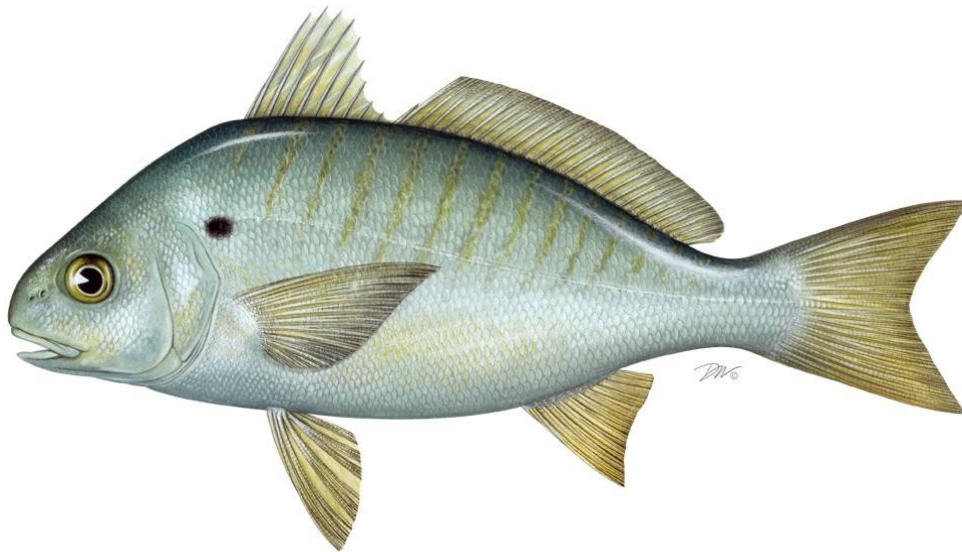# ATLANTIC STATES MARINE FISHERIES COMMISSION

2021 TRAFFIC LIGHT ANALYSIS REPORT FOR SPOT
(*Leiostomus xanthurus*)

2020 Fishing Year

Prepared by the Technical Committee
June 2021

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 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 abundance metric, which is a combination of 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 for either region in any two of the three terminal years.

Impact of COVID on Data Availability

The TLA harvest metric uses commercial and recreational harvest, both of which were available for 2020, although the pandemic impacted harvest and monitoring programs. The Mid-Atlantic abundance index is based on the Chesapeake Bay Multispecies Monitoring and Assessment Program (ChesMMAP) which was not available for 2020 due to lack of calibration factors and the Northeast Fishery Science Center (NEFSC) Multispecies Bottom Trawl Survey which did not sample in 2020. The South Atlantic abundance index is based on the South Carolina Department of Natural Resources (SCDNR) Trammel Net Survey, which was available in 2020, and the Southeast Area Monitoring and Assessment Program (SEAMAP), which did not sample in 2020. Therefore, the harvest metric was calculated for 2020, but both the Mid-Atlantic and South Atlantic abundance metrics are incomplete for 2020.

2020 Harvest Metrics

The Mid-Atlantic harvest metric has triggered at 30% red in two of the three terminal years (2018 and 2019) and the South Atlantic harvest metric has triggered at 30% red in two of the three terminal years (2018 and 2019).

2020 Abundance Metrics

While abundance metrics could not be calculated due to missing 2020 data, Addendum III specifies TLA triggers based on the three terminal years so assumptions can still be made regarding abundance. For the Mid-Atlantic, one of the three terminal years triggered at 30% red (2018) while two of the three are unknown (2019-2020). This metric did trigger at 30% during 2020 TLA for the 2019 fishing year. In the South Atlantic, two of the three terminal years (2018-2019) did not trigger at any level and therefore the 2020 data would not change status regardless of its value.

Conclusions

The harvest triggered at the 30% threshold in both the Mid-Atlantic and South in 2020 indicating continued concern. The abundance did not trigger at any level for the South Atlantic and is undetermined for the Mid-Atlantic due to missing 2020 data, although it could be

determined that the Mid-Atlantic did not trigger at the elevated 60% threshold because the harvest metric did not trigger at this elevated level. Regardless, the previous TLA indicated that the Mid-Atlantic triggered at 30%. Addendum III requires management action taken in 2021 to remain in place for a minimum of two years (thorough and including the 2022 season). Therefore, the TC recommends maintaining management actions taken in 2021 during 2022.

