlantic NEFSC fall groundfish trawl survey from 2002-2021 using a 2002-2012 reference period.



5.2 ChesMMAP Trawl Survey

- The ChesMMAP survey made major changes to the survey in 2019 (vessel change, gear change, altered protocols, etc.) but maintained the same sampling strata and design. Side-by-side comparison tows are being made between the new and old vessels/gears and the survey is in the process of producing conversion factors by species so that historic survey index values can be compared to ongoing survey values in the future. Since the conversion factor determination won't likely be finished until 2023, the ChesMMAP index is only available through 2018 for the adult and juvenile TLA composite characteristics.
- The juvenile spot index showed a declining trend from the late 2000s through the present (Figure 12) with high proportions of red. Red proportions exceeded the 30% threshold for all years since 2011 and exceeded the 60% threshold for six of the last eight years in the data series.
- The adult spot index also showed a similar declining trend during the same time period (2010-2018) with red proportions exceeding the 60% threshold in the terminal four years of the time series (Figure 13).
- Whether the ChesMMAP index would have exceeded either the 30% or 60% thresholds of concern is unknown due to the currently missing values for 2019-2021 (Figure 12 and Figure 13). These index values are expected to be available in 2023, but until then any estimate of whether the ChesMMAP index triggered in 2019-2021 is speculative.

Figure 12. Annual TLA color proportions for juvenile spot (age 0) from the Mid-Atlantic ChesMMAP survey from 2002-2018 using a 2002-2012 reference period.

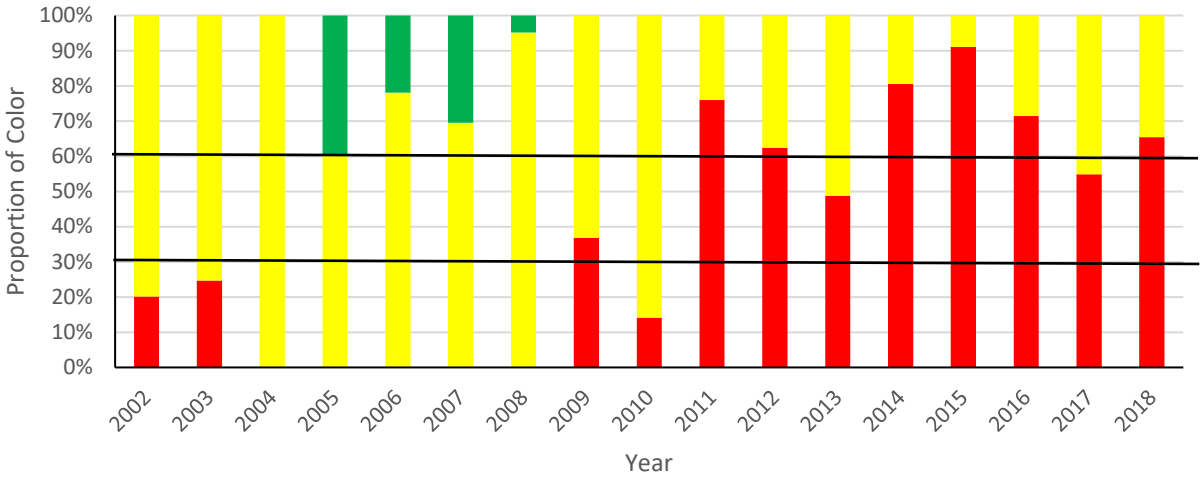
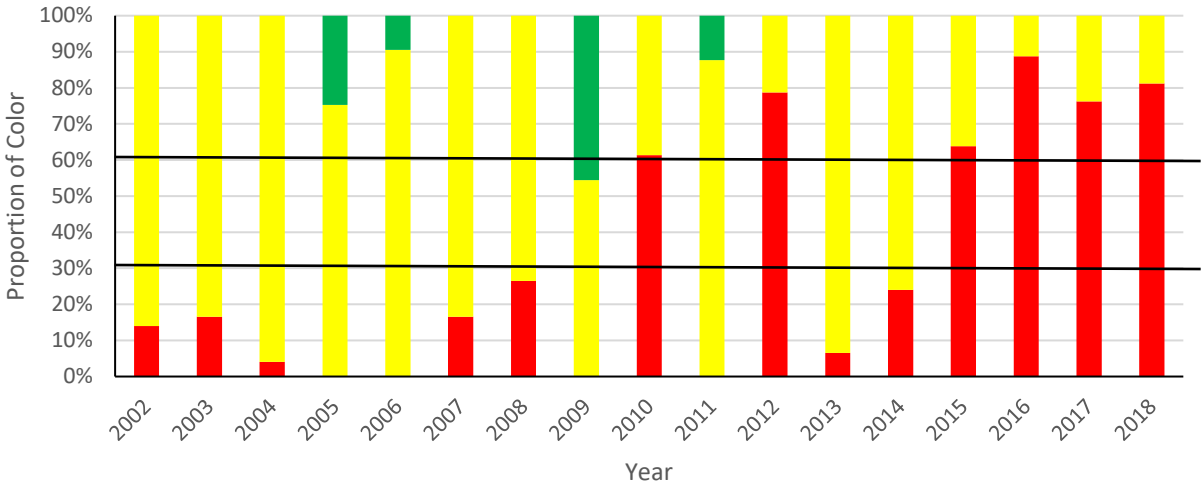


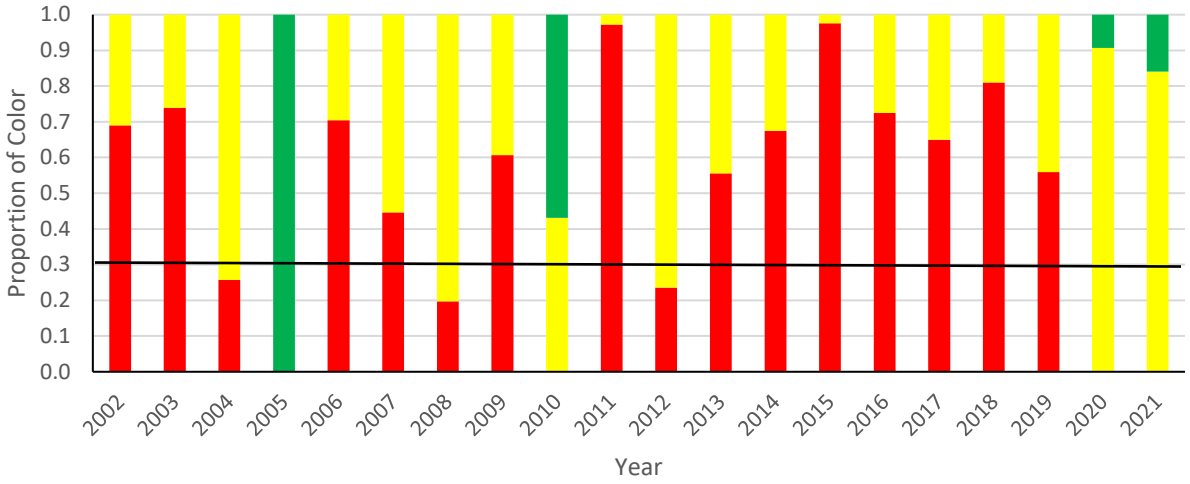
Figure 13. Annual TLA color proportions for adult spot (age 1+) from the Mid-Atlantic ChesMMAP survey from 2002-2018 using a 2002-2012 reference period.



5.3 Maryland Juvenile Fish Seine Survey

- The Maryland CPUE increased 16.9% in 2021 from 2020, and was above the long-term mean for the second year in a row (Figure 14).
- CPUE was above the long-term mean for the two terminal years, indicating annual recruitment was up in the Maryland portion of the Chesapeake Bay in 2021.
- While spot numbers were up in both 2020 and 2021, with no red portion, the index still exceeded the 30% threshold level for the 2013-2019 time period indicating there is still cause for concern for a general decline in recruitment in Maryland waters.

Figure 14. Annual TLA color proportions for the Mid-Atlantic Maryland seine survey juvenile spot (age 0) index from 2002-2021 using a 2002-2012 reference period



5.4 NCDMF Program 195 (Pamlico Sound Survey)

- The NCDMF Program 195 survey saw an increase in juveniles and a decline in adults as indicated by red proportions in both juvenile (Figure 15) and adult (Figure 16) indices.
- Juvenile spot CPUE increased in 2021 from 2020 with the red proportion exceeding the 30% threshold for the second year in a row (Figure 15).
- The adult CPUE decreased in 2021 from 2020 (Figure 16) with a red proportion of 29% in 2021.
- The results of the NCDMF Program 195 data analysis should be treated with caution, as not all stations were sampled due to COVID and staffing issues. Twenty-eight of the 54 stations were sampled in 2020 and 35 of the 54 stations were sampled in 2021.

Figure 15. Annual TLA color proportions for juvenile spot (age 0) from the South Atlantic NCDMF Program 195 Survey from 2002-2021 using a 2002-2012 reference period.

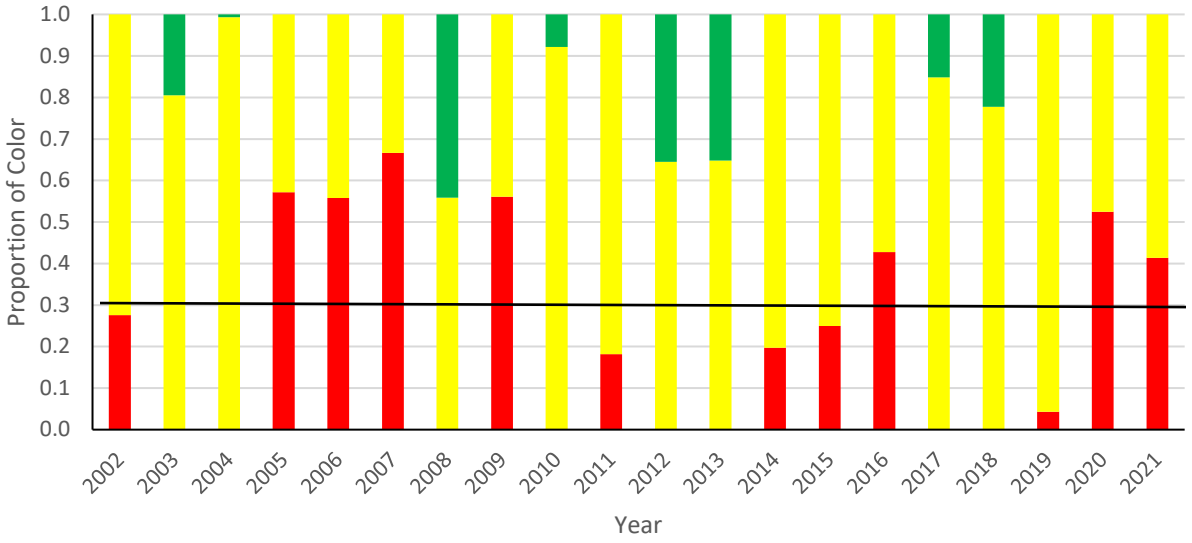
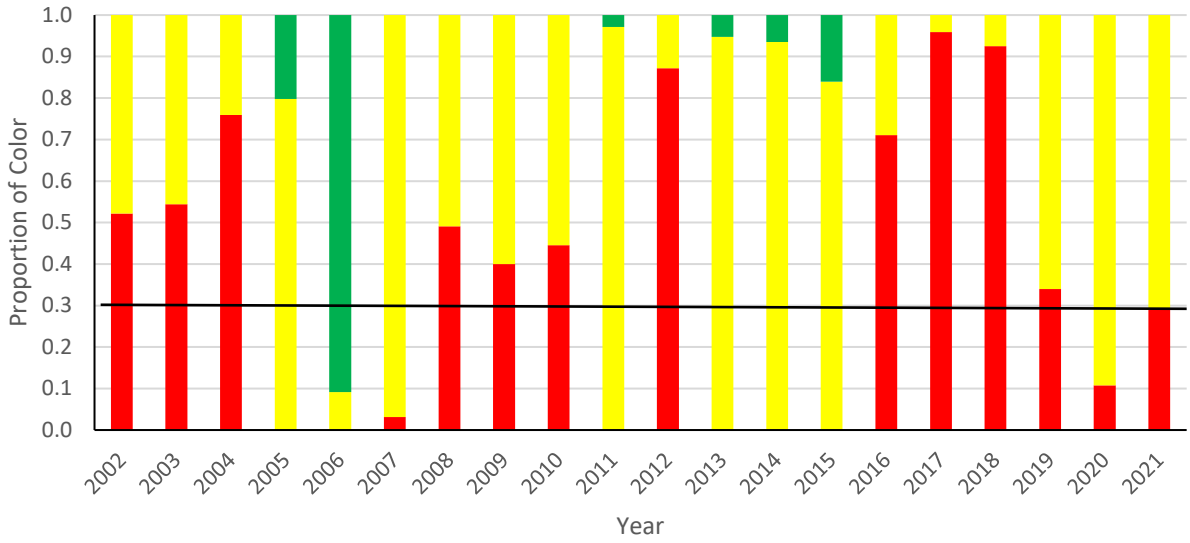


Figure 16. Annual TLA color proportions for adult spot (age 1+) from the South Atlantic NCDMF Program 195 Survey from 2002-2021 using a 2002-2012 reference period.



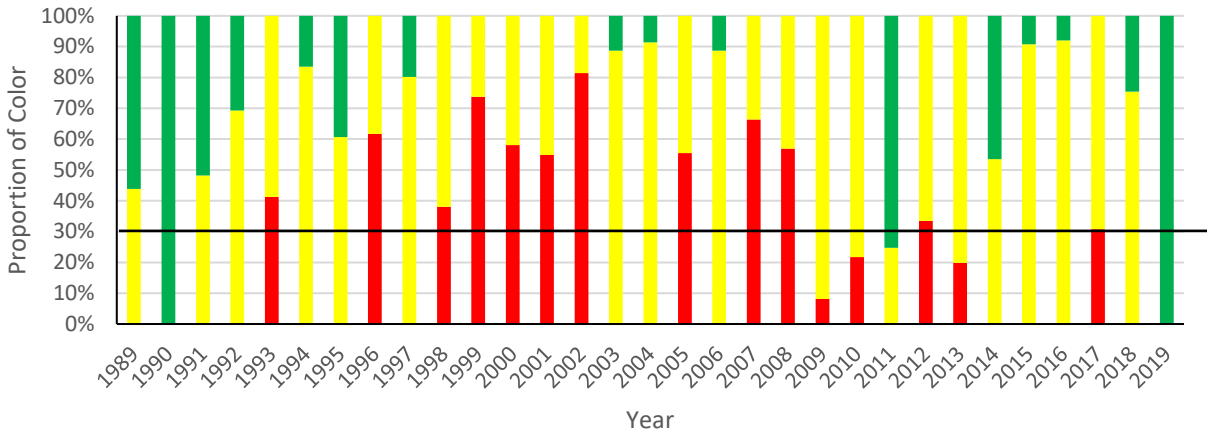
5.5 SEAMAP Trawl Survey

- There were no SEAMAP cruises in 2020 and the spring of 2021 due to COVID. As such, there was no adult TLA values for 2020 and 2021 and the index is only presented through 2019. The juvenile index (fall cruise) TLA for 2021 did occur and the missing 2020 value was imputed as an intermediary value (mean of 2018-2019 and 2021).The

SEAMAP index uses the spring season CPUE because it only catches adult spot (age 1+) during that season.

- The annual adult CPUE increased in 2019 from 2018 and was the highest value in the time series.
- The TLA index has only exceeded the 30% threshold once in the past seven years (Figure 17).

Figure 17. Annual color proportions for Adult spot (age 1+) TLA from the fall South Atlantic SEAMAP survey from 1989-2019 using a 2002-2012 reference period.

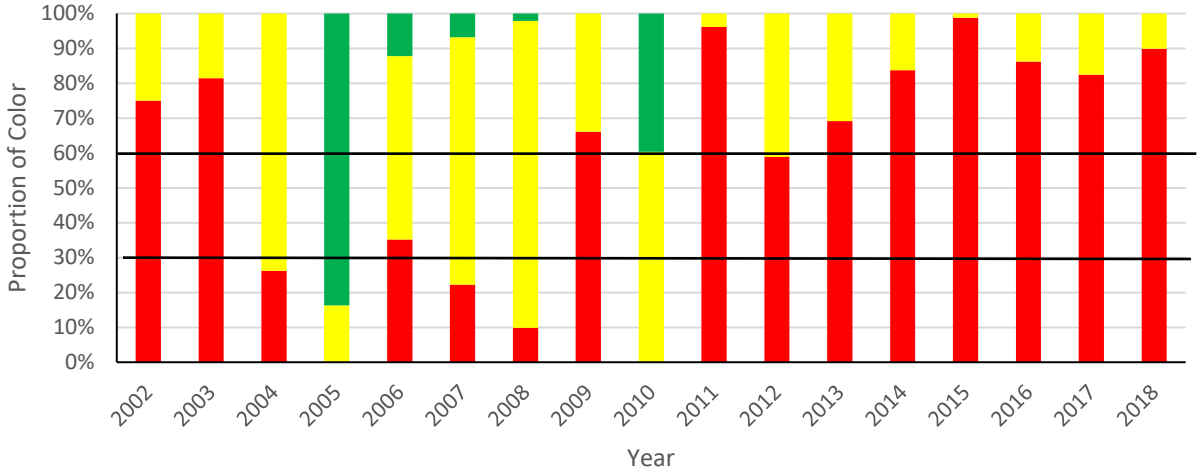


5.6 Juvenile Abundance Composite Indices

The juvenile composite index in the Mid-Atlantic was generated from the ChesMMAP and the Maryland juvenile fish seine survey. ChesMMAP has an age specific index for ages 0 which allowed its use as a juvenile index. The juvenile composite uses a terminal year of 2018, the most recent year the ChesMMAP index is available.

- The juvenile spot TLA for the Mid-Atlantic (MD survey and ChesMMAP) also showed a general decline in recruitment with very high red proportions for the last eight years (Figure 18).
- The juvenile composite index was above the 60% threshold for the past six years (Figure 18).

Figure 18. Annual TLA for juvenile (age 0) spot for composite characteristic of fishery independent suveys in the Mid-Atlantic (NJ-VA) (MD seine survey and ChesMMAP) from 2002-2018 using a 2002-2012 reference period.



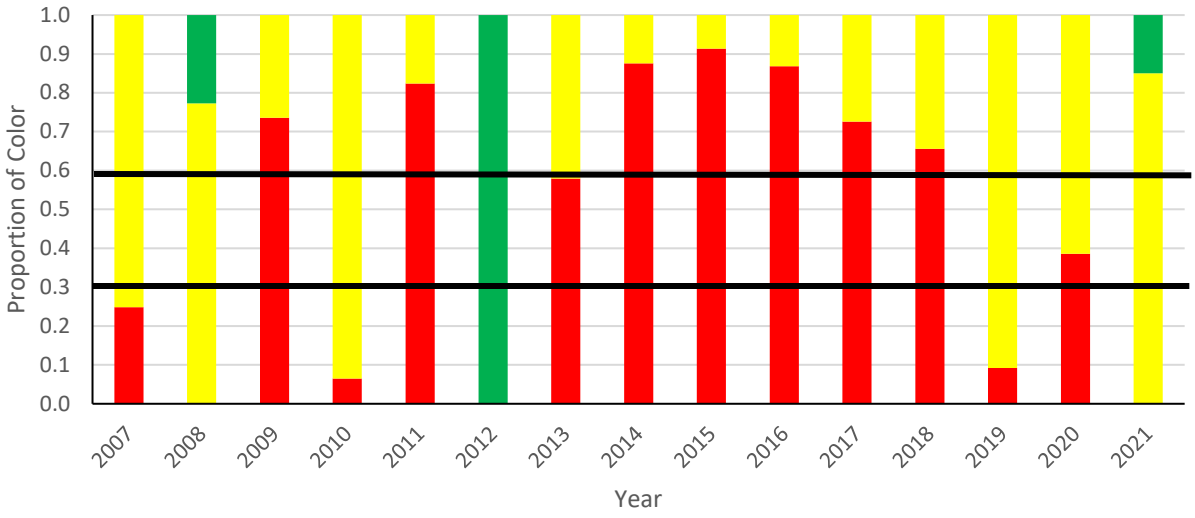
- The South Atlantic juvenile spot index (NCDMF Program 195) increased in 2021 from 2020 with the red proportion exceeding the 30% threshold for the second year in a row (Figure 15).

6 SUPPLEMENTAL MATERIALS

6.1 NEAMAP Survey

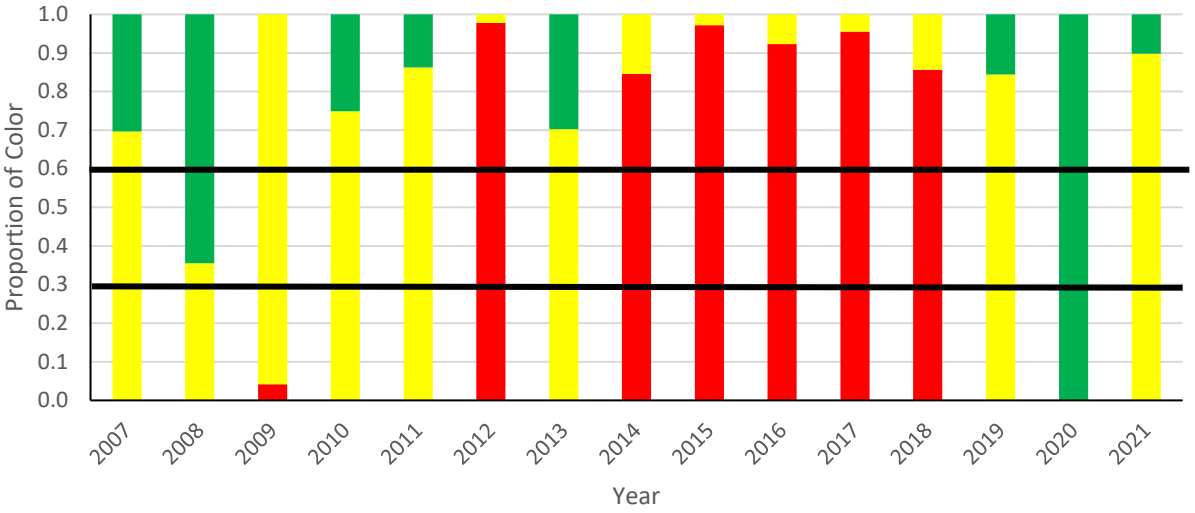
- The juvenile spot TLA index shows the evidence of low recruitment across all years except 2008, 2012, and 2021 (Figure 19). This is similar to the declining trends seen in the MD seine survey and the ChesMMAP survey across the same years.

Figure 19. Annual color proportions from TLA for juvenile (age 0) spot from the Mid-Atlantic NEAMAP survey from 2007-2021 using a 2007-2019 reference period.



- The adult spot TLA index showed a generally declining trend from 2010 through 2018 with red proportions exceeding the 60% threshold (Figure 20). However, the last three years, 2019-2021, have had no red proportions, indicating an increase from previous years.

Figure 20. Annual color proportion from TLA for adult (age 1+) spot from the Mid-Atlantic NEAMAP survey using a 2007-2019 reference period.



6.2 Composite TLA Characteristic for Mid-Atlantic including NEAMAP

In order to generate the composite TLA index that included NEAMAP in the Mid-Atlantic, the other Mid-Atlantic indices (NEFSC, ChesMMAP, and MD Seine Survey) had to be recalculated using the common time period of all three surveys (2007-2019) in order to have a common reference. Since the ChesMMAP survey was not available for 2019-2021, the juvenile composite TLA (age 0) is presented using only NEAMAP and the MD juvenile fish seine survey. Since ChesMMAP for adults (age 1+) in 2019-2021 was also not available, the adult composite TLA was calculated using NEFSC and NEAMAP only.

- The juvenile spot composite characteristic (Figure 21) showed an increase in recruitment in 2021 in the Mid-Atlantic region with green proportions from both the MD and NEAMAP surveys. The continued increase in 2021 put the composite TLA below the 30% threshold for the second year in a row since 2012.
- The adult spot composite characteristic (Figure 22) showed an increase in abundance from both surveys (NEFSC and NEAMAP).
- Neither the juvenile or adult indices tripped in either of the two terminal years presented for each TLA with two of the three terminal years well below the 30% threshold.

Figure 21. Juvenile spot (age 0) TLA composite characteristic index for the Mid-Atlantic (NJ-VA) using NEAMAP and MD Seine surveys from 2007-2021 with a 2007-2019 reference period.

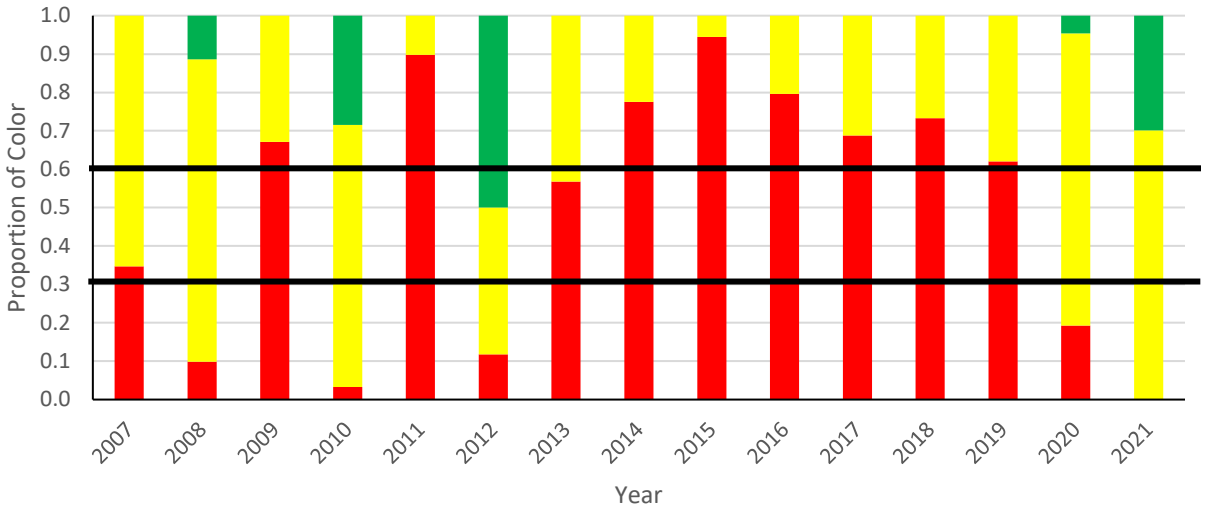
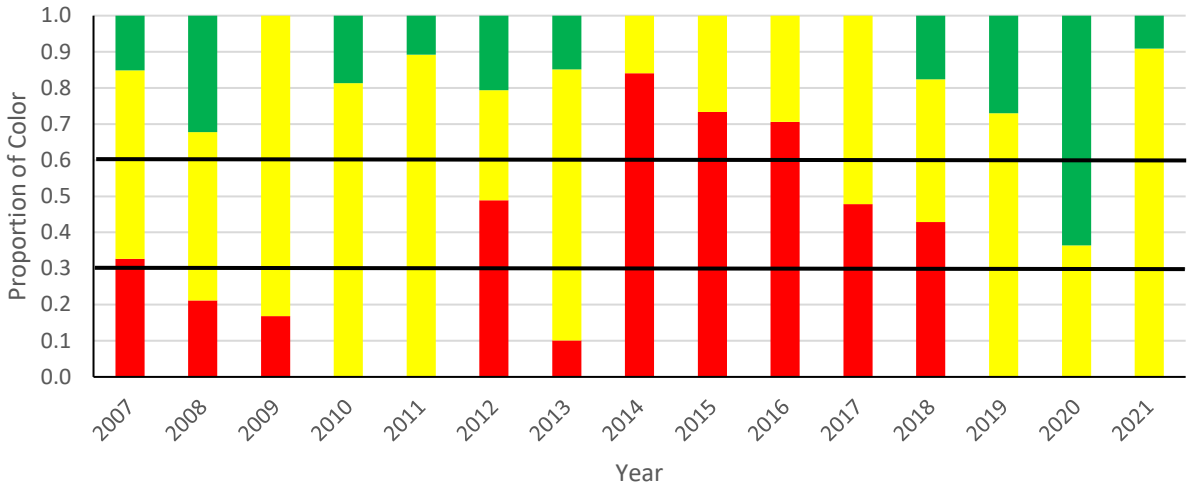


Figure 22. Adult spot (age 1+) TLA composite characteristic index for Mid-Atlantic (NJ-VA) using NEFSC and NEAMAP surveys from 2007-2021 with a 2007-2019 reference period.



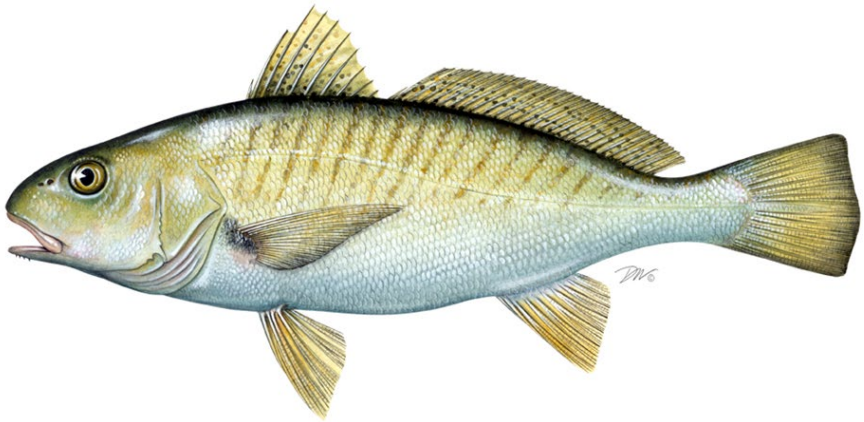
6.3 Summary

The addition of the NEAMAP survey generally supported the increasing abundance trends in the last couple of years in the fishery-independent surveys (NEAMAP and NEFSC). The TC might consider adding the NEAMAP survey to the Traffic Light Analysis before the next scheduled benchmark assessment for spot and re-evaluate all fishery independent surveys for use in the TLA.

ATLANTIC STATES MARINE FISHERIES COMMISSION

2022 TRAFFIC LIGHT ANALYSIS REPORT FOR ATLANTIC CROAKER (*Micropogonias undulatus)*

2021 Fishing Year



Prepared by the Technical Committee
Drafted July 2022

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

EXECUTIVE SUMMARY

Background

The purpose of this report is to evaluate the current status of Atlantic croaker using the annual Traffic Light Analysis (TLA). Atlantic croaker is managed under Addendum III (2020) which outlines the population characteristics evaluated, management triggers, and management responses. Annually, the Technical Committee (TC) conducts a TLA to evaluate a Mid-Atlantic and a South Atlantic harvest metric, combining commercial and recreational landings in the region. The TC also evaluates a Mid-Atlantic (NJ-VA) and South Atlantic (NC-FL) abundance metric, combining indices of abundance from fishery-independent surveys in each region. Each metric is evaluated using a color proportion of green, yellow, or red based on comparing that year to a 2002-2012 reference period. Addendum III defined 30% red threshold as a moderate concern and 60% red threshold as a significant concern to the fishery. Management action is triggered according to the 30% red and 60% red thresholds if both the adult abundance and harvest thresholds are exceeded for either region in any three of the four terminal years.

Data Availability Issues

There have been several data availability issues in recent years due to the COVID-19 pandemic and other factors. The Mid-Atlantic abundance index is based on the Chesapeake Bay Multispecies Monitoring and Assessment Program (ChesMMAP) and the Northeast Fishery Science Center (NEFSC) Multispecies Bottom Trawl Survey. ChesMMAP has not had available data for 2019-2021 due to lack of calibration factors from a change in survey methodology, but should be available in 2023. NEFSC's survey did not operate in 2020 but did operate in 2021. Because of the missing survey data in the Mid-Atlantic region, the NorthEast Area Monitoring and Assessment Program (NEAMAP) was evaluated for trends in the region despite it not being accepted for use in the TLA due to having a shorter time series (2007-2021) that does not include the reference period (2002-2012). The South Atlantic abundance index is based on the South Carolina Department of Natural Resources (SCDNR) Trammel Net Survey and Southeast Area Monitoring and Assessment Program (SEAMAP) Coastal Trawl Survey. SEAMAP did not operate in 2020 and spring 2021. Therefore, the Mid-Atlantic abundance metric is unavailable for 2019-2021 and the South Atlantic abundance metric is unavailable for 2020-2021.

2021 Harvest Metrics

The Mid-Atlantic harvest metric has exceeded the 60% red threshold in all four terminal years (2018-2021) and the South Atlantic harvest metric has exceeded the 30% red threshold in all four terminal years (2018-2021). This is the second consecutive year the harvest metric in both regions have exceeded the 30% threshold, although the harvest metrics in 2021 cannot be used as a trigger mechanism since they represent a year with catch restrictions in place.

2021 Abundance Metrics

The Mid-Atlantic metric could not be updated due to missing ChesMMAP data from 2019-2021. The NEFSC index, an index used in the Mid-Atlantic metric, was available in 2021 and while it was below average, showed an increase from 2019. The South Atlantic composite could not be updated past 2019 due to missing SEAMAP data, so it is unknown if it triggered. The SC Trammel Net Survey increased 24% in 2021 compared to 2020. When the South Atlantic

composite metric was calculated using P195 instead of SEAMAP, all four years (2018-2021) were below the 30% threshold.

Conclusions

The harvest metric triggered in both the Mid-Atlantic (60% threshold) and South Atlantic (30% threshold) from 2018 to 2020 indicating continued concern. Harvest restrictions were in place in 2021 and the harvest metric cannot be used as a trigger mechanism in that year. The abundance composite metrics are unknown for the Mid-Atlantic and South Atlantic due to missing data, and so it could not be determined if further management would be triggered. Addendum III requires management action taken in 2021 to remain in place for a minimum of three years (through and including the 2023 season). The TC recommends maintaining management enacted in 2021.

1 INTRODUCTION

Atlantic croaker are managed under Amendment 1 to the Interstate Fishery Management Plan for Atlantic Croaker (2005) and Addendum I (2011), Addendum II (2014), and Addendum III (2020). The Amendment does not require any specific measures restricting harvest but encourages states with conservative measures to maintain them. It also implemented a set of management triggers, based on an annual review of certain metrics, to respond to changes in the fishery or resource, and initiate a formal stock assessment on an accelerated timeline if necessary. Addendum I revised the management program's biological reference points to assess stock condition on a coastwide basis as recommended by the 2010 stock assessment.

In August 2014, the South Atlantic State/Federal Fisheries Management Board (SAB) approved Addendum II to Amendment I to the Atlantic Croaker Fishery Management Plan (FMP). The Addendum established the Traffic Light Approach (or TLA) to evaluate fisheries trends and develop state-specific management actions (i.e., bag limits, size restrictions, time and area closures, and gear restrictions) when harvest and abundance thresholds are exceeded. Addendum II established the TLA as a precautionary management framework to evaluate fishery trends and develop management actions. Starting in the late 2000s, there were inconsistent signals in the data used to examine the resource. The lack of clear information from the TLA and the assessment made it difficult to provide management advice.

The most recent benchmark stock assessment for Atlantic croaker was completed in 2017 and provided more data for further refinement and modification of the existing TLA, as recommended by the Atlantic Croaker Technical Committee (TC). However, the 2017 stock assessment was not recommended for management use. In February of 2020, the SAB approved Addendum III to Amendment I allowing modification of the TLA to use a regional approach as well as establishing management actions to be taken if the TLA triggers were tripped. Addendum III addressed several issues by modifying the TLA to better reflect stock characteristics and identifying achievable management actions based on stock conditions.

The TLA is a way to incorporate multiple data sources (both fishery-independent and -dependent) into a single, easily understood metric for management advice. It is often used for data-limited species, or species that are not assessed on a frequent basis. As such, it is a

valuable management tool for Atlantic croaker. The name comes from assigning a color (red, yellow, or green) to categorize relative levels of indicators on the condition of the fish population (abundance metric) or fishery (harvest metric). For example, as harvest or abundance increase relative to their long-term mean (LTM), the proportion of green in a given year will increase, and as harvest or abundance decrease, the amount of red in that year becomes more predominant. Under Addendum II, state-specific management action would be initiated when the proportion of red exceeds specified thresholds (30% or 60%), for both harvest and abundance, over three consecutive years. The thresholds were maintained in Addendum III but the trigger mechanism was changed as described below.

Addendum III incorporated the following changes 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 either region in any three of the four terminal years.

Addendum III retained 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 was necessary because of the change to the management-triggering mechanism. Since the implementation of Addendum III, Atlantic croaker management has been moved to the newly formed Sciaenids Management Board.

In 2020, the TLA for Atlantic croaker had red proportions that exceeded the threshold of 30% in both the harvest and abundance metrics in the Mid-Atlantic. The South Atlantic region harvest metric also triggered at 30% threshold in 2020. Exceeding the 30% threshold represents moderate concern to the fishery and initiated a moderate management response. All non-*de minimis* states were required to institute a recreational bag limit of no more than 50 Atlantic

croaker per person per day. States with more restrictive measures in place were encouraged to maintain those measures. For commercial fisheries, states had to set a regulation that, if applied to the state's 2010-2019 average commercial harvest, would have produced at least a 1% reduction. States established different measures by trip limits or season modifications, as long as measures implemented were quantifiable and are projected to achieve this 1% reduction. All states have submitted state implementation plans to meet the required recreational and commercial management measures. Management measures were initiated in 2021 and are required to remain in place for three years, through 2023.

In addition to triggering management, the COVID-19 pandemic occurred in 2020, which had far reaching impacts including limited or no sampling in state and federal fishery-independent monitoring programs. For the TLA, the impact was felt most significantly for the larger scale regional monitoring surveys (NEFSC groundfish survey and the SEAMAP survey) which were not able sample at all in 2020. In 2021, the only survey that was directly impacted by COVID was SEAMAP which could not complete the spring 2021 cruise, but was able to finish the full summer and fall cruises. Additionally, the ChesMMAP survey has not completed the calibration estimates for converting the index for use over the entire time series due to the vessel and gear change that occurred in 2019, so data are unavailable from 2019-2021. It is not clear when ChesMMAP anticipates having the calibration estimates completed.

This report includes the harvest and abundance composite indices in Sections 2 and 3 which are the TLAs that were approved in Addendum III to trigger management action. Individual TLAs for commercial and recreational harvest by region as well as effort and discards of Atlantic croaker in the South Atlantic Shrimp Trawl Fishery are described in Section 4. TLAs for each fishery-independent index that go into the abundance composite or juvenile composite are described in Section 5. The discard data and juvenile indices are included as supplementary information to be reviewed by the TC and are not considered in trigger mechanisms. Supplemental information with NEAMAP incorporated into the Mid-Atlantic composites and NCDMF P195 incorporated into the South Atlantic adult composite are provided in Section 6.

2 TRAFFIC LIGHT ANALYSIS (COMPOSITE INDEXES)

2.1 Harvest Composite Index

- The mean red proportion for the most recent three year time period (2019-2021) in the Mid-Atlantic was 77% with the red proportion being above 60% since 2018 which indicates a significant level of concern (Figure 1). Since catch restrictions were in place in 2021, this year cannot be used as a trigger mechanism for additional management measures.
- The harvest composite TLA index for the South Atlantic also triggered in 2021 at the 30% threshold and represented the eighth consecutive year above 30% (Figure 2). Similar to the Mid-Atlantic, 2021 was consistent with the most recent trends in data but it should not be interpreted as a trigger mechanism since catch restrictions were in place that year.

- Both regions show a continuing decline in recreational and commercial landings for Atlantic croaker.
- The TLA 30% threshold triggers were tripped in 2020 for the period of 2017-2019, leading to restrictive management measures put into place in the commercial and recreational fisheries in the Mid- and South Atlantic. Therefore, the current harvest composite index may be affected by these new management measures and thus cannot be considered when determining if continued management action is necessary.

Figure 1. Annual color proportions for the harvest composite TLA of Mid-Atlantic (NJ-VA) Atlantic croaker recreational and commercial landings from 1989-2021 using a 2002-2012 reference period.

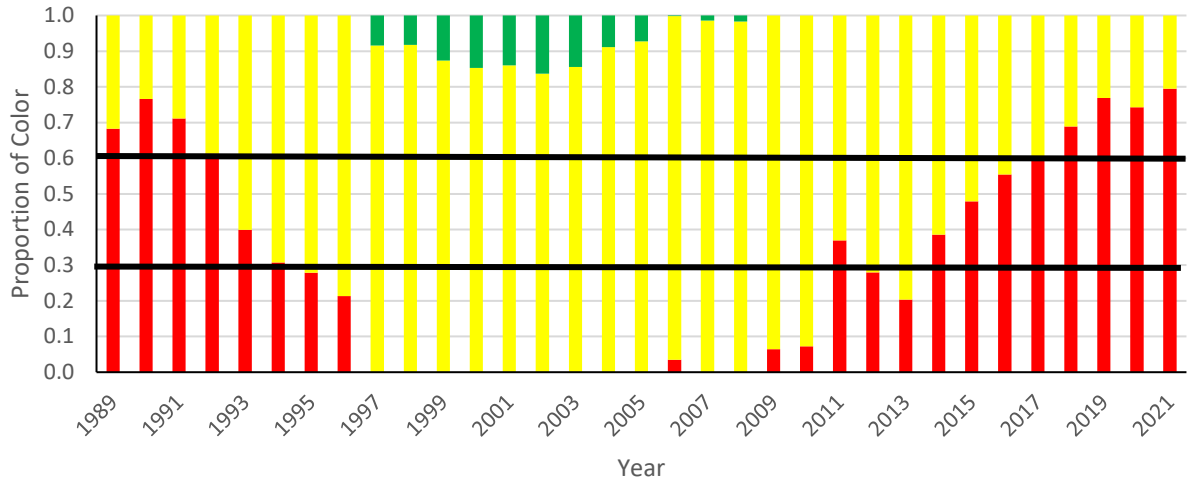
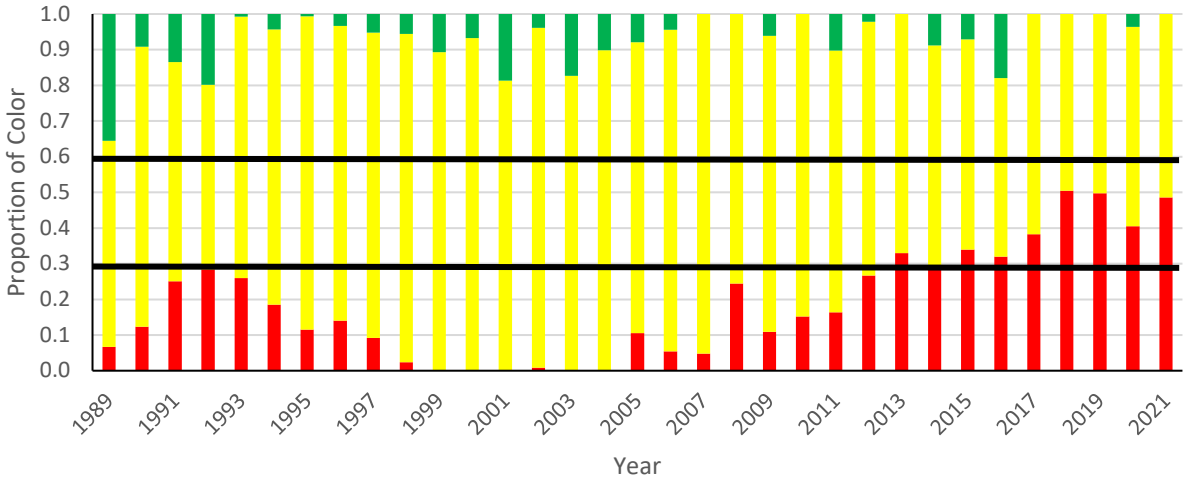


Figure 2. Annual color proportions for the harvest composite TLA of South Atlantic (NC-FL) Atlantic croaker recreational and commercial landings from 1989-2021 using a 2002-2012 reference period.



2.2 Abundance Composite Characteristic Index

The abundance composite TLA index in each region is broken into two components based on age composition, including an adult index (ages 2+) and a juvenile index (ages 0-1). Only adult abundance is used to determine if management action is triggered. Juvenile data is presented as supplementary information only (Section 5.7). The adult composite index was generated from the NEFSC and ChesMMAP surveys for the Mid-Atlantic and SEAMAP and SCDNR trammel net survey in the South Atlantic since the majority of Atlantic croaker captured in these surveys were ages 2+.

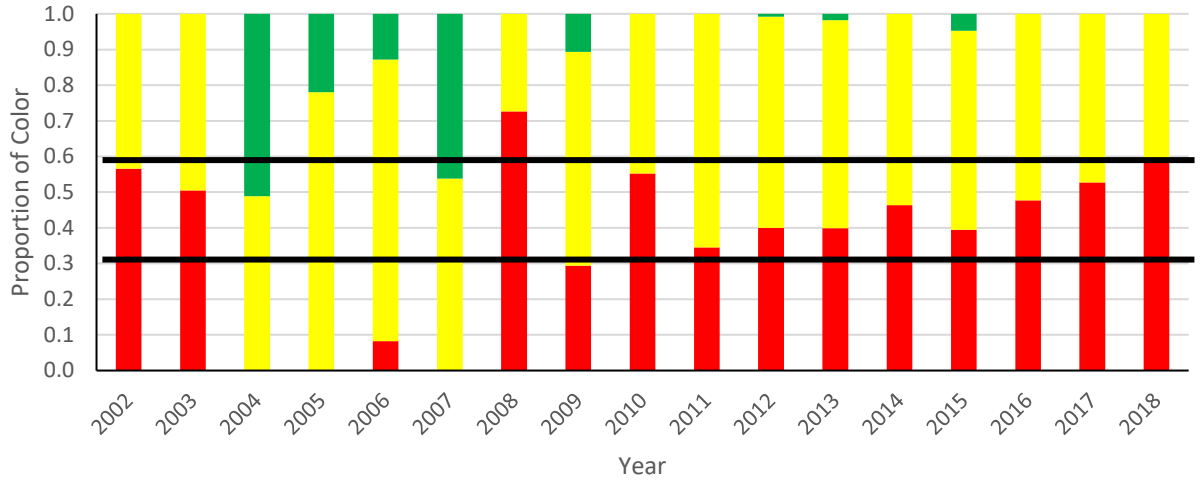
Calculating the abundance indices for the TLA has been challenging since many surveys could not operate during COVID and ChesMMAP has not provided data since 2018. Neither the NEFSC fall ground fish survey nor the SEAMAP survey were able to complete any sampling cruises/trips in 2020. In 2021, SEAMAP also was not able to complete its spring survey sampling which is the season in which adults are typically captured. The ChesMMAP survey has not completed the calibrations necessary to convert the 2019-2021 index values that would allow full use of the entire time series after the vessel and gear changes that occurred in 2019. Therefore, at this time, ChesMMAP only goes through 2018.

2.2.1 Mid-Atlantic

- The adult Mid-Atlantic composite index (Figure 3) could only be calculated through 2018 since ChesMMAP data was not available for 2019-2021. The NEFSC index was available in 2021 and showed an increase from 2019 (Section 5.1). However, it was still below the long-term mean and had a red proportion of 15%.

- The adult composite TLA characteristic for the Mid-Atlantic (Figure 3) shows a trend of increasing red proportions beginning approximately in 2009. The continued declining trend is cause for concern in the Mid-Atlantic region. The juvenile composite (Section 5.7) also shows a continued decline, potentially indicating poor recruitment, which does not bode well for changes in the adult population.
- Results of the TLA for the Mid-Atlantic abundance are inconclusive due to missing data.

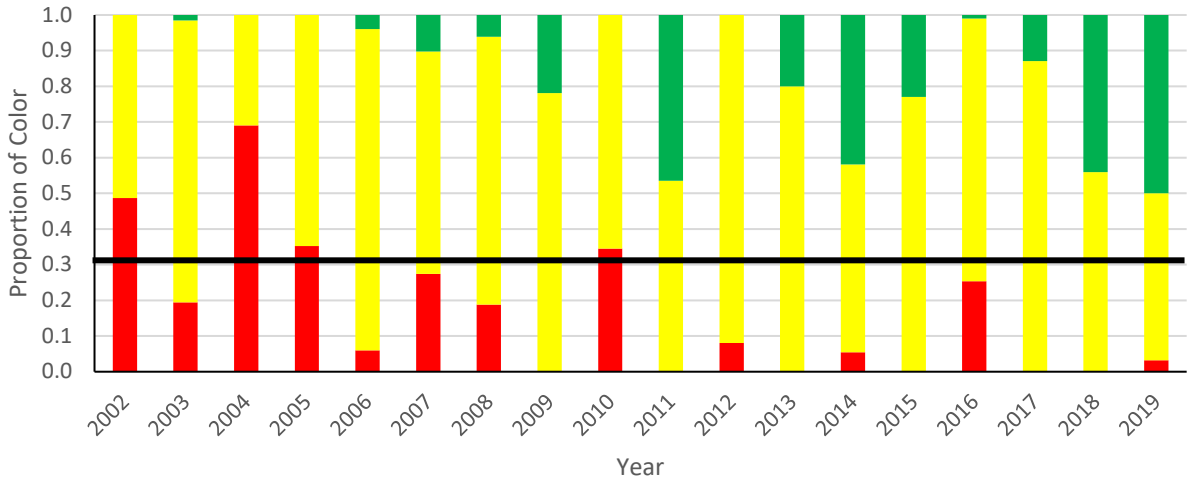
Figure 3. Adult (age 2+) Atlantic croaker TLA composite characteristic index for the Mid-Atlantic (NEFSC and ChesMMAP surveys) from 2002-2018.



2.2.2 South Atlantic

- The adult composite TLA for the South Atlantic region is presented using SEAMAP and SCDNR Trammel Net survey data and did not include data from 2020 and 2021 from SEAMAP due to lack of data for spring cruises in both those years. The SCDNR trammel survey had an increase in abundance in 2021 and was above the long-term mean.
- Results of the TLA for the South-Atlantic abundance are inconclusive due to missing data.

Figure 4. Adult (age 2+) Atlantic croaker TLA composite characteristic index for the South Atlantic (SEAMAP and SCDNR trammel survey) from 2002-2019.



3 SUMMARY

- The harvest composite TLA characteristic remained above triggered thresholds in both the Mid-Atlantic (60% threshold) and South Atlantic (30% threshold) in 2021 indicating continued concern, although 2021 had catch restrictions in place. Therefore, the TLA harvest composite should not be interpreted as a trigger year.
- The continued declining trend in the commercial and recreational harvest for the Atlantic coast is a concern since the decline has become greater in the last two years. However, several states implemented more restrictive management measures in 2021 as required by Addendum III, which may have impacted harvest. According to Addendum III, until the management measures are lifted, further management action can only be triggered based on the abundance composites.
- The Mid-Atlantic abundance composite characteristic did not have 2019-2021 data points, so no determination could be made for these years.
- The South Atlantic abundance composite characteristics are missing 2020-2021 data, so no determination could be made for these years.
- Table 1 provides an overview of the past four years of trigger thresholds for each region, as well as the current TLA status. The adult abundance indices currently have an unknown status; as discussed above, ChesMMAP will be available in the future once calibration factors are developed.

Table 1. Traffic light metrics for the Mid- and South Atlantic regions with known and unknown values, given missing 2019-2021 data. Management action is triggered according to the current 30% red and 60% red thresholds if both the adult abundance and harvest thresholds are exceeded in any three of the four terminal years within either region.