1 INTRODUCTION

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 statistically-robust 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-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 either region 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.

This report includes the harvest and abundance composite indices in Section 2 which are the TLAs that trigger management action. Individual TLAs for commercial and recreational harvest by region, which go into the harvest composite, as well as effort and discards of spot in the South Atlantic Shrimp Trawl Fishery, which are included as supplementary information to be reviewed by the TC and are not included in harvest composite indices, are described in Section 4. TLAs for each fishery-independent index that go into the abundance composite, as well as indices of age zero abundance, which are included as supplementary information to be reviewed by the TC and are not included in abundance composite indices, are described in Section 5. Supplemental information with NEAMAP incorporated into the TLAs is provided in Section 6.

The 2020 TLA report indicated spot had red proportions that exceeded the 30% threshold of in both metrics in one region (Mid-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 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

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implemented were quantifiable and are projected to achieve this 1% reduction. All states have submitted state implementation plans to meet required recreational and commercial management measures. Management actions were initiated in 2021, and Addendum III specifies they will remain in place for a minimum of two years.

The COVID-19 pandemic had far reaching impacts on almost all state and federal fishery independent monitoring programs at some point during 2020. These impacts ranged from short term interruptions in sampling (on the scale of weeks or a month or two) to complete shutdown for the year due to social distancing requirements on research vessels. The social distancing requirements made it impossible for programs to work in enclosed spaces and close quarters for both daily sampling as well as extended at-sea work requiring days and weeks to complete. 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. 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. ChesMMAP anticipates having the calibration estimates completed in 2022. NEFSC and SEAMAP data will be available for 2021, and future TLAs will be able to utilize the most recent years (2019-2021) of the data series beginning with the 2021 fishing year TLA report.

The COVID-19 pandemic also had far reaching impacts economically on both the recreational and commercial industries. While both commercial and recreational harvest datasets were available for 2020, there are caveats for the 2020 fishing year harvest metric. The component of the Marine Recreational Information Program (MRIP) that samples dockside catch rate data (Access Point Angler Intercept Survey - APAIS) was interrupted by the pandemic. Due to this interruption, catch rate data were imputed as needed from 2018 and 2019 to generate total catch estimates in 2020. The contribution of imputed data for spot harvest estimates by state ranged from 0-69% (Table 1). The impact of imputed data on total catch estimates is unknown. While data availability was maintained, the impact of the pandemic on the accuracy of harvest metrics must be considered.

Table 1. Contribution of imputed harvest rate data from 2018 and 2019 for 2020 MRIP harvest estimates of spot.

State	2020 Harvest (A+B1) Total Weight (lb)	PSE	Contribution of Imputed Data to Total Harvest Rate
NEW YORK	1,000	101.6	0%
NEW JERSEY	450	96.3	0%
DELAWARE	19,392	28.9	0%
MARYLAND	1,019,065	18	1%
VIRGINIA	4,589,353	38.4	13%
NORTH CAROLINA	297,813	17.7	4%
SOUTH CAROLINA	131,952	32	9%
GEORGIA	7,377	52.8	0%
FLORIDA	234,040	60.4	69%

2 TRAFFIC LIGHT ANALYSIS (COMPOSITE INDICES)

2.1 Harvest Composite Characteristic Index

- The harvest (recreational and commercial landings) composite TLA index showed an increase in landings in 2020 in both the Mid-Atlantic and South Atlantic (Figure 1 and Figure 2). However index levels were still well below the long term mean.

- The composite characteristic for the Mid-Atlantic has exceeded the 30% threshold for four of the last six years (Figure 1) with an average red proportion of 40.4%. The red proportion in 2020 was below the 30% threshold but still triggered since it was above that threshold for two of the terminal three years (2018-2020).