TLA Metric	Atlantic Croaker			
	2018	2019	2020	2021
Mid-Atlantic Harvest	69% red	77% red	74% red	79% red*
South Atlantic Harvest	51% red	50% red	41% red	49% red*
Mid-Atlantic Adult Index	58% red	Unknown	Unknown	Unknown
South Atlantic Adult Index	44% green	50% green	Unknown	Unknown
2022 TLA Status	Status Unknown			

*Harvest metrics should not be interpreted as a trigger mechanism in the TLA since catch restrictions to lower harvest were in place for these years

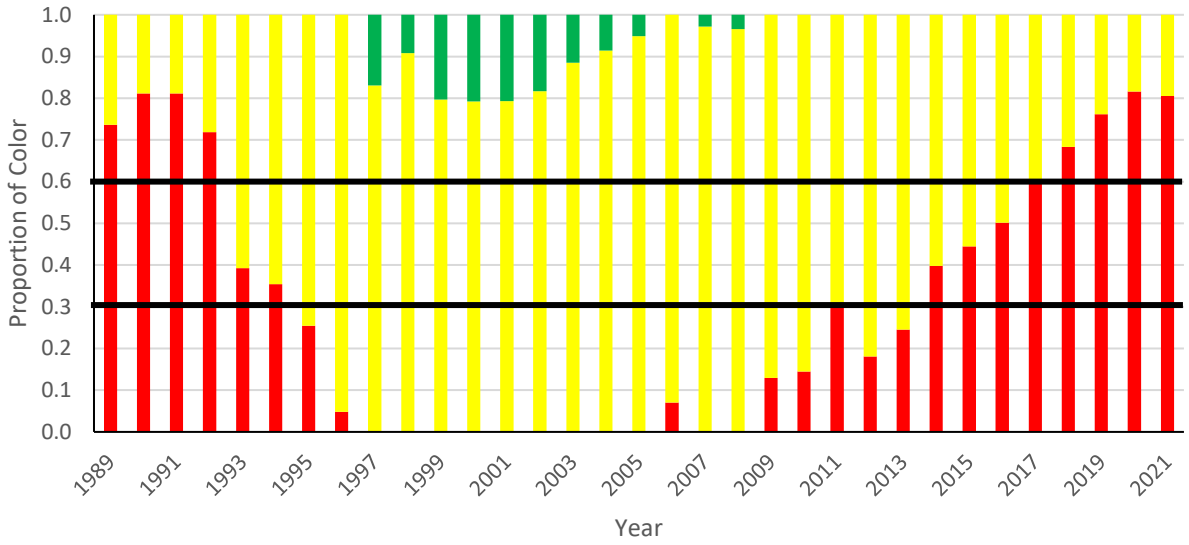
4 TRAFFIC LIGHT ANALYSIS (FISHERY-DEPENDENT)

4.1 Commercial Landings

4.1.1 Mid-Atlantic

- Commercial landings in the Mid-Atlantic increased 98% in 2021 from 2020, but remained low and represented the fourth lowest year of commercial croaker landings in the data series (Figure 5). Several states implemented more restrictive management measures in 2021 as required by Addendum III, which may have impacted harvest.
- The proportion of red for commercial landings has been above the 30% threshold every year since 2014 (Figure 5) and 2021 was the fourth year in a row where landings were above the 60% threshold.

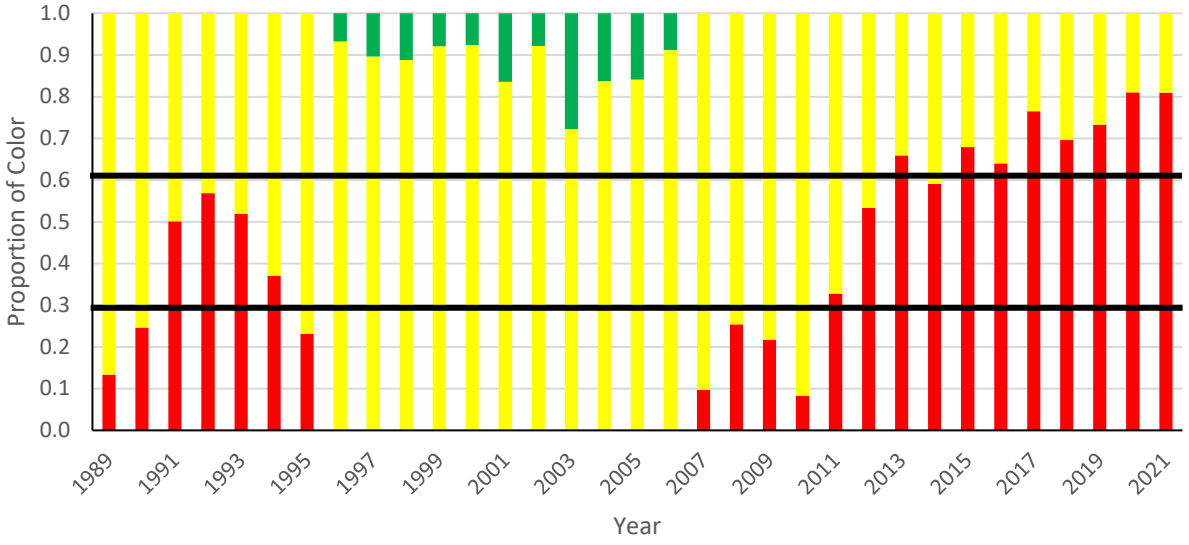
Figure 5. Annual TLA color proportions for Atlantic croaker commercial landings for the Mid-Atlantic (NJ-VA) coast of the U.S. from 1989-2021.



4.1.2 South Atlantic

- Commercial landings in the South Atlantic increased slightly in 2021 from 2020, but remained low and represented the 14th year of decline in commercial croaker landings in the South Atlantic (Figure 6). Several states implemented more restrictive management measures in 2021 as required by Addendum III, which may have impacted harvest.
- The proportion of red for commercial landings in the South Atlantic has been above the 30% threshold every year since 2011 and been above the 60% red threshold for every year since 2015 (Figure 6). This past year, 2021, was the 11th year in a row where landings were above the 30% threshold.

Figure 6. Annual TLA color proportions for Atlantic croaker commercial landings for the South Atlantic (NC-FL) coast of the U.S. from 1989-2021.



4.2 Commercial Discards

4.2.1 South Atlantic

- Discard estimates of Atlantic croaker in the South Atlantic Shrimp Trawl Fishery are informed by catch rates observed during the SEAMAP survey and South Atlantic Shrimp Trawl Fishery Observer Program, and total effort of the South Atlantic Shrimp Trawl Fishery. Increases in discards could be an indicator of higher abundance of juveniles in the region, an increase in effort by the fishery, or a combination of both.
- Total effort (net hours) in the South Atlantic Shrimp Trawl Fishery declined from a time series high in 1991 to a time series low in 2005 (Figure 7). Effort then varied around an increasing trend through 2017 and was variable and lower through 2020. Effort declined slightly from 786,172 net hours in 2020 to 780,515 net hours in 2021.
- Total discards of Atlantic croaker in the South Atlantic Shrimp Trawl Fishery were high during the late 1980s and early 1990s, declined to relatively low levels in the early to mid-2000s, and then increased to levels similar to the beginning of the time series during the 2010s (Figure 7). Discards declined from some of the highest levels of the time series in 2018-2020 to the lowest level since 2009 in 2021.
- There were no SEAMAP survey tows conducted in 2020, so the trend for the 2020 discard estimate relative to previous years is solely informed by South Atlantic Shrimp Trawl Fishery Observer catch rates. Further, there was reduced observer coverage of shrimp trawl fisheries during 2020. Sampling occurred January-March and August-November at levels similar to prior years which includes months in both seasons (off-season and peak-season) used as a factor in the model to estimate catch rates, but

there was no observer coverage from April-July. The observer catch rates of Atlantic croaker over the reduced sampling season in 2020 increased relative to 2019 catch rates (Figure 8). The 2020 discard estimate was likely influenced by the lack of SEAMAP tows and reduced observer coverage. The SEAMAP survey did not sample in spring 2021, but began operations again during the peak of the shrimping season in July. The 2021 catch rates from both data sets show declines relative to 2019, though the SEAMAP survey shows a greater magnitude of decline during this period. As in all years, the magnitude of the 2020 and 2021 discard estimates are informed by the observer data (magnitude of catch rates) and shrimp trawl effort data (expansion factor to expand catch rates to total discards).

- For additional information on the South Atlantic Shrimp Trawl Fishery discard estimation, please see Appendix 1 of the 2020 TLA Update Report.

Figure 7. Total net hours fished (left) and discards of Atlantic croaker (right) in the South Atlantic Shrimp Trawl Fishery.

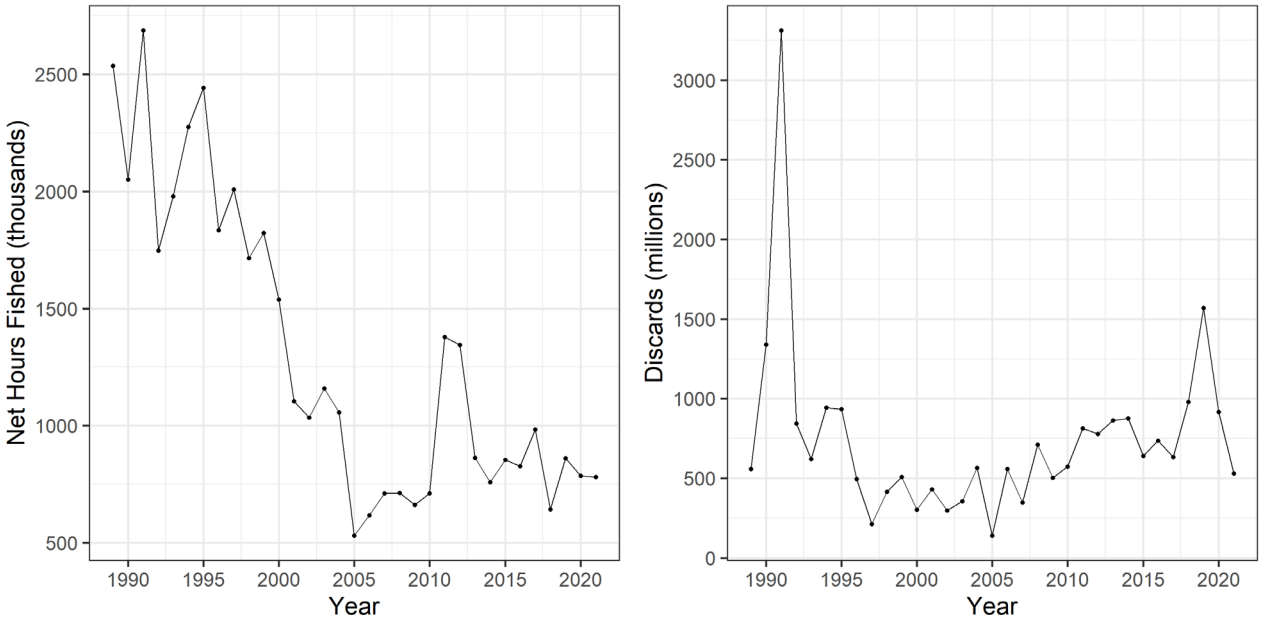


Figure 8. Comparison of Atlantic croaker mean-scaled catch-per-unit-effort from SEAMAP Coastal Trawl Survey data and South Atlantic Shrimp Trawl Fishery Observer data.

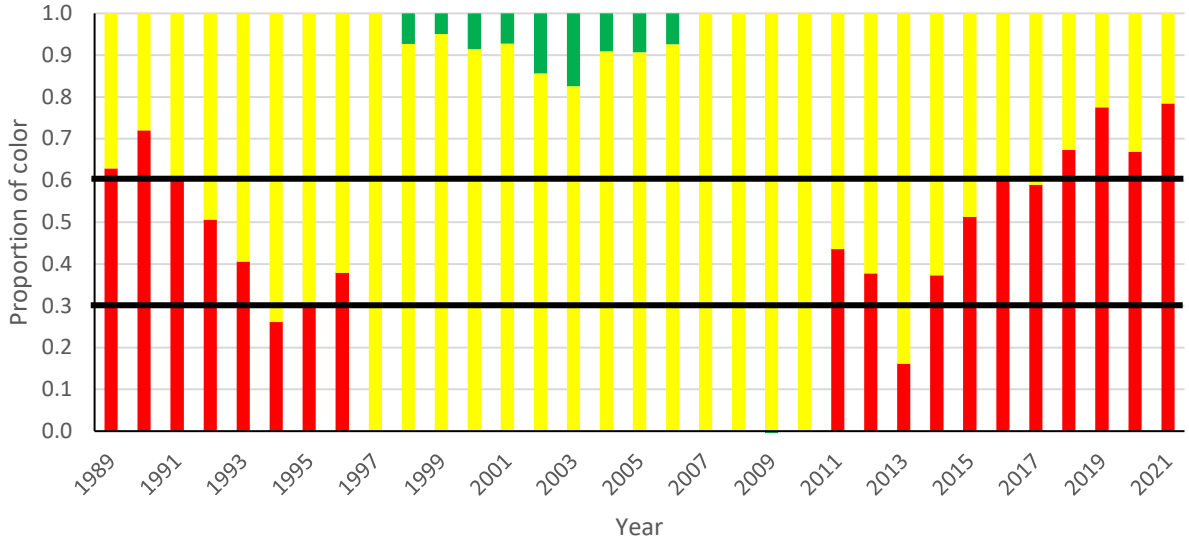
4.3 Recreational Harvest

In July 2018, the Marine Recreational Information Program transitioned from the catch estimates based on effort information from the Coastal Household Telephone Survey (CHTS) to effort information from the mail-based Fishing Effort Survey (FES). FES estimates are used in this and future reports, so recreational estimates and analyses may be different from previous years that used CHTS estimates.

4.3.1 Mid-Atlantic

- The recreational harvest decreased by 64% in 2021 compared to 2020, and is the lowest value in the time series. Several states implemented more restrictive management measures in 2021 as required by Addendum III, which may have impacted harvest.
- The recreational index has been above the 30% level since 2014 and has been above the 60% level for the last four years.
- As with commercial landings, the continued decline in harvest levels for Atlantic croaker in the recreational fishery are also cause for concern.

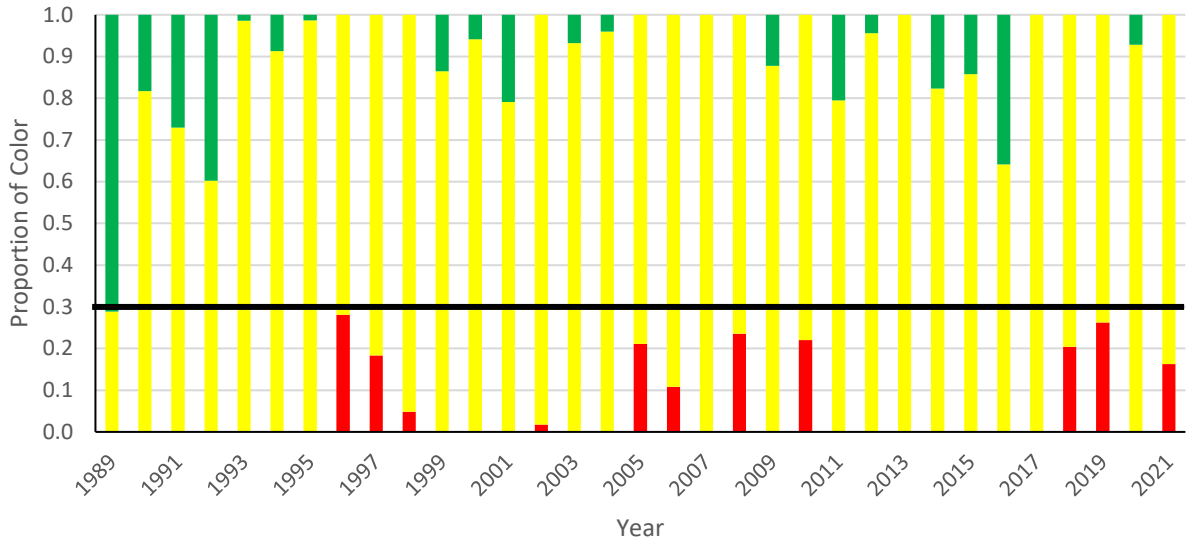
Figure 9. Annual TLA color proportions for Atlantic croaker from the Mid-Atlantic (NJ-VA) coast recreational harvest of the U.S. from 1989-2021 based on a 2002-2012 reference period.



4.3.2 South Atlantic

- The recreational harvest index for the South Atlantic decreased 33% in 2021 compared to 2020. Several states implemented more restrictive management measures in 2021 as required by Addendum III, which may have impacted harvest.
- The index has been below the 30% threshold for the entire time series. However, recreational harvest has been below the long-term mean for 3 of the 4 terminal years in the index (Figure 10).

Figure 10. Annual TLA color proportions for Atlantic croaker for the South Atlantic (NC-FL) recreational harvest of the U.S. from 1989-2021 based on a 2002-2012 reference period.

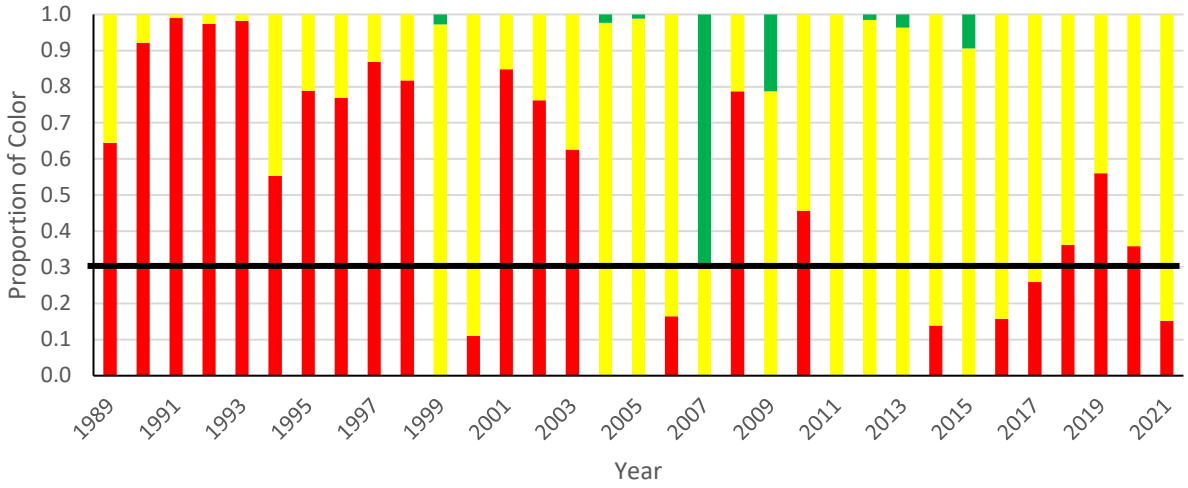


5 TRAFFIC LIGHT ANALYSIS (FISHERY-INDEPENDENT SURVEYS)

5.1 NEFSC Fall Groundfish Survey

- The index value for 2021 represented a 95% increase from 2019, the last sampled year of the survey (Figure 11).
- The NEFSC was not carried out in 2017 due to mechanical problems with the RV Bigelow. An imputed index for 2017 was calculated as the mean of 2015-2016 and 2018. An intermediary placeholder value was also estimated for 2020 (as the mean of 2018-2019 and 2021), when sampling wasn't conducted due to COVID.
- While the red proportion in 2021 did not exceed the 30% threshold, the index has been below the long-term mean for three of the past four years, with the general trend being a decline since the series peak in 2007.

Figure 11. Annual TLA color proportions for Atlantic croaker from NEFSC ground-fish trawl survey from 1989-2021 based on 2002-2012 reference period.



5.2 ChesMMAP Survey

- The ChesMMAP survey made major changes to the survey in 2019 (vessel change, gear change, altered protocols, etc.) but maintained the same sampling strata and design. Side-by-side comparison tows are in the process of being conducted between the new and old vessels/gears and the survey is in the process of producing conversion factors by species so that historic survey index values can be compared to ongoing survey values in the future. Since the conversion factor determination won't likely be finished until 2023, the ChesMMAP index is only available through 2018 for the adult and juvenile TLA composite characteristics.
- The overall declining trend in catch of Atlantic croaker was evident in both the adult (age 2+) and juvenile (ages 0-1) indices, although the adult index was higher than the juvenile index in the early years of the survey (Figure 12 and Figure 13).
- The series peak for juveniles occurred in 2007 and the series peak for adults occurred in 2004. From 2008-2018, abundances for both age groups have remained relatively low.
- Red proportions exceeded 60% since 2010 in the juvenile index and since 2008 in the adult index (Figure 12 and Figure 13).

Figure 12. ChesMMAP survey annual TLA color proportions for Atlantic croaker ages 0-1 from 2002-2018 using a 2002-2012 reference period.

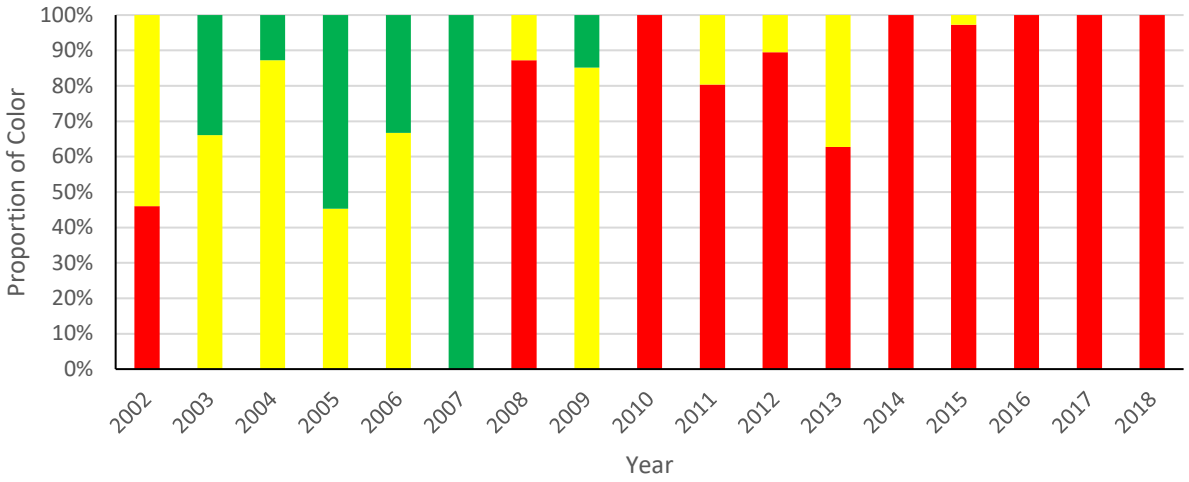
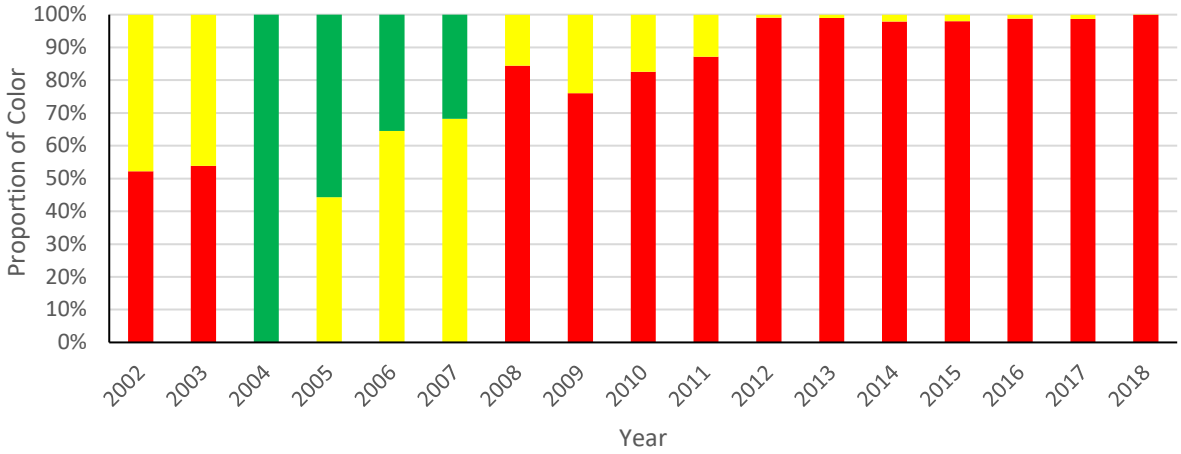


Figure 13. ChesMMAP survey annual TLA color proportions for Atlantic croaker ages 2+ from 2002-2018 using a 2002-2012 reference period.