- The composite characteristic for the South Atlantic has exceeded the 30% threshold for the last five years of the time series (Figure 2) with an average proportion of 48.4%. The red proportion in 2020 exceeded the 30% threshold with a red proportion of 54.1% and triggered since it was above that threshold for two of the terminal three years (2018-2020).

- The TLA composite index triggered in 2020 at the 30% threshold for both regions.

Figure 2. Annual harvest composite (commercial and recreational landings) TLA color proportions for Mid-Atlantic (NJ-VA) spot using a 2002-2012 reference period.
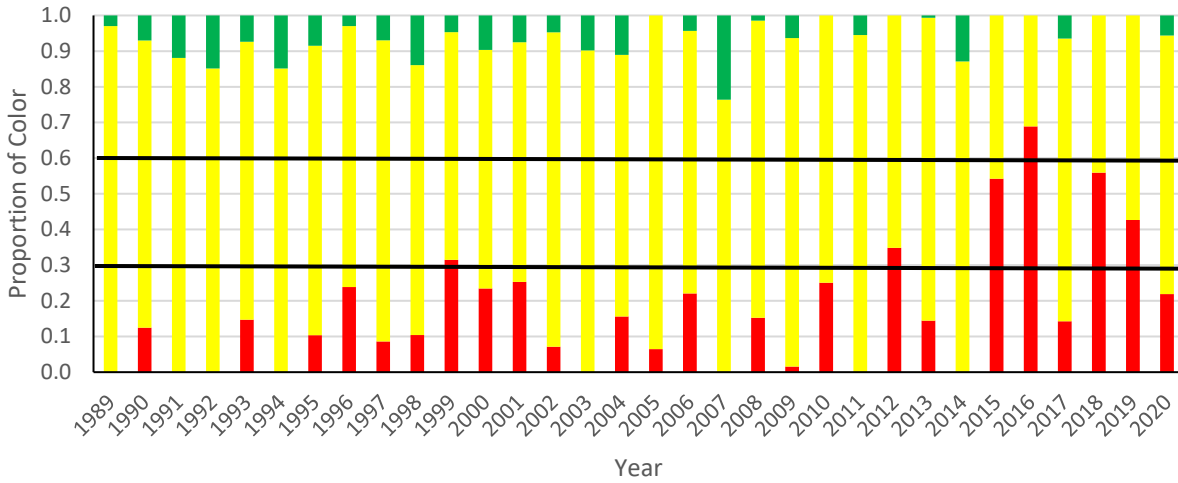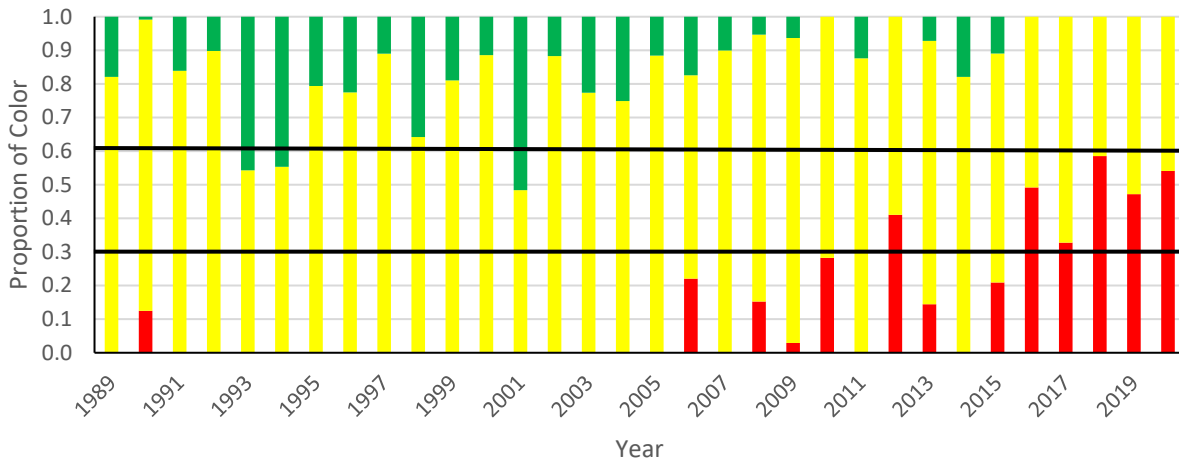

Figure 3. Annual harvest composite (commercial and recreational landings) TLA color proportions for South Atlantic (NC-FL) spot using a 2002-2012 reference period.

2.2 Abundance Composite Characteristic Index

**Important note:

The NEFSC and SEAMAP trawl surveys did not operate in 2020. The ChesMMAP survey has not completed the calibrations necessary to convert the 2019 and 2020 index values that would allow use of the entire time series after the vessel and gear changes that occurred in 2019 (see ChesMMAP section below). ChesMMAP was able to sample in 2020, so once calibration exercises are complete the index data should be available in 2022. Therefore, the NEFSC fall groundfish survey and SEAMAP are only presented through 2019 in this report, ChesMMAP

only goes through 2018, and all three surveys have not been updated from the 2020 TLA report on the 2019 fishing year.

The abundance composite TLA index for spot in each region is broken into two components based on age composition, including an adult index and a juvenile index. Only adult abundance is used to determine if management action is triggered. Juvenile data is presented as supplementary information only (Section 5). The adult composite index was generated from the NEFSC and ChesMMAP surveys for the Mid-Atlantic and SEAMAP and NCDMF Program 195 in the South Atlantic since the majority of spot captured in these surveys were ages 1+. Since neither Mid-Atlantic index was available in 2020 and only NEFSC data was available for 2019, the TLA still uses 2018 as the terminal year. Both NEFSC and ChesMMAP survey indices should be available for the 2021 sampling year, as well as calibrated indices for 2019 and 2020 for ChesMMAP.

In the South Atlantic, SEAMAP data was not available in 2020 because the survey did not run, so data is only presented through 2019. The NCDMF Pamlico Sound Trawl Survey (Program 195) data was available in 2020 for both adults and juveniles but is currently only used in the TLA as a juvenile index for the south Atlantic. Sampling during the 2020 season for Program 195 was restricted to day trips and only the sites accessible from a nearby port were sampled which primarily included the river strata (Neuse River, Pamlico River, and Pungo River) and those sites close to the mouth of the rivers. A total of 28 stations were towed during the June 2020 survey (54 stations are sampled in June under normal conditions).

2.2.1 Mid-Atlantic

- The TLA composite characteristics for spot abundance (NEFSC and ChesMMAP surveys) in the Mid-Atlantic did not have 2019-2020 data points since the ChesMMAP survey indices were not available (Figure 3).

- The adult index triggered at the 30% threshold in the 2018 fishing year because the red proportions in the index have exceed the 30% threshold for the previous five years (Figure 3).

Figure 4. Annual TLA composite characteristic for adult (age 1+) spot in the Mid-Atlantic (NJ-VA) (NEFSC and ChesMMAP) using a 2002-2012 reference period.

2.2.2 South Atlantic

- Since SEAMAP data was not available for 2020, the TLA composite presented only goes through 2019, although the NCDMF Program 195 data was available for 2020 (see Section 5.4 below) and did have a red proportion of 31.5%. The South Atlantic adult abundance composite characteristic did not trigger in the 2019 fishing year since none of the red proportions from 2017-2019 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.