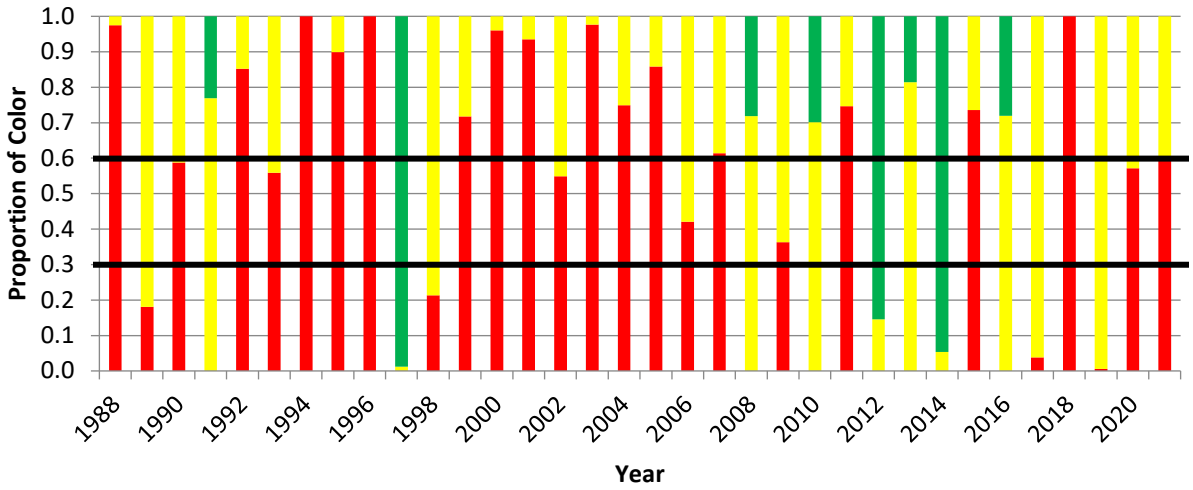


5.3 VIMS Survey

- Due to COVID-19 restrictions, no sampling occurred in April or May 2020 and June sampling was limited to Bay and York River only. However, the index was still calibrated using April - June with the limited sampling in 2020 taken into account so that the index for the entire time series could be utilized for the TLA. The VIMS juvenile trawl survey uses the relative catch levels of 1-year-old juvenile croaker as the proxy for the previous year's recruitment index.

- The VIMS index showed a 6% decrease in 2021 from 2020. High variability in the TLA color proportions was likely due to annual recruitment variations, which would not be uncommon for a juvenile index (Figure 14).
- The index value was below average in 2021 with a red proportion at 60%. The continued high red proportions are an indication of continued poor recruitment in recent years.
- The red proportion was above the 30% threshold for 3 of the 4 terminal years.

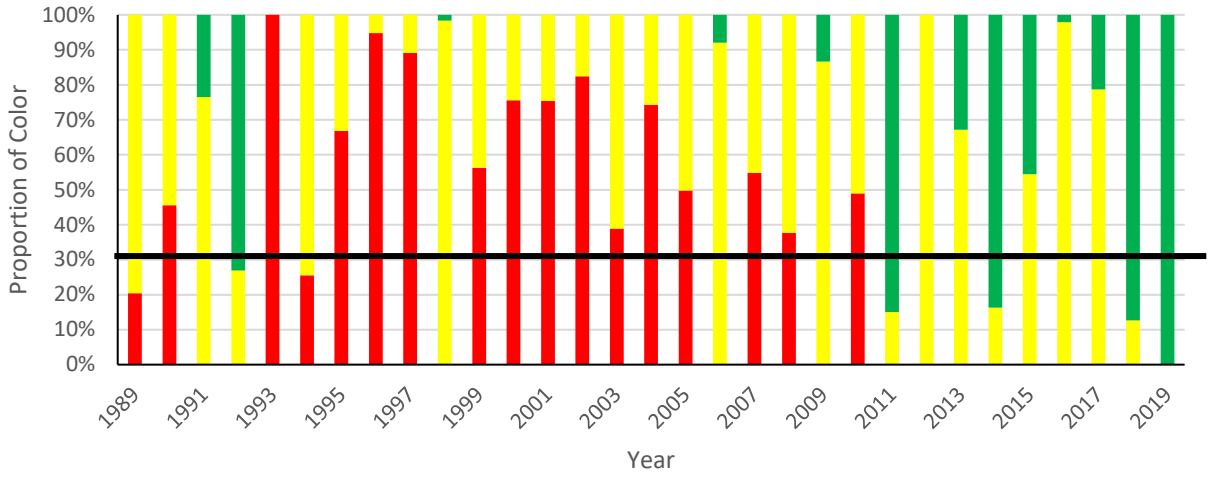
Figure 14. Annual TLA color proportions for age-0 Atlantic croaker from VIMS spring trawl survey from 1988-2021 using 2002-2012 reference period.



5.4 SEAMAP Survey

- The SEAMAP survey index used was for the spring season when adult Atlantic croaker (ages 2+) are captured.
- There were no SEAMAP cruises in 2020 and the spring of 2021 due to COVID. As such, there was no TLA values for 2020 and 2021 and the index is only presented through 2019.
- The SEAMAP index increased by 13% in 2019 from 2018, and values have remained above average since 2011 so there has been no red in the TLA for recent years (Figure 15).
- This index will be updated in 2023 with the spring 2022 survey index values.

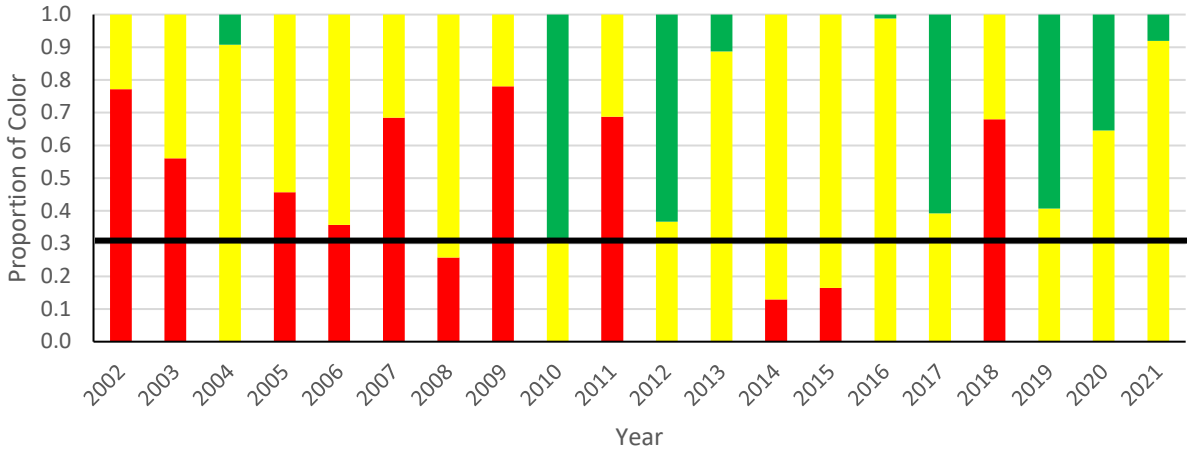
Figure 15. Traffic Light Analysis for SEAMAP catch data by weight in spring from 1989-2019 using a 2002-2012 reference period.



5.5 North Carolina Program 195 (Pamlico Sound Survey)

- The North Carolina index has been well above average the past three years (Figure 16).
- The results of the NCDMF Program 195 data analysis should be treated with caution, as not all stations were sampled due to COVID and staffing issues. Twenty-eight of the 54 stations were sampled in 2020 and 35 of the 54 stations were sampled in 2021. Limited sampling did not appear to change the trend but it appears to have elevated the magnitude.

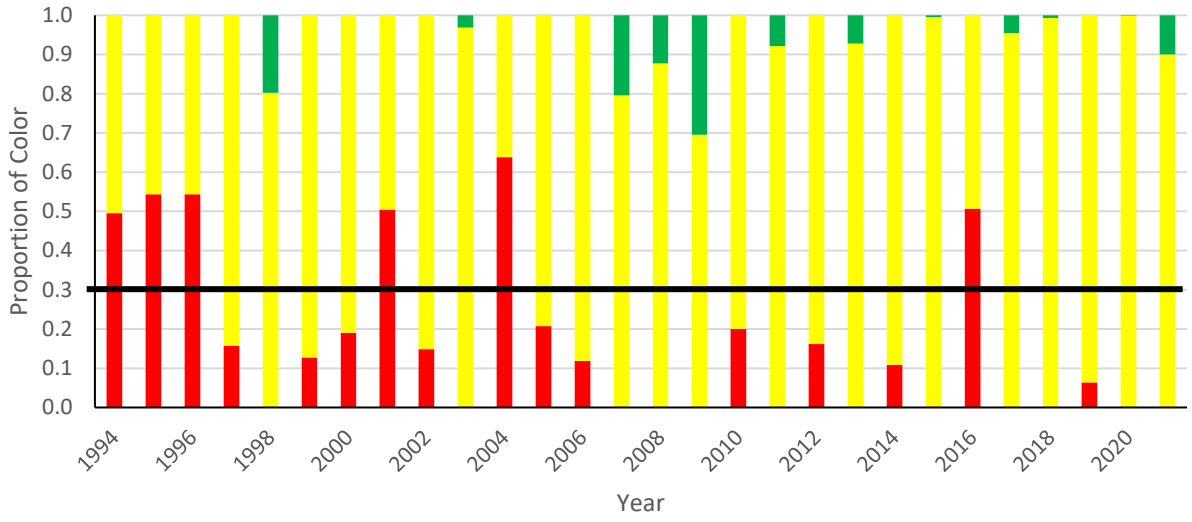
Figure 16. NCDMF Program 195 TLA color proportions for juvenile Atlantic croaker from 1989-2021 using 2002-2012 reference period.



5.6 SCDNR Trammel Net Survey

- The SCDNR trammel index increased 24% in 2021 compared to 2020. Annual CPUE has been variably above and below the average since 2009, indicated by annual alterations between red and green proportions in the TLA (Figure 17).
- Red proportions have not been above the 30% threshold since 2016.

Figure 17. SCDNR trammel net survey TLA color proportions for Atlantic croaker from 1994-2021 using a 2002-2012 reference period.



5.7 Juvenile Composite Indices

The juvenile composite index in the Mid-Atlantic was generated from the ChesMMAP and VIMS surveys, because VIMS is a juvenile survey and ChesMMAP has an age specific index for ages 0-1. The juvenile composite index in the South Atlantic was generated from the NCDMF Pamlico Sound Survey (Program 195) because the survey encounters age-0 croaker. As stated above, NEFSC survey data were not available for 2020 and the ChesMMAP survey does not have the updated calibrations to use the entire time series.

- The juvenile composite TLA (Figure 18) for the Mid-Atlantic is only shown through 2018 since that was the last year with data available for ChesMMAP. The VIMS survey was available through 2021, and continued to show a declining trend in 2021 (Section 5.3).
- The juvenile composite TLA characteristic (Figure 18) for the Mid-Atlantic in 2018 was above the 60% red threshold and was the ninth year above the 30% threshold.
- The high red proportions in recent years are indicative of continued poor Atlantic croaker recruitment in the Mid-Atlantic region.

- The juvenile index for the South Atlantic TLA composite characteristic was the NCDMF Pamlico Sound Survey. It did not trigger in 2021 with three of the four terminal years showing green proportions in the index but the proportion shows a decrease over the past three years (Figure 19).

Figure 18. Juvenile croaker (ages 0-1) TLA composite characteristic index for the Mid-Atlantic (ChesMMAP and VIMS) from 2002-2018.

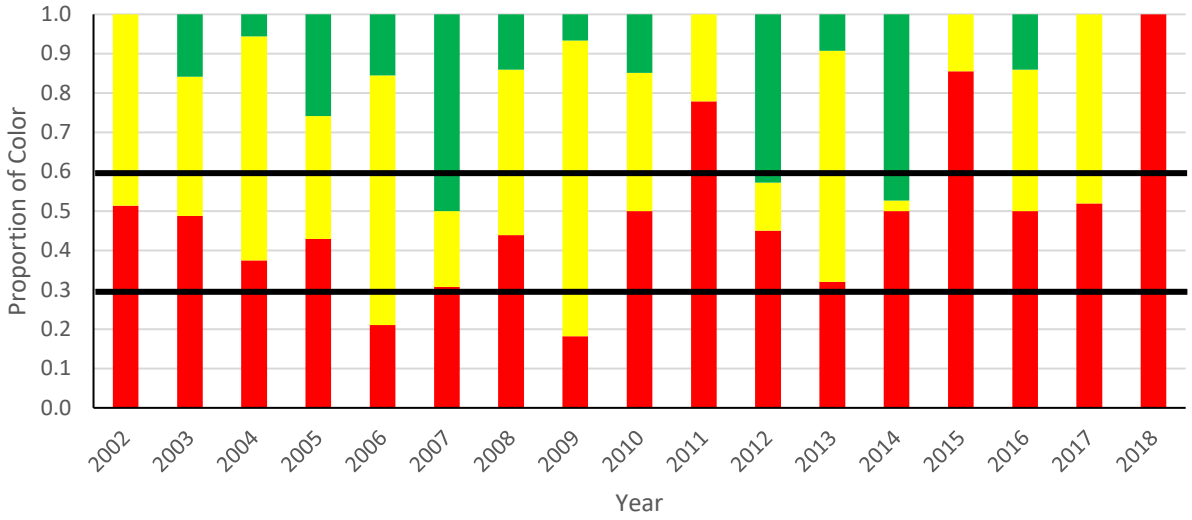
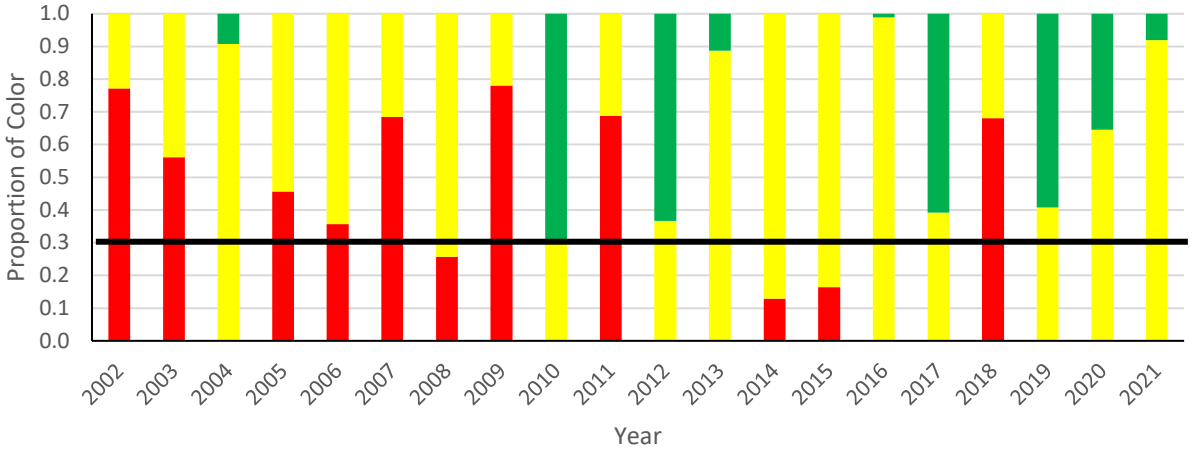


Figure 19. Juvenile (ages 0-1) Atlantic croaker index for the South Atlantic using NCDMF Program 195 from 2002-2021.



6 SUPPLEMENTAL MATERIAL

6.1 NEAMAP Survey

One additional survey that is available in the Mid-Atlantic is the Northeast Area Monitoring and Assessment Program (NEAMAP) which samples from Block Island Sound south to Cape Hatteras. The NEAMAP survey has been considered for use in the TLA but is currently not used due to the shorter time frame (2007-2021) compared to the other surveys. This survey may come into use with the TLA once it reaches a 15 year sampling time span, which corresponds approximately to the max life span of Atlantic croaker, but that will likely have to wait until the next stock assessment. This section describes the trends in the NEAMAP survey and gives composite characteristics that include NEAMAP.

- Juvenile recruitment and adult abundance has been declining since 2012 as indicated by high red proportions above the 60% threshold for the last five years (Figure 20 and Figure 21). This trend reversed in 2021 with significant increases in both juveniles and adults, indicated by high green proportions for both.
- Adult Atlantic croaker in particular showed a showed a significant increase in 2021 (Figure 21), resulting in a green proportion of 1.0.
- Proportions of red for the juvenile index were above 30% in three of the four terminal years. The adult index only exceeded the 30% threshold in two of the four terminal years.

Figure 20. Juvenile (ages 0-1) TLA color proportions for Atlantic croaker from NEAMAP survey from 2007-2021 using a 2007-2019 reference period.

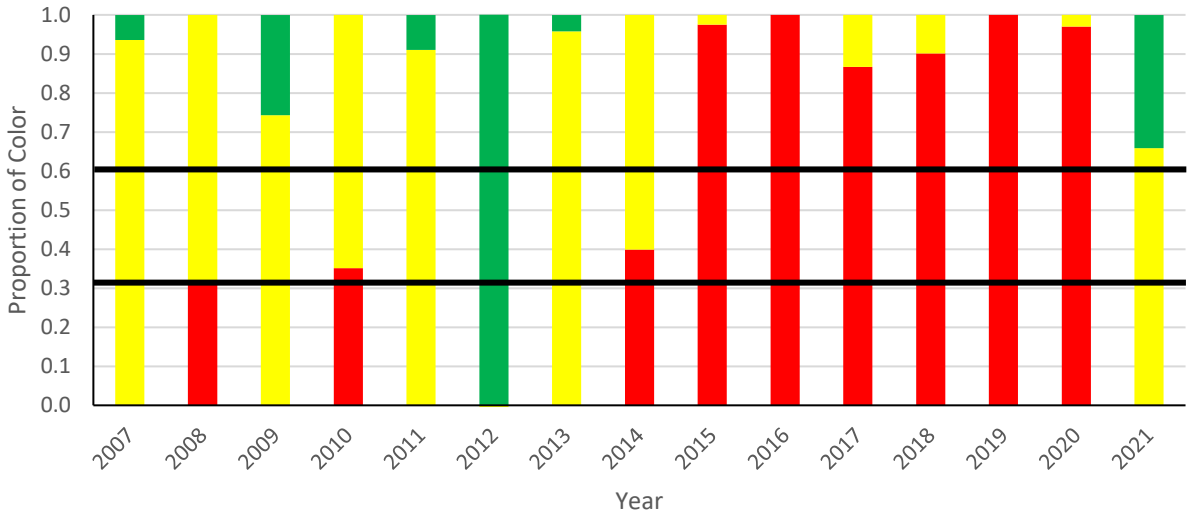
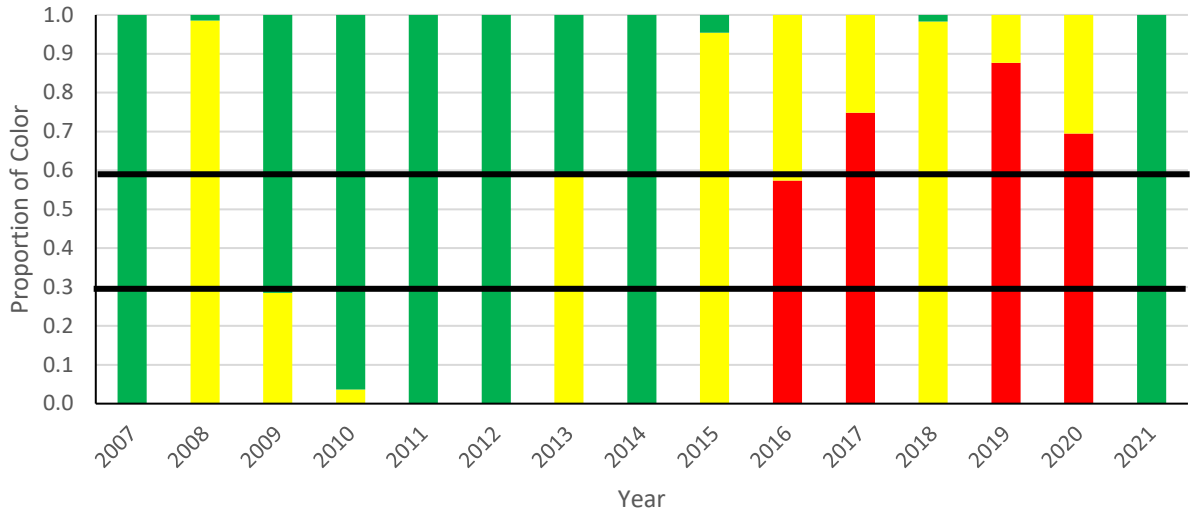


Figure 21. Adult (ages 2+) TLA color proportions for Atlantic croaker from the NEAMAP survey from 2007-2021 using a 2007-2019 reference period.



6.2 Composite TLA Characteristic for Mid-Atlantic including NEAMAP

In order to generate the composite TLA index that included NEAMAP in the Mid-Atlantic, the other Mid-Atlantic indices (NEFSC, ChesMMAP, VIMS) had to be recalculated using the common time period of all three surveys (2007-2019) in order to have a common reference. However, since both the NEFSC and ChesMMAP indices were not available in 2020 due to COVID-19 impacts, NEAMAP was the only available regional index in 2020. Additionally, the VIMS survey was not available in 2019, also due to COVID-19, so the juvenile TLA for 2020 only uses NEAMAP.

- The addition of NEAMAP to the Mid-Atlantic TLA composite characteristic for juvenile Atlantic croaker showed the same general trend of declining recruitment and high levels (> 60%) of red in recent years (Figure 22). Red proportions have been above 30% since 2015.
- The adult Atlantic croaker composite characteristic for the Mid-Atlantic with NEAMAP included also showed increasing proportions of red, but only two of the last four years were above the 30% threshold Figure 23).

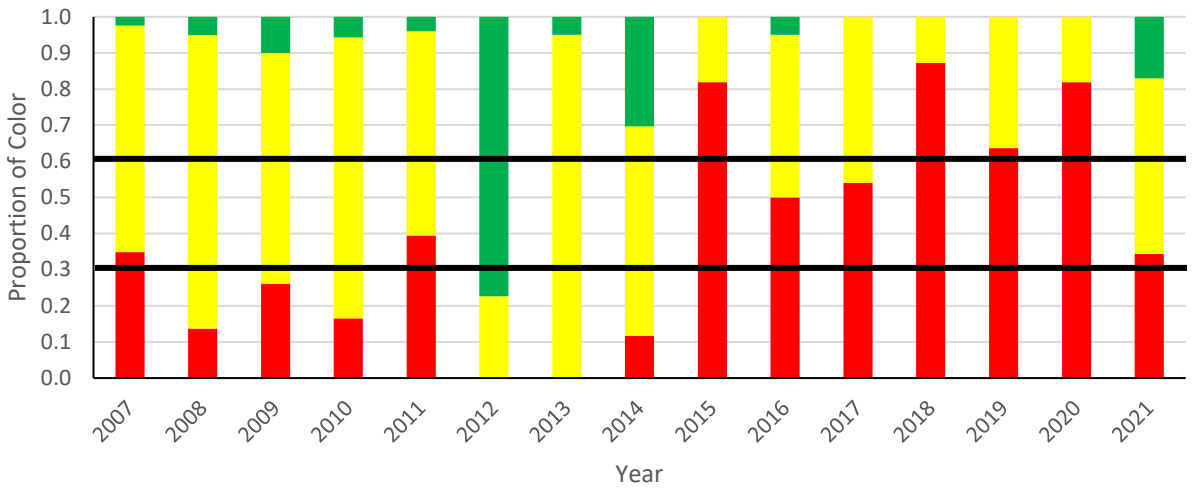
6.2.1 Summary of NEAMAP as a Composite Characteristic for the Mid-Atlantic

The addition of the NEAMAP survey to the Mid-Atlantic composite characteristics supports trends seen with the other indices used in the composite characteristic. The only limitation on the NEAMAP survey is the shorter time frame compared to the other surveys. The TC might consider adding the NEAMAP survey to the Traffic Light Analysis after the next scheduled

benchmark assessment for Atlantic croaker and re-evaluate all fishery independent surveys for use in the TLA. The impact of COVID-19 in 2020 on the different fishery independent surveys and the availability of the fully calibrated ChesMMAP index also makes it a good idea to wait on making changes on the TLA until fishing year 2022.

- The juvenile composite TLA characteristic was above the 30% threshold for red in 2021 and still had some green proportion as well. The red proportion was from the VIMS index which continues to decline and the green proportion was from the NEAMAP index.
- The Mid-Atlantic juvenile index using VIMS and NEAMAP would have triggered at the 30% threshold in 2021 with all years since 2015 exceeding that threshold.

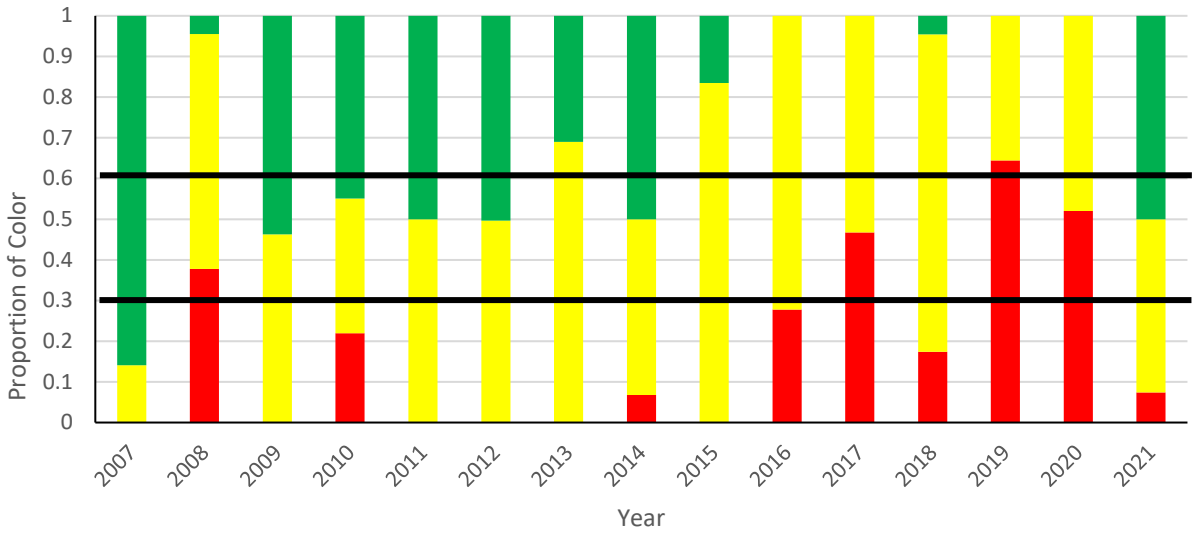
Figure 22. Juvenile Atlantic croaker (ages 0-1) TLA composite characteristic index for the Mid-Atlantic using NEAMAP and VIMS from 2007-2021 with a 2007-2019 reference period.



- The adult composite TLA characteristic was calculated using the NEFSC and NEAMAP surveys since ChesMMAP was not available for 2019-2021.

- The adult composite TLA would not have triggered in 2021 with only two of the four terminal years exceeding the 30% threshold.
- The green proportion in the 2021 composite was primarily due to the high catch levels seen in the NEAMAP survey.

Figure 23. Adult Atlantic croaker (ages 2+) TLA composite characteristic index for the Mid-Atlantic (NJ-VA) using NEFSC, NEAMAP and ChesMMAP (2007-2018), NEFSC and NEAMAP (2019) and NEAMAP only (2020) from 2007-2021 with a 2007-2019 reference period.



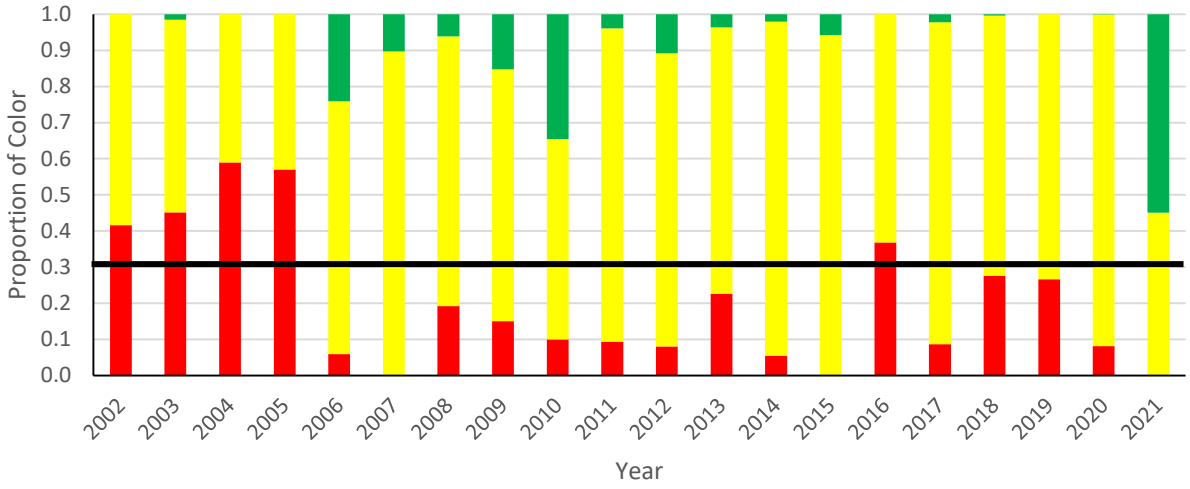
6.3 Composite Abundance TLA Characteristic for South Atlantic including NCDMF P195

The adult abundance composite TLA for the South Atlantic region is presented using the NCDMF Program 195 instead of SEAMAP and SCDNR Trammel Net survey data. This modified adult composite index for the South Atlantic is presented as supplemental material because the version as described in Addendum III could not be updated this year due to missing data. The modified adult composite TLA index for the South Atlantic would not have triggered any management response in 2021.

- The NCDMF survey had a significant increase in 2021 which resulted in a green proportion of 100% (Figure 24). The results of the NCDMF Program 195 data analysis should be treated with caution however, as not all stations in 2020 and 2021 were sampled due to COVID and staffing issues. Twenty-eight of the 54 stations were sampled in 2020 and 35 of the 54 stations were sampled in 2021. Limited sampling did not appear to change the trend but it appears to have elevated the magnitude.

- The SCDNR trammel survey also had an increase in abundance and was above the long-term mean.
- These increases resulted in a positive index above the long-term mean for the composite TLA, and all of the most recent four years (2018-2021) were below the 30% threshold.

Figure 24. Adult (age 2+) Atlantic croaker TLA composite characteristic index for the South Atlantic (NCDMF Program 195 and SCDNR trammel survey) from 2002-2021.



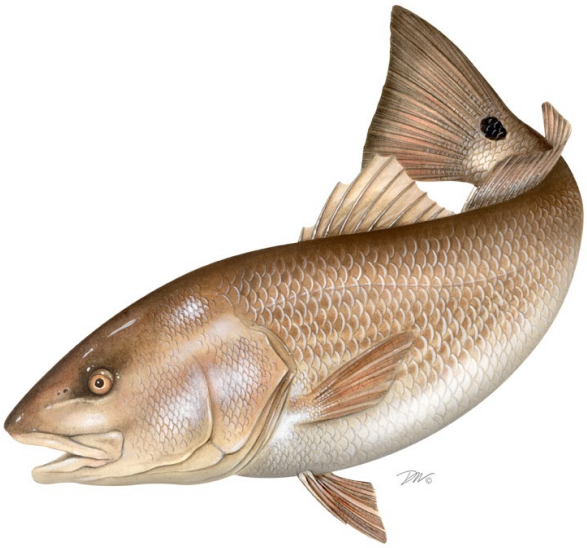
ATLANTIC STATES MARINE FISHERIES COMMISSION

REVIEW OF THE INTERSTATE FISHERY MANAGEMENT PLAN

FOR

RED DRUM
(*Sciaenops ocellatus*)

2021 FISHING YEAR



Prepared by the Plan Review Team
Drafted July 2022

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

Table of Contents

I. Status of the Fishery Management Plan

Date of FMP Approval:	Original FMP – October 1984
Amendments & Addenda:	Amendment 1 – October 1991 Amendment 2 – June 2002 Addendum 1 – August 2013
Management Areas:	The Atlantic coast distribution of the resource from New Jersey through Florida Northern: New Jersey through North Carolina Southern: South Carolina through the east coast of Florida
Active Boards/Committees:	Sciaenids Management Board, Red Drum Technical Committee, Stock Assessment Subcommittee, Plan Development Team, Plan Review Team, South Atlantic Species Advisory Panel

The Atlantic States Marine Fisheries Commission (ASMFC) adopted an Interstate Fishery Management Plan (FMP) for Red Drum in 1984. The original management unit included the states from Maryland to Florida. In 1988, the Interstate Fisheries Management Program (ISFMP) Policy Board requested that all Atlantic coastal states from Maine to Florida implement the plan's recommended management regulations to prevent development of northern markets for southern fish. The states of New Jersey through Florida are now required to follow the FMP, while Maine through New York (including Pennsylvania) are encouraged to implement consistent provisions to protect the red drum spawning stock.

In 1990, the South Atlantic Fishery Management Council (Council) adopted a FMP for red drum that defined overfishing and optimum yield (OY) consistent with the Magnuson Fishery Conservation and Management Act of 1976. Adoption of this plan prohibited the harvest of red drum in the exclusive economic zone (EEZ), a moratorium that remains in effect today. Recognizing all harvest would take place in state waters, the Council FMP recommended states implement measures necessary to achieve the target level of at least 30% escapement.

Consequently, ASMFC initiated Amendment 1 in 1991, which included the goal to attain optimum yield from the fishery over time. Optimum yield was defined as the amount of harvest that could be taken while maintaining the level of spawning stock biomass per recruit (SSBR) at or above 30% of the level which would result if fishing mortality was zero. However, a lack of information on adult stock status resulted in the use of a 30% escapement rate of sub-adult red drum to the off-shore adult spawning stock.

Substantial reductions in fishing mortality were necessary to achieve the escapement rate; however, the lack of data on the status of adult red drum along the Atlantic coast led to the adoption of a phase-in approach with a 10% SSBR goal. In 1991, states implemented or maintained harvest controls necessary to attain the goal.

As hoped, these management measures led to increased escapement rates of juvenile red drum. Escapement estimates for the northern region of New Jersey through North Carolina

(18%) and the southern region of South Carolina through Florida (17%) were estimated to be above the 10% phase-in goal, yet still below the ultimate goal of 30% (Vaughan and Carmichael 2000). North Carolina, South Carolina, and Georgia implemented substantive changes to their regulations from 1998-2001 that further restricted harvest.

The Council adopted new definitions of OY and overfishing for red drum in 1998. Optimum yield was redefined as the harvest associated with a 40% static spawning potential ratio (sSPR), overfishing as an sSPR less than 30%, and an overfishing threshold as 10% sSPR. In 1999, the Council recommended management authority for red drum be transferred to the states through the Commission's Interstate Fishery Management Program (ISFMP) process. This was recommended, in part, due to the inability to accurately determine an overfished status, and therefore stock rebuilding targets and schedules, as required under the revised Sustainable Fisheries Act of 1996. The transfer necessitated the development of an amendment to the interstate FMP in order to include the provisions of the Atlantic Coastal Fisheries Cooperative Management Act.

ASFMC adopted Amendment 2 to the Red Drum FMP in June 2002 (ASMFC 2002), which serves as the current management plan. The goal of Amendment 2 is to achieve and maintain the OY for the Atlantic coast red drum fishery as the amount of harvest that can be taken by U.S. fishermen while maintaining the sSPR at or above 40%. There are four plan objectives:

- Achieve and maintain an escapement rate sufficient to prevent recruitment failure and achieve an sSPR at or above 40%.
- Provide a flexible management system to address incompatibility and inconsistency among state and federal regulations which minimizes regulatory delay while retaining substantial ASMFC, Council, and public input into management decisions; and which can adapt to changes in resource abundance, new scientific information, and changes in fishing patterns among user groups or by area.
- Promote cooperative collection of biological, economic, and sociological data required to effectively monitor and assess the status of the red drum resource and evaluate management efforts.
- Restore the age and size structure of the Atlantic coast red drum population.

The management area extends from New Jersey through the east coast of Florida, and is separated into a northern and southern region at the North Carolina/South Carolina border. The sSPR of 40% is considered a target; an sSPR below 30% (threshold level) results in an overfishing determination for red drum. Amendment 2 required all states within the management unit to implement appropriate recreational bag and size limit combinations needed to attain the target sSPR, and to maintain current, or implement more restrictive, commercial fishery regulations. All states were in compliance by January 1, 2003. See Table 1 for state commercial and recreational regulations in 2021.

Following the approval of Amendment 2 in 2002, the process to transfer management authority to ASMFC began, including an Environmental Assessment and public comment period. The final

rule became effective November 5, 2008. It repeals the federal Atlantic Coast Red Drum Fishery Management Plan and transfers management authority of Atlantic red drum in the exclusive economic zone from the South Atlantic Fishery Management Council to the Atlantic States Marine Fisheries Commission.

The Board approved Addendum I to Amendment 2 in August 2013. The Addendum revised the habitat section of Amendment 2 to include current information on red drum spawning habitat and life-stages (egg, larval, juvenile, sub-adult, and adult). It also identified and described the distribution of key habitats and habitats of concern.

II. Status of the Stocks

The 2017 Red Drum Stock Assessment and Peer Review Report indicated overfishing was not occurring for either the northern or southern stock of red drum (ASMFC 2017). The assessment was unable to determine an overfished/not overfished status because population abundance could not be reliably estimated due to limited data for the older fish (ages 4+). A simulation assessment was recently completed providing a roadmap for future Red Drum stock assessments through the ASMFC process, with a planned benchmark assessment to follow; all work will be completed by the end of 2024.

Northern Region (NJ-NC)

Recruitment (age 1 abundance) has varied annually with a large peak occurring in 2012 (Figure 1). The trend in the three-year average sSPR indicates low sSPR early in the time series with increases during 1991 – 1997 and fluctuations thereafter (Figure 2). The average sSPR has been above the overfishing threshold ($F_{30\%}$) since 1994, and at or above the target ($F_{40\%}$) since 1996, except during one year (2002). Fishing pressure and mortality appear to be stabilized near the target fishing mortality. The average sSPR is also likely above the target benchmark.

Southern Region (SC-FL)

Recruitment (age 1 abundance) has fluctuated without apparent trend since 1991 (Figure 1). A high level of uncertainty exists around the three-year average sSPR estimates for the southern region. While the 3-year average sSPR estimate in 2013 was above both the target ($F_{40\%}$) and the overfishing threshold ($F_{30\%}$), indicating that overfishing is not occurring, the high level of uncertainty around this estimate indicates this conclusion should be considered with extreme caution (Figure 2).

NOTE: In 2018, the Marine Recreational Information Program (MRIP) transitioned from estimating effort using the Coastal Household Telephone Survey (CHTS) to the mail-based Fishing Effort Survey (FES). The 2017 stock assessment used CHTS data to estimate recreational harvest. However, as red drum is not managed by a quota and to accommodate the transition, recreational harvest estimates based on the FES data or calibration are shown in this report. Due to differing estimation methodologies, these harvest data should not be compared to reference points from the 2017 stock assessment. Harvest estimates based on either effort survey can be compared at: https://www.st.nmfs.noaa.gov/st1/recreational/queries/.

III. Status of the Fishery

Red drum landings from New Jersey through the east coast of Florida in 2021 are estimated at 6.2 million pounds (Tables 3 and 4; Figure 3). In 2021, 55% of the total landings came from the southern region where the fishery is exclusively recreational, and 45% from the northern region, similar to 2020 when 56% of the total landings came from the southern region and 44% from the northern region (Figure 4). These shifts are a significant change from the 2019 regional landings split, which were 20% from the northern region and 80% from the southern region.

Northern Region (NJ-NC)

Red drum landings in the northern region totaled 2.8 million pounds in 2021, increasing less than 1% from the previous year (Table 2). There was an increase in both commercial and recreational landings. Commercial landings totaled 218,476 pounds or 8% of the combined commercial and recreational harvest in the northern region, with 92% of commercial landings coming from North Carolina (Figure 5). This is a 26% increase in commercial landings from 2020. In North Carolina, a daily commercial trip limit and an annual cap of 250,000 pounds with payback of any overage constrained the commercial harvest. Unique to this state, the red drum fishing year extends from September 1 to August 31. In 2008, the Board approved use of this fishing year to monitor the cap. During the 2020/2021 fishing year, North Carolina landed 207,694 pounds of the 250,000 pound annual landings cap.

Recreational landings were estimated to be 2.6 million pounds in the northern region, only a slight increase from the previous year's estimates of recreational harvest at 2.5 million pounds (Table 4). North Carolina is estimated to have 1.5 million pounds of recreational landings, followed by Virginia with 1.1 million pounds. Virginia red drum recreational landings increased by 84% from the previous year. The number of fish harvested in the recreational fishery was 583,358 fish, down 13% from 2020 (Table 5). The number of fish released was similar to 2019 and 2020 at 3.8 million fish released in the northern region (Figure 6). It is estimated that 8% of released fish die as a result of being caught, resulting in an estimated 307,308 dead discarded fish in 2021 (Table 6). Recreational removals from the fishery are thus estimated to be 890,666 fish in 2021 (Figure 6 & 7).

Southern Region (SC-FL)

The southern region had no commercial landings; Florida commercial harvest has been prohibited since January 1988. South Carolina and Georgia designated red drum as a gamefish, banning commercial harvest and sale since 1987 and 2013, respectively.

Recreational landings were estimated to be 3.4 million pounds in the southern region, similar to 2020 estimates which were 3.3 million pounds (Table 4). Florida is estimated to have 2.5 million pounds of recreational landings, followed by Georgia with 506,962 lbs. The number of fish harvested in the recreational fishery was 1.2 million fish, a 15% increase from 2020 (Table 4). The number of fish released also increased by 40% compared to 2020 with 7.4 million fish released in the southern region in 2021 (Figure 6). It is estimated that 8% of released fish die as

a result of being caught, resulting in an estimated 590,172 dead discarded fish in 2021 (Table 6). Recreational removals from the fishery are thus estimated to be 1.8 million fish in 2021 (Figure 6 & 7).

IV. Status of Assessment Advice

Current stock status information comes from the 2017 stock assessment (ASMFC 2017) completed by the ASMFC Red Drum Stock Assessment Subcommittee (SAS) and Technical Committee (TC), peer reviewed by an independent panel of experts through ASMFC's desk review process, and approved by the South Atlantic State-Federal Fisheries Management Board for use in management decisions. Previous interstate management decisions were based on the last coastwide assessment, SEDAR 18 (SAFMC 2009), and prior to 2009, decisions were based on regional assessments conducted by Vaughan and Helser (1990), Vaughan (1992, 1993, 1996), and Vaughan and Carmichael (2000) that reflected the current stock structure, two stocks divided at the North Carolina-South Carolina border. Several states have also conducted state-specific assessments (e.g., Murphy and Munyandorero 2009; Takade and Paramore 2007 [update of Vaughan and Carmichael 2000]).

In 2017, a state-specific stock assessment was completed by South Carolina, which indicated the South Carolina population of red drum was experiencing overfishing (Murphy 2017). This assessment result prompted new state management regulations, which went into effect on July 1, 2018 (Table 1).

In 2020, Florida completed a stock assessment for red drum in Florida state waters[1], and found that the Atlantic Coast red drum stock was not overfished and overfishing was not occurring. The northeast region (Flagler through Nassau counties) exceeded the Commission's target escapement rate of 40%. The southeast region (Miami-Dade-Volusia counties) exceeded the escapement rate in the terminal year (2019), but does not meet the current escapement rate target. Overall, the state of Florida has an escapement rate higher than the Commission's goal of 40%.

At the Winter meeting of ASMFC in 2019, the management Board reviewed a proposal from the SAS that recommended a population simulation model be developed to simulate the full red drum population. The simulated population would be used to test a variety of assessment modeling techniques to determine which model would be the most applicable for the next benchmark stock assessment. Due to the work and modeling expertise needed for the simulation assessment, the benchmark assessment has been postponed until 2024. The Red Drum Simulation Assessment and Peer Review Report was accepted by the Board at their May 2022 meeting. The Peer Review Panel recommended the stock synthesis model should be used to assess the northern (from New Jersey – North Carolina) and southern (from South Carolina – Florida) red drum stocks, while the statistical catch-at-age model should not be used. The Panel also recommended using a traffic light approach to monitor changes in landings and stock

[1] Addis, D. 2020. The 2020 stock assessment of Red Drum, *Sciaenops ocellatus*, in Florida. Florida Fish and Wildlife Conservation Commission Fish and Wildlife Research Institute In-House Report IHR2020-002: 129 p.

abundance in between assessments. Work will begin on the 2024 Red Drum Benchmark Assessment in fall 2022.

V. Status of Research and Monitoring

No monitoring or research programs are annually required of the states except for the submission of a compliance report. Fishery-dependent (other than catch and effort data) monitoring programs are conducted from Maryland to Florida, with biological and sportfish carcass recovery programs collecting age, length, and sex data. Virginia, North Carolina, and South Carolina also conduct sportfish tagging programs. Fishery-independent monitoring programs that directly target or may encounter red drum are conducted in New Jersey, Delaware, North Carolina, South Carolina, Georgia, and Florida. Data collected includes CPUE, biological data, YOY indices, and mark-recapture data. See Table 2 for details on the fishery independent indices and ongoing-surveys.

VI. Status of Management Measures and Issues

Fishery Management Plan

Amendment 2 was fully implemented by January 1, 2003, providing the management requirements for 2021. Requirements include: recreational regulations designed to achieve at least 40% sSPR, a maximum size limit of 27 inches or less, and current or more stringent commercial regulations. States are also required to have in place law enforcement capabilities adequate to successfully implement their red drum regulations. In August 2013, the Board approved Addendum I to Amendment 2 of the Red Drum FMP. The Addendum revises the habitat section of Amendment 2 to include the most current information on red drum spawning habitat for each life stage (egg, larval, juvenile, sub-adult, and adult). It also identifies the distribution of key habitats and habitats of concern, including potential threats and bottlenecks.

Management Changes

At its July meeting, the Florida Fish and Wildlife Conservation Commission approved new management regions and regulation changes for red drum in state waters following a final rule hearing, to be effective September 1, 2022. Statewide, the new regulations will prohibit the captain and crew to retain a bag limit when on a fire-head trip and reduce the off-the-water transport limit of red drum from 6 to 4 fish per person. Regionally, there will now be nine red drum management regions, the Indian River Lagoon Region will be catch-and-release only, and a one fish bag limit will be maintained in the Big Bend Region. Additionally, the 8 fish bag limit will be reduced to 4 fish in the Panhandle, Big Bend, and Northeast Regions, and reduced to 2 fish in the Tampa Bay, Sarasota Bay, Charlotte Harbor, Southwest, and Southeast regions.

De Minimis Requests

New Jersey and Delaware requested *de minimis* status through the annual reporting process. While Amendment 2 does not include a specific method to determine whether a state qualifies for *de minimis*, the PRT chose to evaluate an individual state's contribution to the fishery by comparing the two-year average of total landings of the state to that of the management unit. New Jersey and Delaware each harvested zero percent of the two-year average of total landings. *De minimis* status does not exempt either state from any requirement; it may exempt

them from future management measures implemented through addenda to Amendment 2, as determined by the Board.

VII. Implementation of FMP Compliance Requirements for 2021

The PRT found no inconsistences among states with the requirements of Amendment 2 and no inconsistences were found.

VIII. Recommendations of the Plan Review Team

Management and Regulatory Recommendations

Consider approval of the *de minimis* requests by New Jersey and Delaware.

Research Recommendations

Research recommendations can be found in the most recent stock assessment found here and the 2022 Simulation Assessment and peer review report here. The PRT had the additional research recommendations:

- Implement surveys (e.g., logbooks, electronic methods, etc.) to determine the length composition (and age data, if possible) of recreational discards (B2) of red drum. This information has been highlighted as the single largest data gap in previous assessments.

- Continue sampling of adult red drum surveys to determine abundance, size, age, sex composition, and maturity of the adults. Additionally, investigate the possibility of senescence in female red drum. Investigate how targeting of adult red drum spawning and post-spawning aggregations via catch-and-release hook-and-line fisheries by anglers is affecting the reproductive potential of the stock due to both direct lethal and sub-lethal effects.

- Assess the effects of environmental factors on stock density/year class strength. Determine whether natural environmental perturbations affect recruitment and modify relationships with spawning stock size.

- Support and conduct applied research to evaluate the social and economic value of this important, primarily recreational fishery. Accomplishing this includes continued support of the Marine Recreational Fishing Expenditures Survey that is conducted every three to five years by NOAA fisheries as well as conducting applied research on projecting social and/or economic estimated impacts associated with this fishery.

IX. References

Atlantic States Marine Fisheries Commission (ASMFC). 2002. Amendment 2 to the Interstate Fishery Management Plan for Red Drum. ASMFC, Washington, DC, Fishery Management Report No. 38, 141 p.

ASMFC. 2017. Red Drum Stock Assessment and Peer Review Report. Atlantic States Marine Fisheries Commission, Stock Assessment Report, 126 p.

ASMFC. 2022. Red Drum Simulation Assessment and Peer Review Report. Atlantic States Marine Fisheries Commission, Stock Assessment Report, 567 p.

Murphy, MD. 2017. An assessment of red drum in South Carolina, 1982-2016. South Carolina Department of Natural Resources Marine Resources Research Institute, In House Report 2017, 46 p.

Murphy, MD and J. Munyandorero. 2009. An assessment of the status of red drum in Florida through 2007. Florida Fish and Wildlife Commission Fish and Wildlife Research Institute, St. Petersburg, In-House Report 2008-008, 106 p.

South Atlantic Fishery Management Council (SAFMC). 2009. Southeast Data, Assessment and Review 18, Stock Assessment Report, Atlantic Red Drum. North Charleston, SC. 544 p.

Takade, H and L Paramore. 2007. Stock Status of the Northern Red Drum Stock. North Carolina Division of Marine Fisheries. In-House Report, 60 p.

Vaughan, DS. 1992. Status of the red drum stock of the Atlantic coast: Stock assessment report for 1991. NOAA Tech. Mem. NMFS-SEFC-297. 58 p.

Vaughan, DS. 1993. Status of the red drum stock of the Atlantic coast: Stock assessment report for 1992. NOAA Tech. Mem. NMFS-SEFC-313. 60 p.

Vaughan, DS. 1996. Status of the red drum stock of the Atlantic coast: Stock assessment report for 1995. NOAA Tech. Mem. NMFS-SEFC-380. 50 p.

Vaughan, DS and JT Carmichael. 2000. Assessment of Atlantic red drum for 1999: northern and southern regions. NOAA Tech. Mem. NMFS-SEFSC-447, 54 p. + app. U.S. DOC, NOAA, Center for Coastal Fisheries and Habitat Research, Beaufort, NC.

Vaughan, DS and JT Carmichael. 2001. Bag and size limit analyses for red drum in northern and southern regions of the U.S. South Atlantic. NOAA Tech. Mem. NMFS-SEFSC-454, 37 p. U.S. DOC, NOAA, Center for Coastal Fisheries and Habitat Research, Beaufort, NC.

Vaughan, DS and TE Helser. 1990. Status of the red drum stock of the Atlantic coast: Stock assessment report for 1989. NOAA Tech. Mem. NMFS-SEFC-263. 117 p.