Figure 5. Annual TLA composite characteristic for adult spot (age 1+) in the South Atlantic (SEAMAP and NCDMF Program 195) using a 2002-2012 reference period.
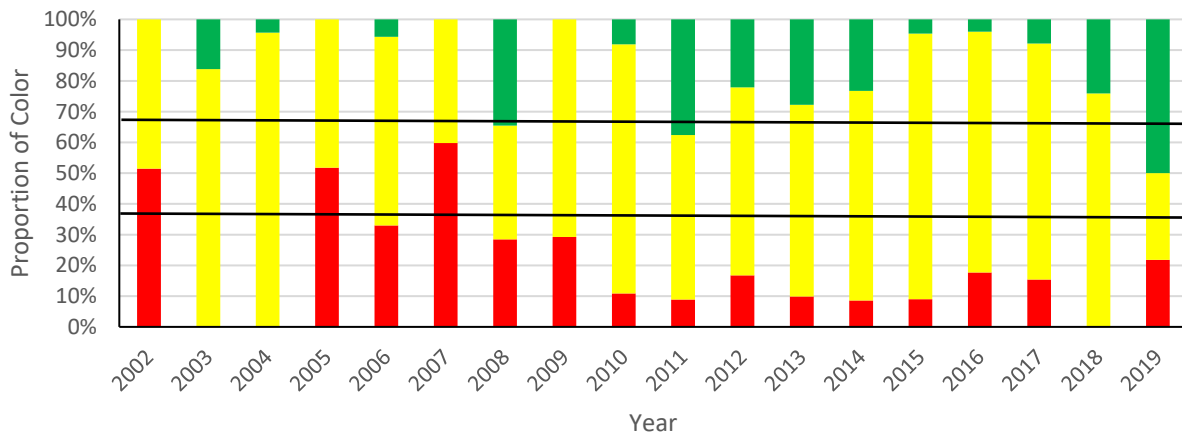
3 SUMMARY

- The harvest composite TLA for spot exceeded the 30% threshold in both regions and triggered in 2020.

- The Mid-Atlantic abundance composite characteristic did not have 2019-2020 data points, but did trigger the two previous years thus triggering at 30% in last year's TLA.

- The South Atlantic abundance composite characteristic did not trigger in 2020 for adults with red proportions in the terminal three years either not present or below the 30% threshold of concern.

- With the harvest TLAs triggering at 30% for both regions in 2020, significant management concern cannot be trigger by the TLA for either region (60% red threshold) and coastwide management action outlined in Addendum III remains triggered at the moderate concern level in 2021.

- Table 2 provides an overview of the past three 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 2. Traffic light metrics for the Mid- and South Atlantic regions with known and unknown values, given missing 2020 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 two of the three terminal years within either region.

| TLA Metric	Spot		
	2018	**2019**	**2020**
Mid-Atlantic Harvest	56% red	43% red	22% red
South Atlantic Harvest	62% red	52% red	54.1% red
Mid-Atlantic Adult Index	44% red	Unknown	Unknown
South Atlantic Adult Index	24% green	50% green	Unknown; cannot trigger regardless of 2020 data
2021 TLA Status	Triggered at 30% (Mid-Atl Harvest, S. Atl Harvest, Mid-Atl Index unknown; S. Atl Index did not trigger)		

4 TRAFFIC LIGHT ANALYSIS (FISHERY DEPENDENT)

4.1 Commercial Landings

4.1.1 Mid-Atlantic

- Commercial landings of spot on the Atlantic coast increased 44.6% in 2020 from 2019. Landings were still well below the long term mean, although they were up from the time series low which occurred in 2016. Long term, commercial landings are still relatively low, a trend that has been occurring since 2003. Total annual landings have declined 68.6% from 2004 to 2020 (Figure 5).

- The TLA for commercial landings in the Mid-Atlantic peaked in the 1990s and early 2000s (Figure 5). The general trend has been a decline since 2005, although there is some year-to-year variability between red and green proportions. In the last six years the red proportion has been above the 30% threshold in all but one year.

- The TLA commercial index was above the 30% threshold level in 2020 and represents the third year above this threshold.