X. Figures

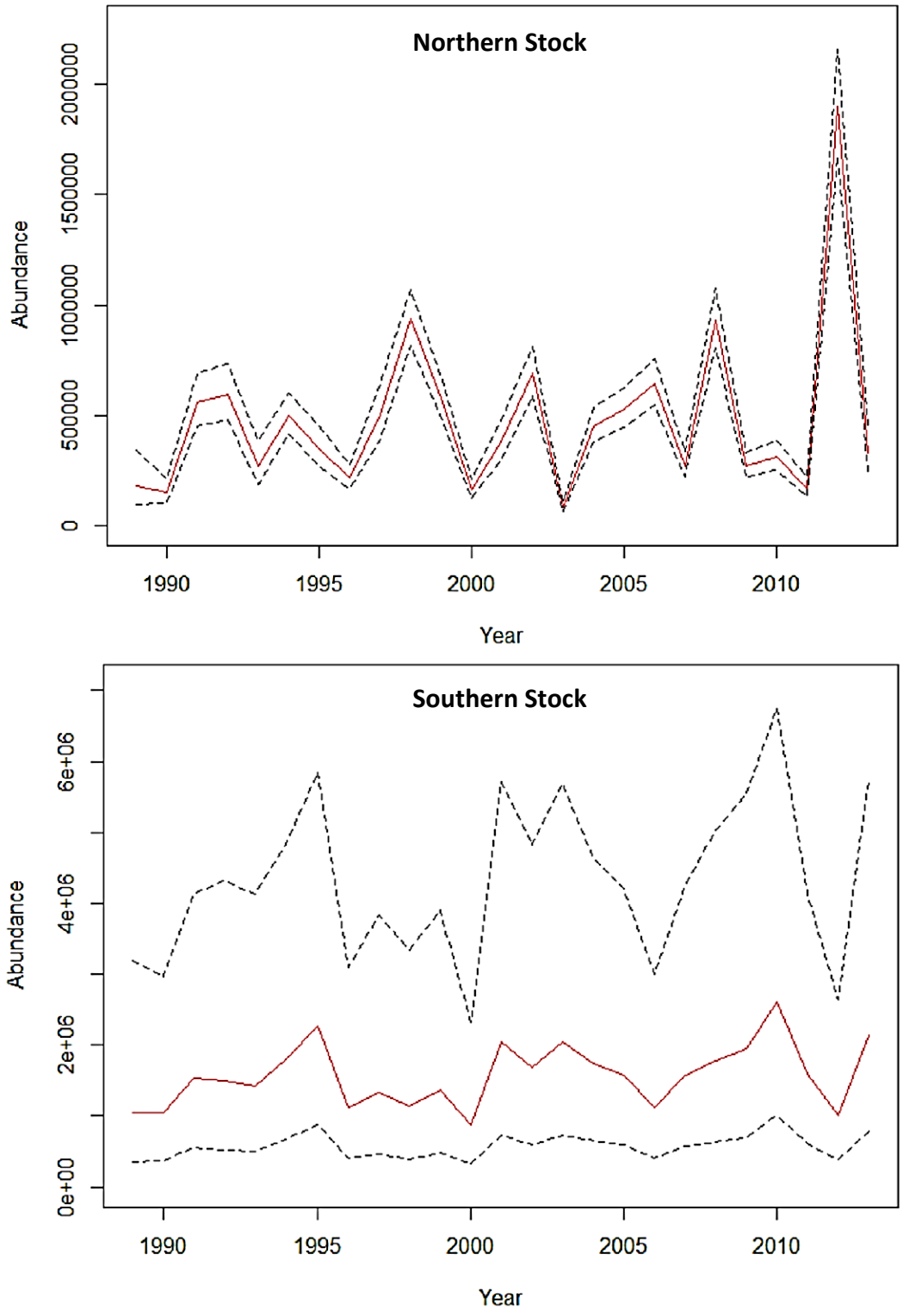


Figure 1. Predicted recruitment (age-1 abundance, red lines) with 95% confidence intervals (dashed black lines) for the northern (top) and southern (bottom) regions (Source: ASMFC 2017).

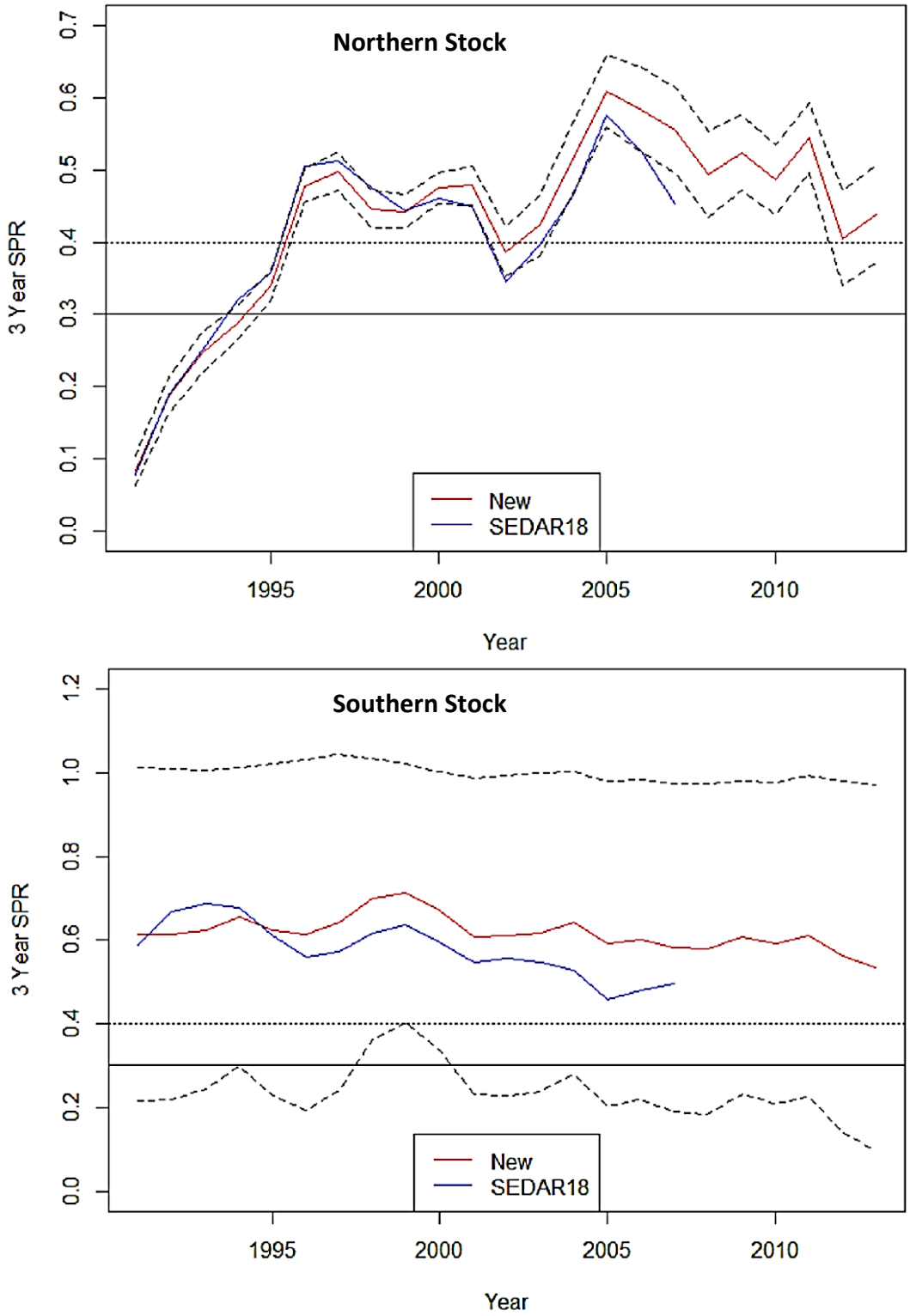


Figure 2. Three year average sSPR (red lines) for the northern (top) and southern (bottom) stocks with 95% confidence intervals (dashed black lines). Point estimates from the previous benchmark assessment (SEDAR18) are included for comparison. The target sSPR (dotted black line) is 40% and the threshold sSPR (solid black line) is 30% (Source: ASMFC 2017)**.**

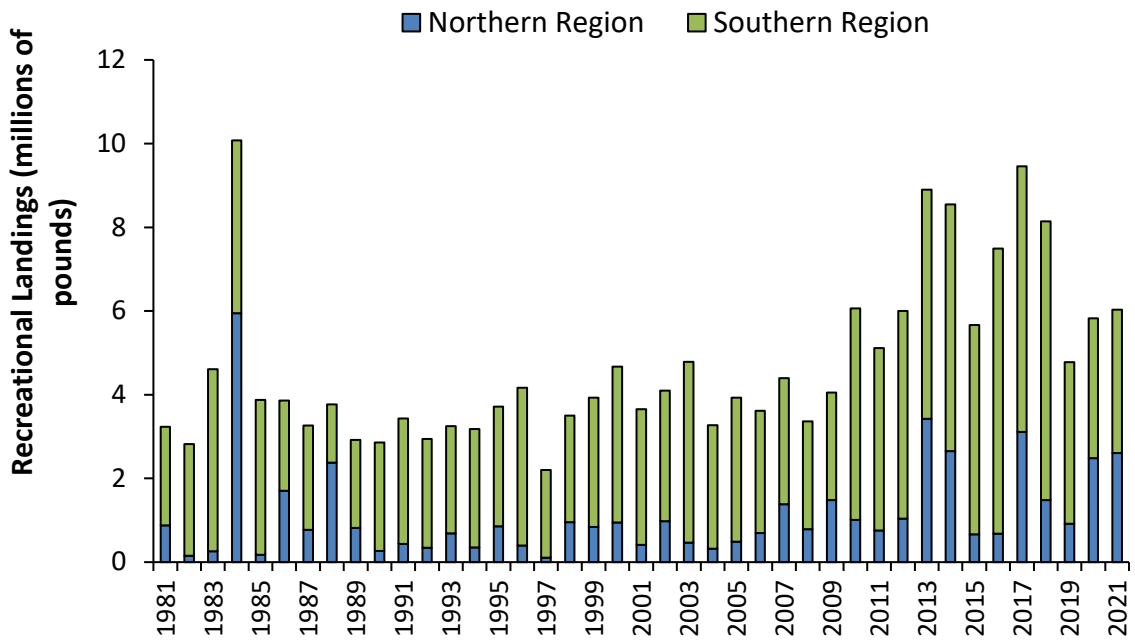


Figure 3. Recreational landings of red drum by region (1981-2021). See Table 3 for values and data sources.

*Recreational weight data for NC-FL in 1988 is unavailable. Recreational harvests in pounds were estimated for these states in this year by multiplying each state's 1988 harvest in numbers of fish by its time series average weight.

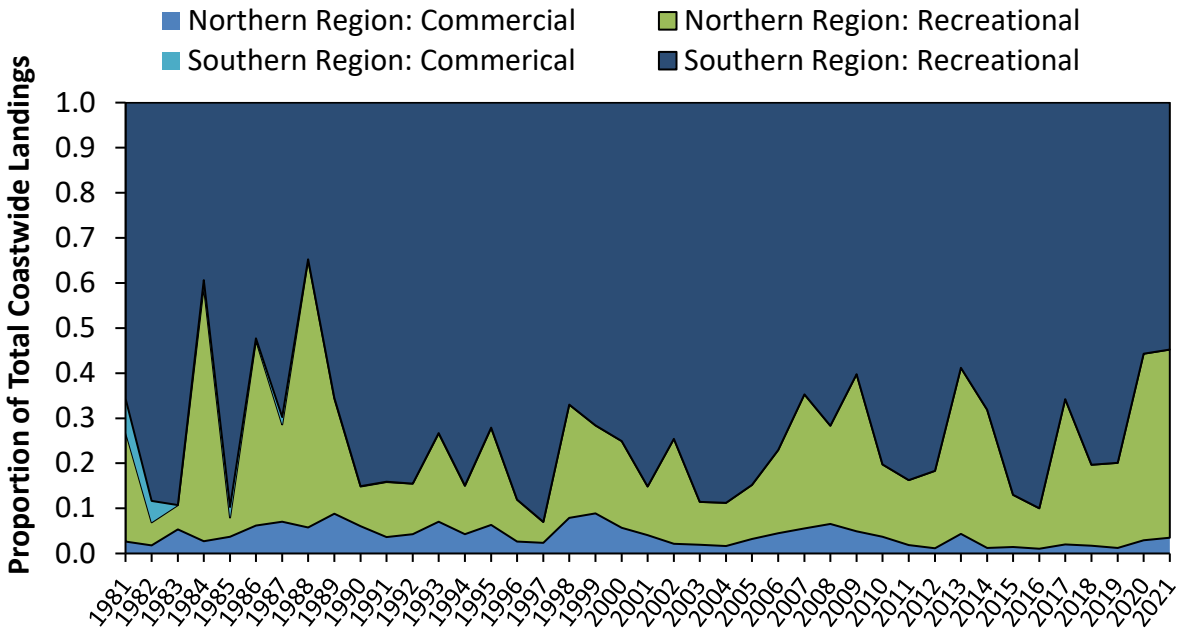


Figure 4. Proportion of regional, sector-specific landings to total coastwide landings (pounds). See Tables 2 and 3 for data sources.

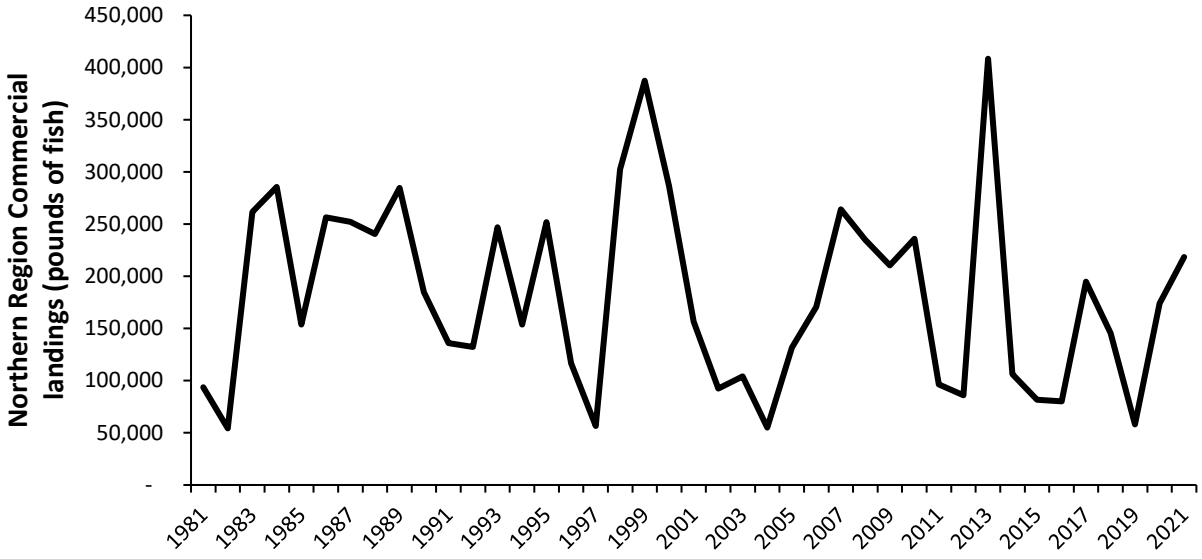


Figure 5. Commercial landings of red drum from the Northern Region (1981-2021). See Table 2 for values and data sources.

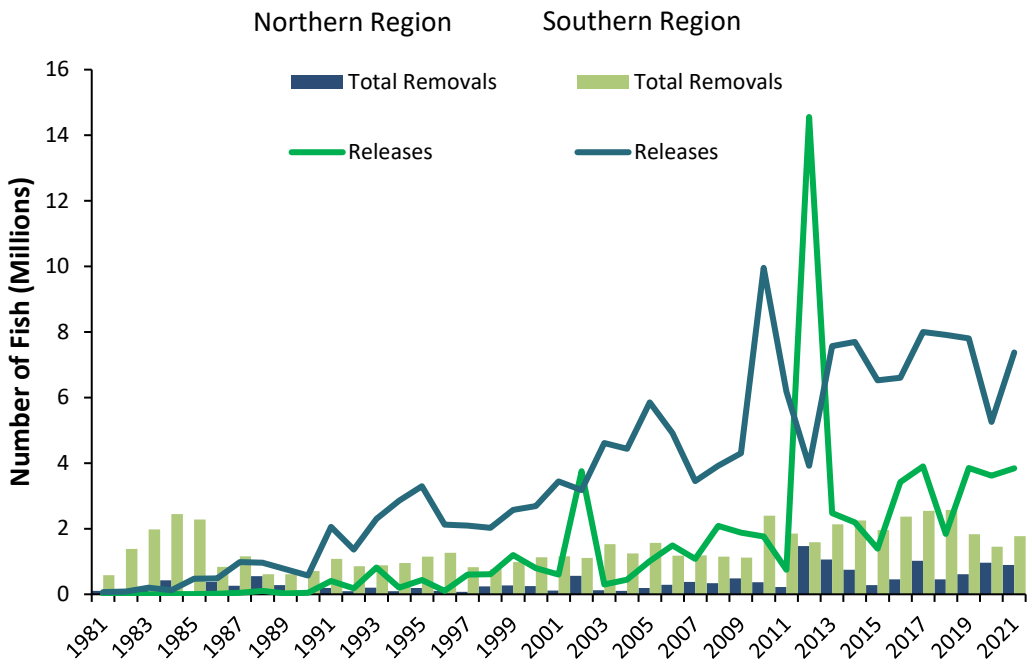


Figure 6. Total recreational removals (numbers) compared to recreational releases of red drum (numbers). See Tables 5 and 6 for values and data sources.

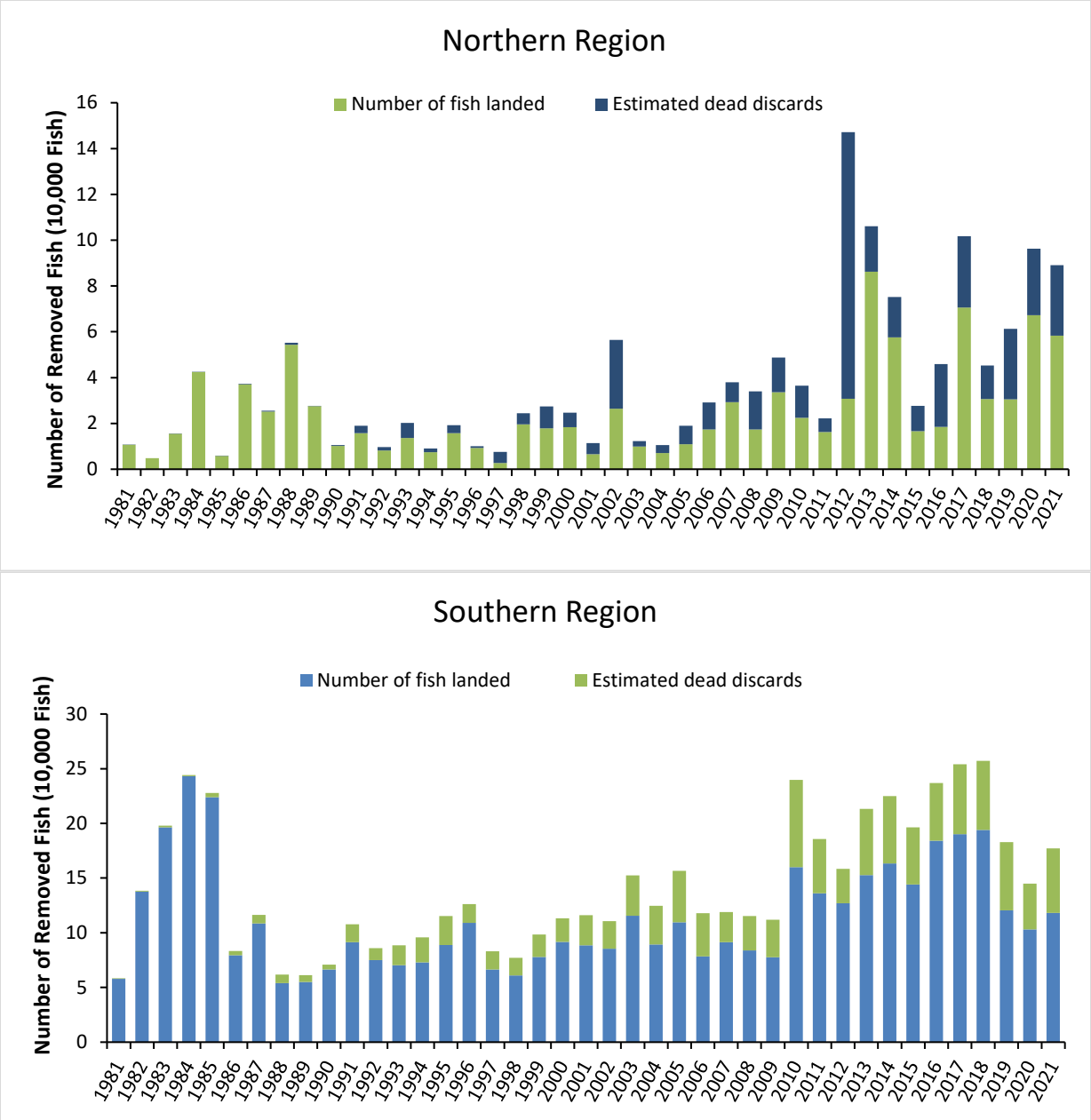


Figure 7. Recreational removals (landings and dead discards) of red drum (numbers) by region. Dead discards are estimated by applying an 8% discard mortality rate to alive releases. See Tables 5 & 6 for values and data sources.

XI. Tables

Table 1. Red drum regulations for 2021. The states of New Jersey through Florida are required to meet the requirements in the FMP; states north of New Jersey are encouraged to follow the regulations. All size limits are total length.

State	Recreational	Commercial
NJ	18" - 27", 1 fish	18" - 27", 1 fish
DE	20" - 27", 5 fish	20" - 27", 5 fish
MD	18" - 27", 1 fish	18" - 25", 5 fish
PRFC	18" - 25", 5 fish	18" - 25", 5 fish
VA	18" - 26", 3 fish	18" - 25", 5 fish
NC	18" - 27", 1 fish	18" - 27"; 250,000 lbs harvest cap with overage payback (150,000 lbs Sept 1- April 30; 100,000 lbs May 1-Aug 31); harvest of red drum allowed with 7 fish daily trip limit; daily landed catch of flounder, bluefish, black drum or striped mullet must exceed daily catch of drum; small mesh (<5" stretched mesh) gill nets attendance requirement May 1 - November 30. Fishing year: September 1 – August 31.
SC	15" - 23", 2 fish per person per day bag limit and 6 fish per boat per day boat limit	Gamefish Only
GA	14" - 23", 5 fish	Gamefish Only
FL	18" - 27"; Northeast Region – 2 fish per person per day, 8 fish vessel limit, Northwest and South Region – 1 fish per person day bag limit, 8 fish vessel limit	Sale of native fish prohibited

Table 2. Overview of each state's fishery independent surveys.

State	Fishery Independent Monitoring Details
New Jersey	Five annual nearshore trawl surveys conducted since 1988, in January/February, April, June, August, and October. Length and weight data, and catch per unit effort (CPUE) in number of fish per tow and biomass per tow recorded for all species.
Delaware	30-ft bottom trawl survey and 16-ft bottom trawl survey. Neither survey has ever captured red drum.
North Carolina	Seine survey since 1991 produces age-0 abundance index. Gill net survey in Pamlico Sound since 2001 characterizes size and age distribution, produces abundance index, improves bycatch estimates, and studies habitat usage. Longline survey since 2007 produces adult index of abundance and tags fish.
South Carolina	Estuarine trammel net survey for subadults. Electrofishing survey in low salinity estuarine areas for juveniles/subadults. Inshore and coastal bottom longline survey for biological data and adult abundance index. Genetic sub-sampling and tagging conducted during these three surveys.
Georgia	Estuarine trammel net survey for subadult biological data and abundance index. Estuarine gill net survey for young-of-year (YOY) biological data and abundance index. Bottom longline survey for adult biological data and abundance index.
Florida	Seine surveys characterizing young-of-year (YOY) (<40 mm standard length) and sub-adult (>299 mm) abundance along the northeast (NE) and southeast (SE) Florida coasts.

Table 3. Commercial landings (pounds) of red drum by state, 2012-2021. (Source: personal communication with ACCSP, Arlington, VA, for years prior to 2021 and state compliance reports for 2021, except as noted below.) Note that SC, GA, and FL do not have commercial red drum fisheries, and years with incidental landings are included in the total.

Year	NJ to PRFC	VA	NC	Total
2012	8,318	2,786	66,519	77,691
2013	3,176	30,137	371,949	405,262
2014	353	14,733	90,647	105,732
2015	421	814	80,282	81,516
2016	197	1,898	77,833	79,927
2017	644	6,971	186,411	194,032
2018	C	885	144,464	145,501
2019	32	1,650	56,393	58,107
2020	104	7,989	165,670	173,867
2021	324	17,788	200,364	218,476

*C indicates confidential landings, and totals have been rounded to protect confidentiality.

Table 4. Recreational landings (pounds) of red drum by state, 2012-2021. (Source: personal communication with MRIP for data prior to 2021; state compliance reports for 2021)

Year	NJ	DE	MD	VA	NC	Northern Region Total
2012		9,948	158,313	225,732	648,342	1,042,335
2013		13,536	12,086	1,185,572	2,214,045	3,425,239
2014				979,388	1,674,595	2,653,983
2015				98,329	567,730	666,059
2016				45,451	633,496	678,947
2017			6,782	1,628,692	1,475,852	3,111,326
2018				31,566	1,452,358	1,483,924
2019	4,107		2,113	470,940	436,219	913,379
2020		1,544	115,181	610,001	1,758,789	2,485,515
2021			5,441	1,123,953	1,479,550	2,608,944

Year		SC	GA	FL	Southern Region Total
2012		1,007,542	221,044	3,727,020	4,955,606
2013		682,544	452,283	4,341,545	5,476,372
2014		921,971	387,367	4,582,561	5,891,899
2015		656,747	394,787	3,949,000	5,000,534
2016		536,550	586,235	5,694,370	6,817,155
2017		1,048,249	826,857	4,470,905	6,346,011
2018		643,213	1,186,306	4,829,344	6,658,863
2019		862,124	630,294	2,372,773	3,865,191
2020		671,004	535,674	2,135,588	3,342,073
2021		441,191	506,962	2,473,995	3,422,148

Table 5. Recreational landings (numbers) of red drum by state, 2012-2021. (Source: personal communication with MRIP for data prior to 2021; state compliance reports for 2021)

Year	NJ	DE	MD	VA	NC	Northern Total
2012		2,256	62,444	90,856	152,005	307,561
2013		3,734	4,766	333,590	520,758	862,848
2014				251,501	324,303	575,804
2015				22,102	143,876	165,978
2016				15,866	169,195	185,061
2017			4,943	347,145	353,716	705,804
2018				6,334	299,577	305,911
2019	1,331		1,258	205,824	97,186	305,599
2020		493	44,975	214,069	413,419	672,956
2021			1,415	256,281	325,662	583,358

Year	SC	GA	FL		Southern Total
2012	296,380	96,354	877,569		1,270,303
2013	282,688	236,760	1,007,729		1,527,177
2014	393,424	212,193	1,027,980		1,633,597
2015	258,493	201,049	981,685		1,441,227
2016	241,224	289,928	1,309,505		1,840,657
2017	455,887	467,522	978,520		1,901,929
2018	262,725	606,836	1,069,604		1,939,165
2019	333,315	271,970	599,348		1,204,633
2020	239,874	230,026	560,382		1,030,282
2021	210,454	261,488	710,091		1,182,033

Table 6. Recreational alive releases (numbers) of red drum by state, 2012-2021. (Source: personal communication with MRIP for data prior to 2021; state compliance reports for 2021)

Year	NJ	DE	MD	VA	NC	Northern Region Total	Northern Region Dead Discards
2012		42,738	1,250,726	8,323,032	4,939,534	14,556,030	1,164,482
2013		1,325	7,125	576,743	1,892,171	2,477,364	198,189
2014		264	659	1,108,646	1,086,967	2,196,536	175,723
2015			1,456	78,590	1,308,072	1,388,118	111,049
2016		2,598	47,908	164,575	3,203,452	3,418,533	273,483
2017			14,148	1,722,618	2,165,656	3,902,422	312,194
2018	4,715		21,384	85,338	1,729,260	1,840,697	147,256
2019		474	5,740	865,957	2,976,601	3,848,772	307,902
2020			217,710	716,277	2,686,150	3,620,137	289,611
2021		1,147	22,218	1,272,609	2,545,371	3,841,345	307,308

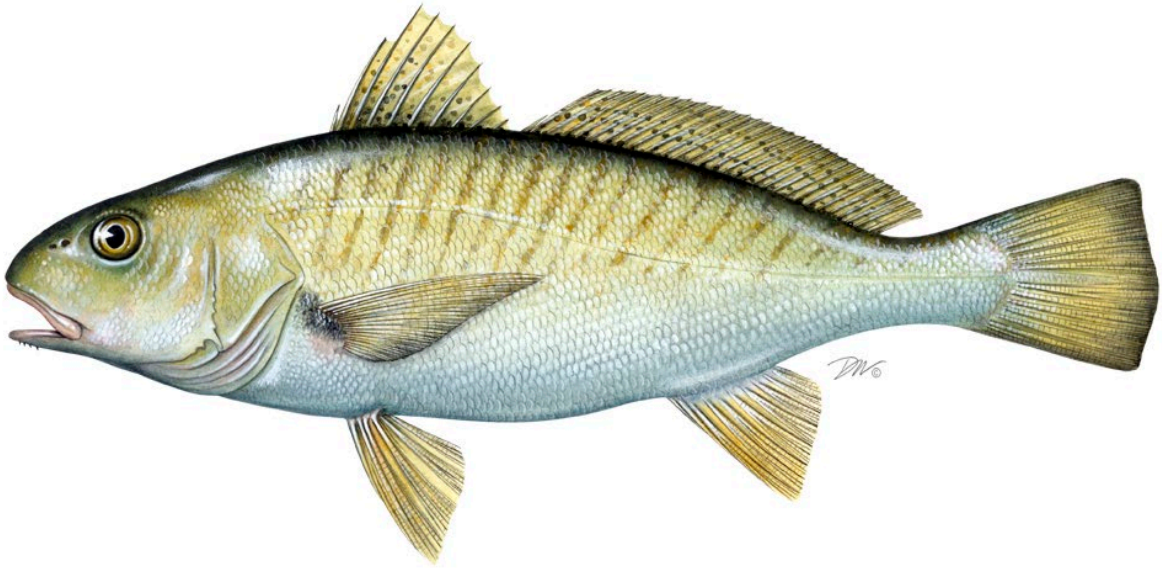
Year	SC	GA	FL		Southern Region Total	Southern Region Dead Discards
2012	1,083,096	220,312	2,614,554		3,917,962	313,437
2013	1,864,510	504,759	5,196,513		7,565,782	605,263
2014	1,874,809	750,619	5,074,602		7,700,030	616,002
2015	1,432,754	961,277	4,132,461		6,526,492	522,119
2016	1,266,931	601,153	4,734,303		6,602,387	528,191
2017	2,094,199	1,176,524	4,727,411		7,998,134	639,851
2018	1,493,803	1,045,570	5,375,011		7,914,384	633,151
2019	2,911,653	1,206,707	3,688,884		7,807,244	624,580
2020	1,705,054	393,368	3,154,500		5,252,922	420,234
2021	1,894,088	794,030	4,689,030		7,377,148	590,172

ATLANTIC STATES MARINE FISHERIES COMMISSION

REVIEW OF THE INTERSTATE FISHERY MANAGEMENT PLAN

FOR ATLANTIC CROAKER
(Micropogonias undulatus)

2021 FISHING YEAR



Prepared by the Plan Review Team
Drafted July 2022

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

Table of Contents

I. Status of the Fishery Management Plan

Date of FMP Approval:	Original FMP – October 1987
Amendments:	Amendment 1 – November 2005 (implemented January 2006) Addendum I – March 2011 Addendum II – August 2014 Addendum III – February 2020
Management Areas:	The Atlantic coast distribution of the resource from New Jersey through Florida
Active Boards/Committees:	South Atlantic State/Federal Fisheries Management Board; Atlantic Croaker Technical Committee, Stock Assessment Subcommittee, and Plan Review Team; South Atlantic Species Advisory Panel

The Fishery Management Plan (FMP) for Atlantic Croaker was adopted in 1987 and included the states from Maryland through Florida (ASMFC 1987). In 2004, the South Atlantic State/Federal Fisheries Management Board (Board) found the recommendations in the FMP to be vague, and recommended that an amendment be prepared to define management measures necessary to achieve the goals of the FMP. The Interstate Fisheries Management Program Policy Board also adopted the finding that the original FMP did not contain any management measures that states were required to implement.

In 2002, the Board directed the Atlantic Croaker Technical Committee (TC) to conduct the first coastwide stock assessment of the species to prepare for developing an amendment. The Atlantic Croaker Stock Assessment Subcommittee developed a stock assessment in 2003, which was approved by a Southeast Data Assessment Review (SEDAR) panel for use in management in June 2004 (ASMFC 2005a). The Board quickly initiated development of an amendment and, in November 2005, approved Amendment 1 to the Atlantic Croaker FMP (ASMFC 2005b). The amendment was fully implemented by January 1, 2006.

The goal of Amendment 1 was to utilize interstate management to perpetuate the self-sustainable Atlantic croaker resource throughout its range and generate the greatest economic and social benefits from its commercial and recreational harvest and utilization over time. Amendment 1 contains four objectives:

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.

Amendment 1 expanded the management area to include the states from New Jersey through Florida. Consistent with the stock assessment completed in 2004, the amendment defined two Atlantic coast management regions: the south-Atlantic region, from Florida through South Carolina; and the mid-Atlantic region, from North Carolina through New Jersey.

Amendment 1 established biological reference points (BRPs) to define an overfished and overfishing stock status for the mid-Atlantic region only. Reliable stock estimates and BRPs for the South Atlantic region could not be developed during the 2004 stock assessment due to a lack of data. The BRPs were based on maximum sustainable yield (MSY), and included threshold and target levels of fishing mortality (F) and spawning stock biomass (SSB): F threshold = F_{MSY} (estimated to be 0.39); F target = 0.75 X F_{MSY} (estimated to be 0.29); SSB threshold = 0.7 X SSB_{MSY} (estimated to be 44.65 million pounds); and SSB target = SSB_{MSY} (estimated to be 63.78 million pounds). An SSB estimate below the SSB threshold resulted is an overfished status determination, and an F estimate above the F threshold resulted is an overfishing status determination. The Amendment established that the Board would take action, including a stock rebuilding schedule if necessary, should the BRPs indicate the stock is overfished or overfishing is occurring.

Amendment 1 did not require any specific measures restricting recreational or commercial harvest of Atlantic croaker. States that already had more conservative measures were encouraged to maintain those regulations (Table 1). The Board was able to revise Amendment 1 through adaptive management, including any regulatory and/or monitoring requirements in subsequent addenda, along with procedures for implementing alternative management programs via conservation equivalency.

The Board initiated Addendum I to Amendment I at its August 2010 meeting, following the updated stock assessment, in order to address the proposed reference points and management unit. The stock assessment evaluated the stock as a coastwide unit, rather than the two management units established within Amendment I. In approving Addendum I, the Board endorsed consolidating the stock into one management unit, as proposed by the stock assessment. In addition, Addendum I established a procedure, similar to other species, by which the Board may approve peer-reviewed BRPs without a full administrative process, such as an amendment or addendum.

In August 2014, the Board approved Addendum II to the Atlantic Croaker FMP. The Addendum established the Traffic Light Approach (TLA) as the new precautionary management framework to evaluate fishery trends and develop management actions. The TLA was originally developed as a management tool for data poor fisheries. The name comes from assigning a color (red, yellow, or green) to categorize relative levels of population indicators. When a population characteristic improves, the proportion of green in the given year increases. Harvest and abundance thresholds of 30% and 60% were established in Addendum II, representing

moderate and significant concern for the fishery. If thresholds for both population characteristics achieve or exceed a threshold for a three year period, then management action is enacted.

The TLA framework replaces the management triggers stipulated in Addendum I, which dictated that action should be taken if recreational and commercial landings dropped below 70% of the previous two year average. Those triggers were limited in their ability to illustrate long-term declines or increases in stock abundance. In contrast, the TLA approach is capable of better illustrating trends in the fishery through changes in the proportion of green, yellow, and red coloring. A 2018 TC report recommended several updates to the current TLA approach (ASMFC 2018). The Board initiated an Addendum III to incorporate these updates.

In February 2020 the Board approved Addendum III to Amendment 1 of the Atlantic Croaker FMP. This addenda adjusted the TLA to incorporate additional fishery-independent indices, age information, use of regional characteristics, and changes to the management triggering mechanisms. Management triggers and responses include bag limits for the recreational fishery and percentage harvest reductions from a 10 year average for the commercial fishery. The response will be defined by which percent threshold (30% or 60%) that was exceeded in any of the 3 out of 4 terminal years.

Addenda III did not add or change any management measures or requirements, unless management-triggering mechanisms are tripped. The only pre-existing requirement is for states 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.

II. Status of the Stock

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

The conclusions of the 2010 stock assessment (ASMFC 2010), which is the most recent assessment that was recommended by peer review for management use, were that Atlantic croaker was not experiencing overfishing and biomass had increased and fishing mortality decreased since the late 1980s. The 2010 assessment was unable to confidently determine stock status, particularly with regards to biomass, due to an inability to adequately estimate removals from discards of the South Atlantic shrimp trawl fishery. 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 discards represent a considerable proportion of Atlantic croaker removals, ranging from 7% to 78% annually during 1988-2008, according to the 2010 assessment (ASMFC 2010).

One of the primary reasons that the 2017 stock assessment did not pass peer review was due to conflicting signals in harvest and abundance metrics. 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 recent abundance indices have shown increases while harvest has declined to some of the lowest levels on record. One factor thought 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.

In response, the Atlantic Croaker TC recommended several changes to the annual TLA through Addendum III. The addendum added 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, all surveys used revised adult abundance indices and not have an established reference period of 2002-2012. Regional metrics where also used to characterize the fisheries north and south of the Virginia-North Carolina state line. The ChesMMAP and the NEFSC surveys will be used to characterize abundance north of the state line, and SCDNR Trammel Net and SEAMAP surveys will be used to characterize abundance south of the state line.

III. Status of the Fishery

This report includes updated recreational estimates from the Marine Recreational Information Program's transition to the mail-based Fishing Effort Survey (FES) on July 1, 2018. Past recreational estimates have been calibrated to the FES and, therefore, are different from those shown in FMP Reviews and state compliance reports prior to 2018.

Total Atlantic croaker harvest (recreational and commercial) from New Jersey through the east coast of Florida in 2021 is estimated at 3.0 million pounds (Tables 2 and 3, Figure 1). This represents a 39% decrease in total harvest from 2020 (5.0 million pounds). The commercial and recreational fisheries harvested 32% and 68% of the 2021 total, respectively, which was similar to 2020 when the recreational fishery also harvested a majority (84%) of the total Atlantic croaker harvest. This represents a large shift from the previous 10 year average spilt, of 52% and 47%, respectively, from 2010 to 2019. Many states had to have some data for 2020 recreational harvest data imputed from prior years due to interruptions in sampling from COVID-19 (Table 4).

Atlantic coast commercial landings of Atlantic croaker exhibit a cyclical pattern, with low harvests in the 1960s to early 1970s and the 1980s to early 1990s, and high harvests in the mid-to-late 1970s and the mid-1990s to early 2000s (Figure 1). Commercial landings increased from a low of 3.7 million pounds in 1991 to 28.6 million pounds in 2001; however, landings have declined every year from 2010 to 806,781 pounds in 2020, the lowest of the time series (1950-2021). Landings increased by 21% in 2021, to 972,121 pounds, the second lowest value in the time series. Within the management unit, the majority of 2021 commercial landings came from North Carolina (56%) and Virginia (30%).

From 1981-2021, recreational landings of Atlantic croaker from New Jersey through Florida have varied by count between 5.2 million fish in 2021 and 36.2 million fish in 1986 and by weight between 1.8 million pounds in 2019 and 18.9 million pounds in 2003 (Tables 5 and 6, Figure 2). Landings generally increased from 1990 until 2003, after which they showed a declining trend through 2021. The 2021 landings are estimated at 5.2 million fish and 2.0 million pounds, a 51% decrease in number of fish and fish weight from 2020. Virginia was responsible for 36% of the 2021 recreational landings, in numbers of fish, followed by North Carolina (20%). It is important to note that due to the COVID-19 pandemic, some 2020 MRIP data was imputed to fill in missing data. The percent contribution of imputed data ranged from 0% for Maryland up to 70% for New Jersey (Table 4).

The number of recreational releases generally increased over the time series until 2013 when releases steadily declined until 2018, when a time series low of 18.1 million fish were released (Table 6 and Figure 2). From 2018 through 2021, releases have overall been increasing again. The percentage of released recreational catch has shown an increasing trend from the 1990s to 2021. In 2021, anglers released 27.5 million fish, a slight decrease from the 31.8 million fish released in 2020. However, anglers released a greater percentage of the total recreational catch in 2021, compared to 2020. An estimated 84% of the total recreational croaker catch was released in 2021, the highest percentage on record, compared to 75% in 2020 (Figure 2).

IV. Status of Assessment Advice

A statistical catch-at-age (SCA) model was used in the 2010 Atlantic croaker stock assessment (ASMFC 2010). This model combines catch-at-age data from the commercial and recreational fisheries with information from fishery-independent surveys and biological information such as growth rates and natural mortality rates to estimate the size of each age class and the exploitation rate of the population. The assessment was peer reviewed by a panel of experts in conjunction with the Southeast Data, Assessment, and Review (SEDAR) process.

The benchmark stock assessment conducted in 2017 was not recommended for management use due to uncertainty in biomass estimates resulting from conflicting signals among abundance indices and catch time series as well as sensitivity of model results to assumptions and model inputs. Specifically, model-estimated values of stock size, fishing mortality, and biological reference points are too uncertain for use; however, the trends in model-estimated parameters and ratio-based fishing F reference points are considered reliable. Currently, a Traffic Light Approach (TLA) is used to monitor the stock and make management decisions in lieu of an approved stock assessment. The TLAs can be found here.

V. Status of Research and Monitoring

There are no research or monitoring programs required of the states except for the submission of an annual compliance report. New Jersey, Delaware, Maryland, Potomac River Fisheries Commission (PRFC), Virginia, North Carolina, South Carolina, and Georgia conduct fishery-dependent (other than catch and effort data) monitoring programs. All states and jurisdictions

conduct fishery-independent monitoring programs along the Atlantic coast from New Jersey to Florida.

The Northeast Fishery Science Center (NEFSC) performs a randomly stratified groundfish survey from Cape Hatteras, North Carolina to Maine. Atlantic croaker are one of the main species caught throughout much of the survey area and, since the surveys started in 1972, it provides a long term data set. Since 1994, there has been an increase in annual catch variability. The NEFSC survey was not carried out in 2020 due to the COVID-19 pandemic, but was active again in 2021.

VI. Status of Management Measures and Issues

Fishery Management Plan

Amendment 1 was fully implemented by January 1, 2006, and provided the management plan for the 2009 fishing year. There are no interstate regulatory requirements for Atlantic croaker. Should regulatory requirements be implemented in the future, all state programs must include law enforcement capabilities adequate for successfully implementing the regulations. Addendum I to Amendment 1 was initiated in August 2010 and approved in March 2011, in order to 1) revise the biological reference points to be ratio-based, and 2) remove the distinction of two regions within the management unit, based on the results of the 2010 stock assessment. Addendum II was approved August 2014 and established the TLA management framework for Atlantic croaker in order to better illustrate long-term trends in the fishery. Addendum III was approved February 2020 and adjusted management though the TLA by incorporating additional fishery-independent indices, age information, use of regional characteristics, and changes to the management-triggering mechanisms.

Traffic Light Approach

2021 Harvest Metrics

The Mid-Atlantic harvest metric exceeded the 60% red threshold in all four terminal years (2018-2021; Figure 3) and the South Atlantic harvest metric has exceeded the 30% red threshold in all four terminal years (2018-2021; Figure 4). This is the second consecutive year the harvest metric in both regions has triggered at least at the 30% threshold, although the harvest metrics in 2021 cannot be used as a trigger mechanism since they represent a year with catch restrictions in place.

2021 Abundance Metrics

The Mid-Atlantic metric could not be updated due to missing ChesMMAP data from 2019-2021 (Figure 5). The NEFSC index, an index used in the Mid-Atlantic metric, was available in 2021 and while it was below average, it showed an increase from 2019. The South Atlantic metric could also not be updated past 2019 due to missing SEAMAP data in 2020 and spring 2021 (Figure 6). The SC Trammel Net Survey, an index used in the South Atlantic metric, increased 24% in 2021

compared to 2020. When the South Atlantic metric was calculated including P195 instead of SEAMAP, all four terminal years (2018-2021) did not exceed any threshold.

Conclusions

The harvest metric triggered in both the Mid-Atlantic (60% threshold) and South Atlantic (30% threshold) from 2018 to 2020 indicating continued concern. Harvest restrictions were in place in 2021 and the harvest metric cannot be used as a trigger mechanism in that year. The abundance composite metrics are unknown for the Mid-Atlantic and South Atlantic due to missing data, and so it could not be determined if further management would be triggered. Addendum III requires management action taken in 2021 to remain in place for a minimum of three years (through and including the 2023 season). The TC recommends maintaining management enacted in 2021.

De Minimis Requests

States are permitted to request *de minimis* status if, for the preceding three years for which data are available, their average commercial landings or recreational landings (by weight) constitute less than 1% of the coastwide commercial or recreational landings for the same three year period. A state may qualify for *de minimis* in either its recreational or commercial sector, or both, but will only qualify for exemptions in the sector(s) that it qualifies for as *de minimis*. Amendment 1 does not include any compliance requirements other than annual state reporting, which is still required of *de minimis* states. Addendum III, depending on the level of management action triggered, has exemptions for *de minimis* states when measures a triggered at the 30% level (see above for the TLA description). If the TLA triggers at the 60% level, then all states, including *de minimis*, must implement management measures.

In the annual compliance reports, the following states requested *de minimis* status: New Jersey (commercial and recreational fisheries), Delaware (recreational and commercial fisheries), South Carolina (commercial fishery), and Georgia (commercial fishery). The commercial and recreational *de minimis* criteria for 2022 are based on 1% of the average coastwide 2019-2021 landings in each fishery. New Jersey, Delaware, South Carolina, and Georgia commercial fisheries all qualify for *de minimis* status, but landings are confidential. New Jersey and Delaware recreational fisheries both qualify for *de minimis* status, but landings are also confidential.

Changes to State Regulations

In 2020, the TLA triggered management measures at the 30% level, or moderate concern. Non *de minimis* states were required to implement management measures that instituted a 50 fish recreational bag limit and reduce the commercial harvest by 1% of the average state commercial harvest from the previous 10 years. If the state had more restrictive measures in place, they did not need to make any changes. All proposed management changes were reviewed by the Technical Committee and approved by the Board. Below is a list of states that who implemented measures in 2021:

- Virginia: 50 fish bag limit, charter allowance, and commercial fishery season closure from January 1 to January 15. Approved on March 23, 2021.

- North Carolina: 50 fish bag limit and a commercial fishery season closure from December 16 to December 31. Proclamation authority published on April 15, 2021.
- Florida: 50 fish bag limit and a commercial vessel limit of 1,200 pounds in state waters. Rule published December 1, 2021.

Atlantic Croaker Habitat

In winter of 2017, the ASMFC Habitat Committee released *Atlantic Sciaenid Habitats: A Review of Utilization, Threats, and Recommendations for Conservation, Management, and Research*, which outlines the habitat needs of Atlantic croaker at different life stages (egg, larval, juvenile, adult). This report also highlights threats and uncertainties facing these ecological areas and identifies Habitat Areas of Particular Concern. It can be found online at: http://www.asmfc.org/files/Habitat/HMS14_AtlanticSciaenidHabitats_Winter2017.pdf.

Bycatch Reduction

Atlantic croaker is subject to both direct and indirect fishing mortality. Historically, croaker ranked as one of the most abundant bycatch species of the south Atlantic shrimp trawl fishery, resulting in the original FMP's recommendation that bycatch reduction devices (BRDs) be developed and required in the shrimp trawl fishery. Since then, the states of North Carolina through Florida have all enacted requirements for the use of BRDs in shrimp trawl nets in state waters, reducing croaker bycatch from this fishery (ASMFC 2010). However, bycatch and discard monitoring from the shrimp trawl fishery have historically been inadequate, resulting in a major source of uncertainty for assessing this stock, as well as other important Mid- and South Atlantic species. Most of the discarded croaker are age-0 and thus likely have not yet reached maturity (ASMFC 2010). The North Carolina Division of Marine Fisheries conducted a two-year study, published in 2015, to collect bycatch data from state shrimp trawlers. It found that Atlantic croaker represent between 34-49% of the total observed finfish bycatch by weight in estuarine waters and between 20-42% in ocean waters. The at-net mortality for Atlantic croaker was found to be 23% (Brown 2015). These data will be valuable for incorporating estimates of removals in future stock assessments.

Discard estimates of Atlantic croaker in the South Atlantic Shrimp Trawl Fishery are informed by catch rates observed during the SEAMAP survey and South Atlantic Shrimp Trawl Fishery Observer Program, and total effort of the South Atlantic Shrimp Trawl Fishery. Increases in discards could be an indicator of higher abundance of juveniles in the region, an increase in effort by the fishery, or a combination of both. Total effort (net hours) in the South Atlantic Shrimp Trawl Fishery declined from a time series high in 1991 to a time series low in 2005 (Figure 7). Effort then varied around an increasing trend through 2017 and was variable and lower through 2020. Effort declined slightly from 786,172 net hours in 2020 to 780,515 net hours in 2021. Total discards of Atlantic croaker in the South Atlantic Shrimp Trawl Fishery were high during the late 1980s and early 1990s, declined to relatively low levels in the early to mid-2000s, and then increased to levels similar to the beginning of the time series during the 2010s (Figure 7). Discards declined from some of the highest levels of the time series in 2018-2020 to the lowest level since 2009 in 2021. For additional information on the South Atlantic Shrimp Trawl Fishery discard estimation, see Appendix 1 of the 2020 TLA Update Report.

Atlantic croaker are also discarded from other commercial fishing gears, primarily due to market pressures and few restrictions on croaker harvest at the state level. The National Oceanic and Atmospheric Administration (NOAA) Fisheries Pelagic Observer Program provides data to estimate these discards for use in assessments; however, the time series is limited and only discards from gill nets and otter trawls could be estimated for the 2010 assessment based on the available data. Since 1988, estimated discards have fluctuated between 94 and 15,176 mt without trend, averaging 2,503 mt (ASMFC 2010).

Atlantic croaker is also a major component of the scrap/bait fishery. Landings from this fishery are not reported at the species level, except in North Carolina, which has a continuous program in place to sample these landings and enable estimation of croaker scrap landings for use in the stock assessment. As part of the 2010 stock assessment, North Carolina estimated the scrap/bait landings, which have declined in recent years, from a high of 1,569 mt in 1989 to a low of 84 mt in 2008, primarily due to restrictions placed on fisheries producing the highest scrap/bait landings (ASMFC 2010). Regulations instituted by North Carolina include a ban on flynet fishing south of Cape Hatteras, incidental finfish limits for shrimp and crab trawls in inside waters, minimum mesh size restrictions in trawls, and culling panels in long haul seines.

South Carolina has also begun a state monitoring program to account for bait landings. The state initiated a bait harvester trip ticket program for all commercial bait harvesters licensed in South Carolina. The impetus for this program is to track bait usage of small sciaenid species (croaker, spot, and whiting) as well as other important bait species.

Several states have implemented other commercial gear requirements that further reduce bycatch and bycatch mortality, while others continue to encourage the use of the BRD devices. NOAA Fisheries published a notice on June 24, 2011 for public scoping in the Federal Register to expand the methods for reducing bycatch interactions with sea turtles, which may have additional effects on the bycatch of finfish like Atlantic croaker in trawls (76 FR 37050). Continuing to reduce the quantity of sub-adult croaker harvested should increase spawning stock biomass and yield per recruit.

Atlantic croaker are also subject to recreational discarding. The percentage of Atlantic croaker released alive by recreational anglers has generally increased over time. Discard mortality was estimated to be 10% for the 2010 stock assessment (ASMFC 2010). The use of circle hooks and appropriate handling techniques can help reduce mortality of released fish.

VII. Implementation of FMP Compliance Requirements for 2022

The PRT found no inconsistences among states with regard to the requirements of Amendment 1 and Addendum III.

VIII. Recommendations

Management and Regulatory Recommendations

- Consider approval of the *de minimis* requests from New Jersey, Delaware, South Carolina, and Georgia for their commercial fisheries.
- Consider approval of the *de minimis* requests from New Jersey and Delaware for their recreational fisheries.
- Research into the impacts of climate change on the range of the species.
- Research into Atlantic croaker juvenile discard mortality for recreational and commercial fisheries by each gear type in regions where removals are highest.

Research and Monitoring Recommendations

Additional research and monitoring recommendations can be found in the 2016 Atlantic Croaker Stock Assessment Peer Review Report here under Term of Reference 8.

IX. References

Atlantic States Marine Fisheries Commission (ASMFC). 1987. Fishery Management Plan for Atlantic Croaker. Washington (DC): ASMFC. Fishery Management Report No. 10. 90 p.

ASMFC. 2005a. Atlantic Croaker Stock Assessment & Peer Review Reports. Washington (DC): ASMFC. 370 p.

ASMFC. 2005b. Amendment 1 to the Interstate Fishery Management Plan for Atlantic Croaker. Washington (DC): ASMFC. Fishery Management Report No. 44. 92 p.

ASMFC. 2010. Atlantic Croaker 2010 Benchmark Stock Assessment. Washington (DC): ASMFC. 366 p.

ASMFC. 2018. Memorandum 18-8: Recommended Updates to the Annual Traffic Light Analyses for Atlantic Croaker and Spot.

Kevin Brown. 2015. Characterization of the commercial shrimp otter trawl fishery in the estuarine and ocean (0-3 miles) waters of North Carolina. Morehead City (NC): NCDEQ, Division of Marine Fisheries. Abstract.

X. Figures

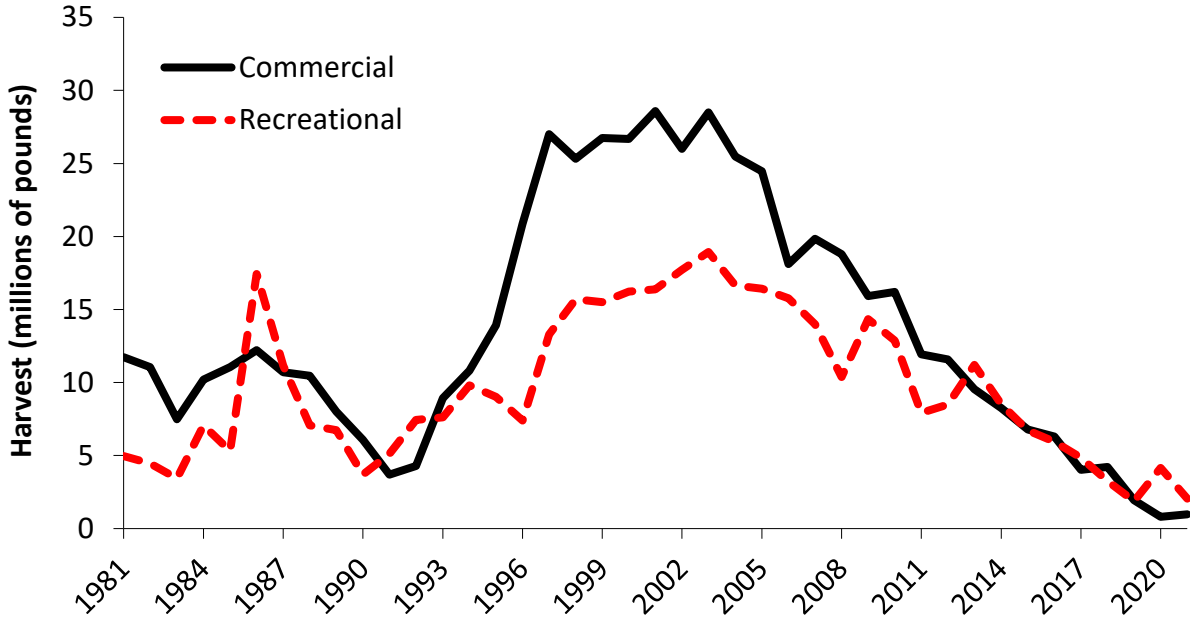


Figure 1. Atlantic croaker commercial and recreational landings (millions of pounds) from 1981-2021. (See Tables 2 and 3 for source information. Commercial landings estimate for 2021 is preliminary. Reliable recreational landings estimates are not available prior to 1981. Recreational landings estimates are based on the mail-based Fishing Effort Survey.)

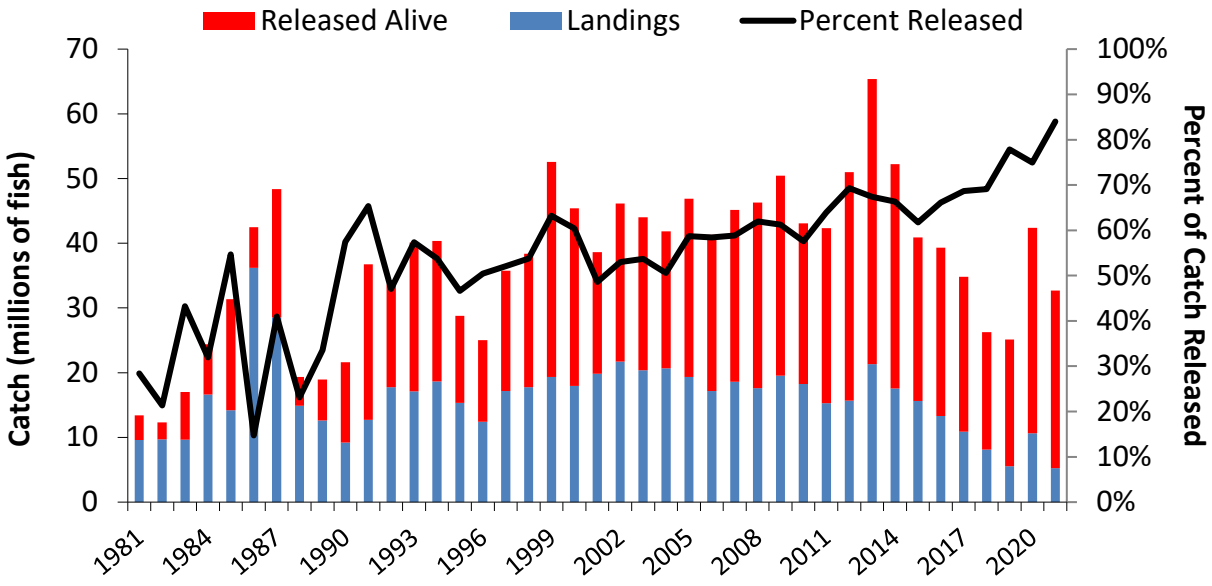


Figure 2. Recreational catch (landings and alive releases, in millions of fish) and the percent of catch that is released, 1981-2021, based on the mail-based Fishing Effort Survey calibration. (See Tables 4 and 5 for values and source information.)

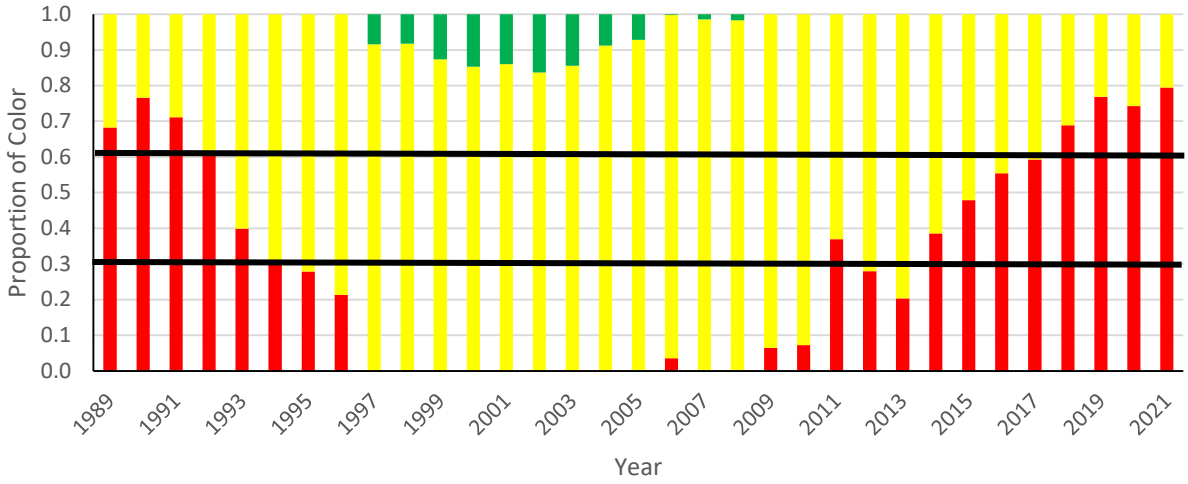


Figure 3. Annual color proportions for harvest composite TLA of Mid-Atlantic region (NJ-VA) for Atlantic croaker recreational and commercial landings from 1989-2021 using a 2002-2012 reference period.

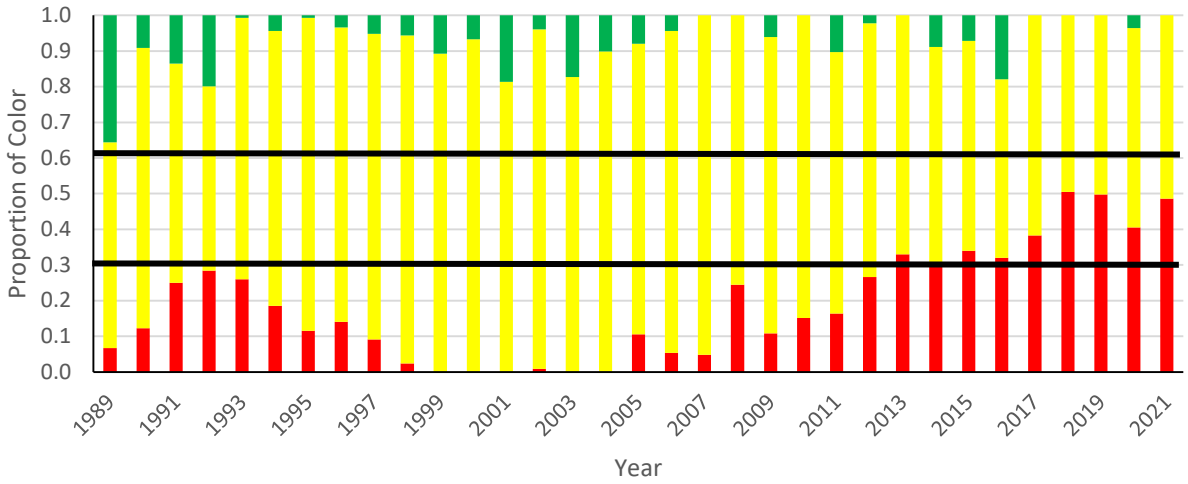


Figure 4. Annual color proportions for harvest composite TLA of South Atlantic region (NC-FL) for Atlantic croaker recreational and commercial landings from 1989-2021 using a 2002-2012 reference period.

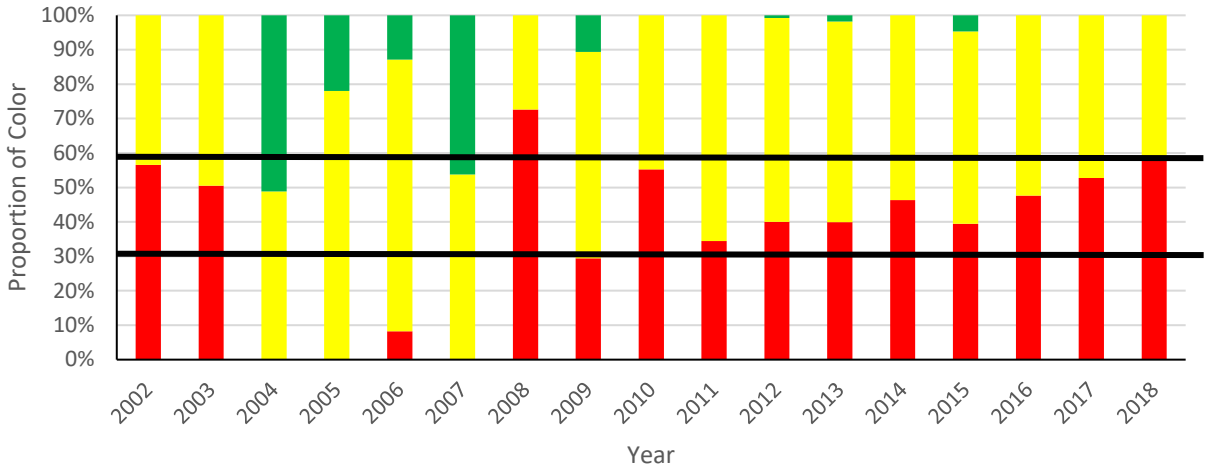


Figure 5. Adult (age 2+) Atlantic croaker TLA composite characteristic index for the Mid-Atlantic (NJ-VA; NEFSC and ChesMMAP surveys) from 2002-2018. This figure is unchanged from the previous three years due to the recalibration effort of ChesMMAP.

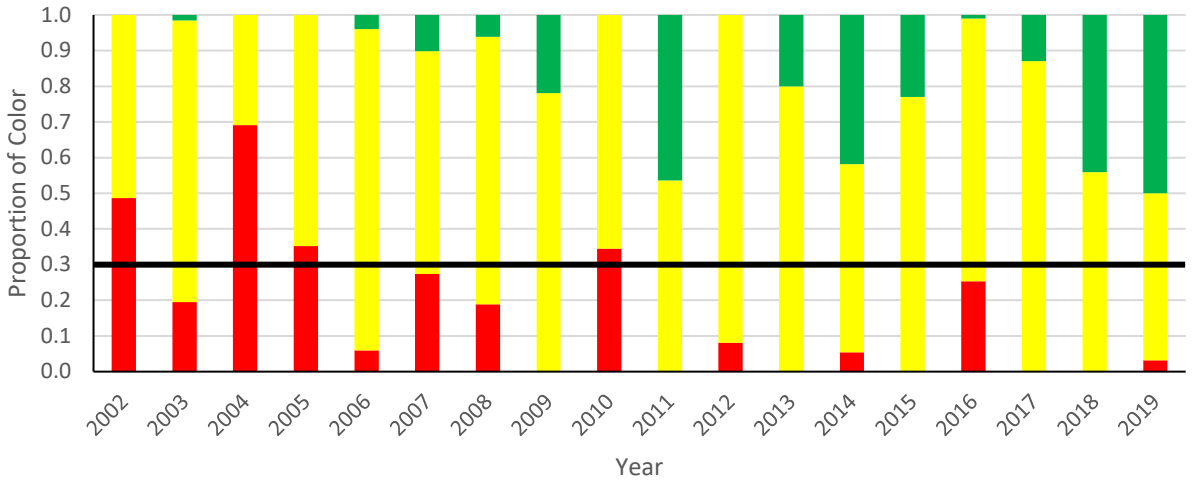


Figure 6. Adult (age 2+) Atlantic croaker TLA composite characteristic index for the South Atlantic (NC-FL; SEAMAP and SCDNR trammel survey) from 2002-2019. This figure is unchanged from the previous two years due to missing data from SEAMAP.

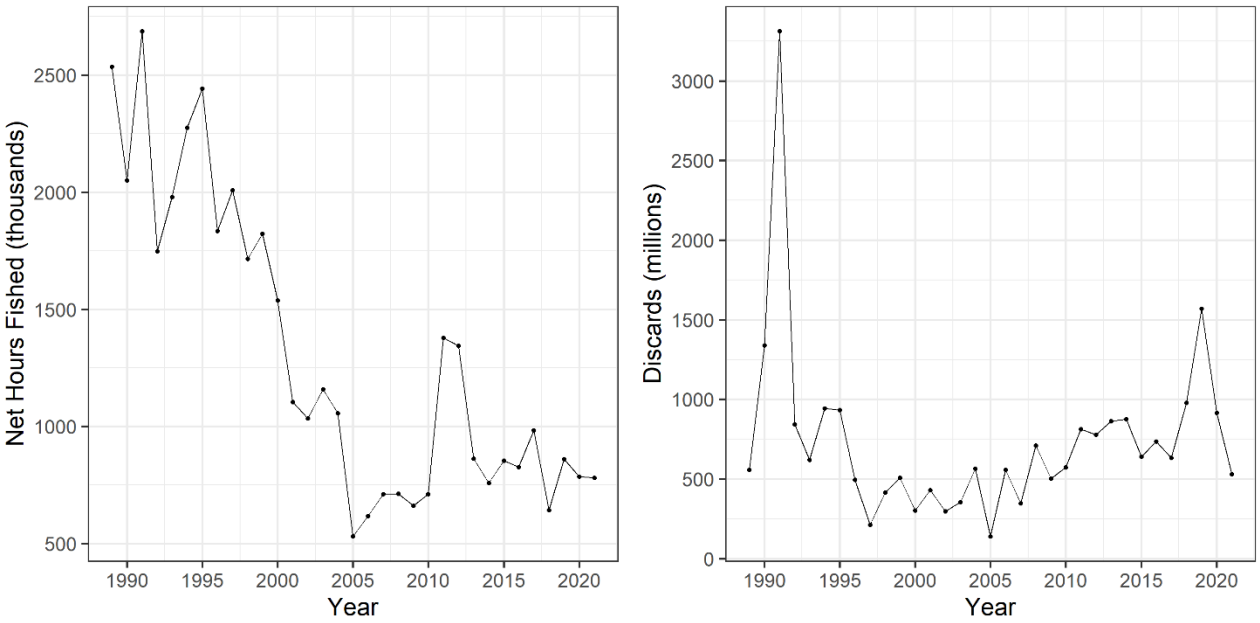


Figure 7. Total net hours fished (left) and discards of Atlantic croaker (right) in the South Atlantic Shrimp Trawl Fishery from 1989-2021.

XI.
Tables

Table 1. Summary of state regulations for Atlantic croaker in 2021.

State	Recreational	Commercial
NJ	None	Otter/beam trawl mesh restriction for directed croaker harvest (>100 lbs in possession)
DE	8" minimum; recreational gill nets (up to 200 ft.) with license	8" minimum
MD	9" min, 25 fish/day, charter boat logbooks	9" minimum; open 3/16 to 12/31
PRFC	25 fish/day	Pound net season: 2/15 to 12/15
VA	50 fish/day, with additional charter live bait allowance (effective 3/23/21)	Open 1/1 to 12/31 (effective 3/23/21)
NC	50 fish/day (effective 4/15/21), recreational use of commercial gears with license and gear restrictions	Open 1/1 to 12/15 (effective 4/15/21)
SC	Mandatory for-hire logbooks, small Sciaenidae species aggregate bag limit of 50 fish/day	None
GA	25 fish/day	25 fish/day limit except for trawlers harvesting shrimp for human consumption (no limit)
FL	50 fish/day (effective 12/1/21)	1,200 commercial vessel limit (effective 12/1/21)

* A commercial fishing license is required to sell croaker in all states with fisheries. For all states, general gear restrictions affect commercial croaker harvest.

Table 2. Commercial harvest (pounds) of Atlantic croaker by state, 2012-2021.
(Estimates for 2021 are preliminary. Sources: 2022 state compliance reports for 2021 fishing year and for years prior to 2021, personal communication with ACCSP, Arlington, VA, except PRFC [compliance reports only].) Note that Georgia does not have a commercial fishery for Atlantic croaker.

Year	NJ	DE	MD	PRFC	VA	NC	SC	GA	FL	Total
2012	C	C	915,432	273,849	6,842,005	3,106,616	C		74,527	11,582,978
2013	C	C	820,777	130,285	6,237,602	1,927,938	C		76,463	9,538,901
2014	265,166	C	443,661	177,777	4,697,381	2,629,908	C		45,587	C
2015	C	C	294,038	118,996	4,426,957	1,819,007	C		39,096	6,784,146
2016	C	C	101,949	168,889	3,825,737	2,092,287	C		57,538	6,302,799
2017	C	C	42,958	114,319	2,822,005	1,008,015	C		43,033	4,032,993
2018	C	C	44,306	16,561	2,450,984	1,643,646	C		54,409	4,210,715
2019	C	463	2,865	C	595,434	1,278,340	C		68,179	1,945,723
2020	C	C	1,857	601	147,026	570,453	C		84,906	806,781
2021	C	C	4,584	11,430	287,898	540,622	C		124,642	972,121

C: Confidential data

Table 3. Recreational harvest (pounds) of Atlantic croaker by state, 2012-2021. (Sources: 2022 state compliance reports for 2021 fishing year and for years prior to 2021, personal communication with MRIP)

Year	NJ	DE	MD	VA	NC	SC	GA	FL	Total
2012	259,645	147,737	1,980,417	4,664,264	307,338	30,149	29,815	1,063,337	8,482,702
2013	1,637,516	253,447	1,581,384	6,442,166	453,881	84,248	89,781	642,887	11,200,818
2014	750,580	427,615	1,265,217	4,354,046	758,751	104,434	138,423	712,090	8,511,554
2015	263,749	189,320	871,596	3,514,410	557,735	181,909	248,431	881,185	6,708,335
2016	7,133	10,959	407,010	2,998,022	443,728	81,896	116,313	1,893,203	5,958,264
2017	0	26,441	238,659	3,383,057	237,160	310,621	100,565	555,389	4,851,892
2018	34,125	5,859	191,854	2,245,518	164,644	81,251	83,258	445,663	3,252,172
2019	973	23,973	38,895	995,491	224,337	133,227	97,791	358,941	1,873,628
2020	16,358	21,870	91,047	2,410,612	223,685	230,205	77,876	1,072,714	4,144,367
2021	7,079	35,746	69,744	823,319	376,121	173,526	95,031	461,048	2,041,614

Table 4. Contribution of imputed harvest rate data from 2018 and 2019 for 2020 MRIP harvest estimates of Atlantic croaker.

State	2020 Harvest (A+B1) Total Weight (lb)	PSE	Contribution of Imputed Data to Total Harvest Rate
NEW JERSEY	16,358	60.6	70%
DELAWARE	21,870	26.8	33%
MARYLAND	91,047	36.9	0%
VIRGINIA	2,410,612	20.2	50%
NORTH CAROLINA	223,685	20.6	21%
SOUTH CAROLINA	230,205	19.1	2%
GEORGIA	77,876	41.4	13%
FLORIDA	1,072,714	27.5	3%

Table 5. Recreational harvest (numbers) of Atlantic croaker by state, 2012-2021. (Sources: 2022 state compliance reports for 2021 fishing year and for years prior to 2021, personal communication with MRIP)

Year	NJ	DE	MD	VA	NC	SC	GA	FL	Total
2012	830,891	202,283	2,565,599	8,786,350	848,495	132,264	104,944	2,190,268	15,661,094
2013	2,707,410	530,236	2,308,987	12,517,286	1,300,804	336,140	264,984	1,332,465	21,328,324
2014	852,733	806,256	2,197,125	9,533,829	1,935,961	600,482	289,781	1,359,207	17,576,096
2015	339,021	334,676	1,738,576	8,024,381	1,437,019	555,263	790,014	2,429,723	15,648,673
2016	8,236	24,546	659,318	7,276,719	1,109,570	268,470	402,254	3,553,777	13,302,890
2017	0	65,606	423,790	7,644,516	666,930	765,227	371,301	969,146	10,906,516
2018	104,321	12,370	305,469	5,472,329	472,917	335,833	241,382	1,176,999	8,121,620
2019	3,031	53,048	69,771	3,055,510	651,268	593,475	332,073	801,751	5,559,927
2020	58,097	54,193	244,788	6,529,494	673,377	827,904	232,535	2,010,168	10,630,556
2021	22,722	71,237	174,056	1,862,543	1,066,533	707,924	371,257	952,581	5,228,853

Table 6. Recreational releases (number) of Atlantic croaker by state, 2012-2021. (Sources: 2022 state compliance reports for 2021 fishing year and for years prior to 2021, personal communication with MRIP)

Year	NJ	DE	MD	VA	NC	SC	GA	FL	Total
2012	3,336,964	1,036,383	7,090,976	15,140,369	3,878,710	1,070,703	781,302	2,999,225	35,334,824
2013	2,980,744	1,811,661	7,557,223	18,480,099	6,729,556	3,754,143	1,361,943	1,265,571	44,025,744
2014	703,031	1,396,970	2,806,693	10,314,405	10,347,332	4,742,718	2,057,898	2,265,961	34,635,008
2015	240,840	309,389	1,236,293	6,815,343	9,632,560	3,236,774	1,320,939	2,451,253	25,243,391
2016	139,085	390,655	726,662	6,993,470	7,254,382	5,233,835	1,178,630	4,073,001	25,989,720
2017	152,540	230,455	2,829,255	8,464,305	4,631,445	4,755,853	1,059,539	1,770,846	23,894,238
2018	144,637	85,424	203,081	5,359,179	4,311,368	5,568,892	1,403,560	1,072,381	18,148,522
2019	33,333	101,523	1,243,785	6,642,685	3,634,211	3,768,288	1,893,287	2,259,705	19,576,817
2020	147,494	286,780	2,870,268	6,223,025	5,560,605	12,921,019	1,696,852	2,057,158	31,763,201
2021	116,606	353,743	1,909,466	4,306,221	9,539,047	8,207,074	1,687,801	1,363,075	27,483,033