Figure 6.   Annual TLA color proportions using 2002-2012 reference period for spot from commercial landings for the Mid-Atlantic (NJ-VA) coast of the US.
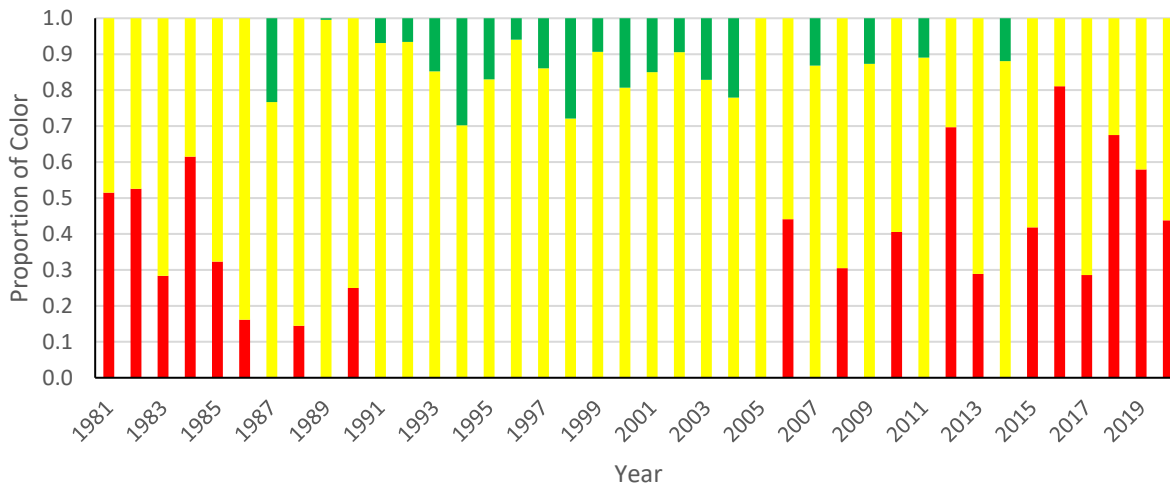
4.1.2 South Atlantic

- 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 increased 13.6% in 2020, but red proportion was still above the 30% threshold.

- The continued decline in commercial landings may be due to changes in effort in some other fisheries (most notably the shrimp trawl fishery) so it is difficult to determine the exact cause of the general decline in commercial landings in the South Atlantic.

Figure 7. Annual TLA color proportions using a 2002-2012 reference period for spot from commercial landings for the South Atlantic (NC-FL) coast of the US.
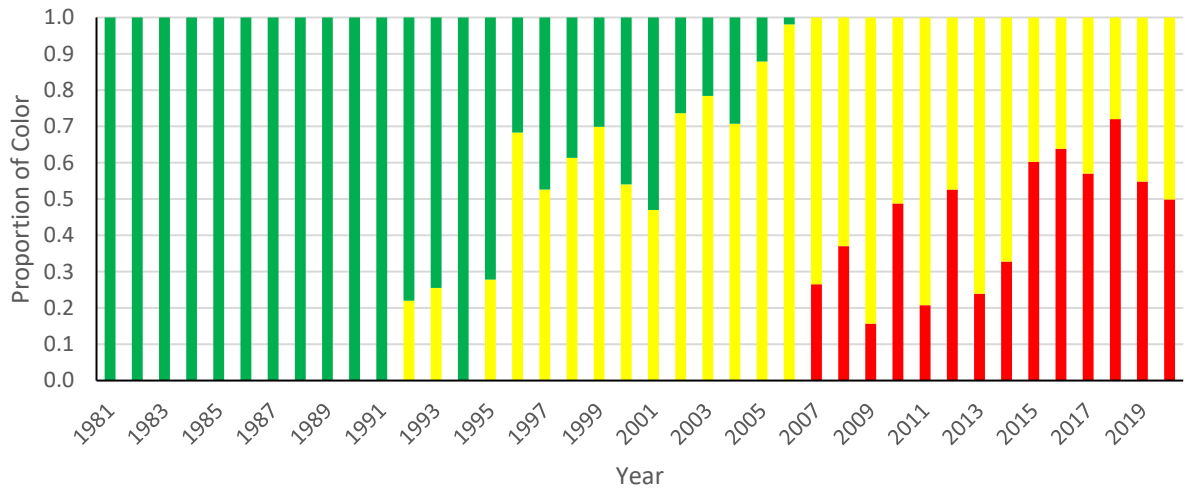
4.2 Commercial Discards

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 Coastal Trawl 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.

- 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 in the last two years of the time series were highly variable, decreasing from one of the highest estimates in 2019 to one of the lowest estimates in 2020.

- There were no SEAMAP Coastal Trawl 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 spot over the reduced sampling season in 2020 declined relative to 2019 catch rates using both full observer coverage and SEAMAP tows, and this trend was likely influenced by the

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lack of SEAMAP tows and reduced observer coverage. Figure 8 shows how the trends in catch rates track in years prior to 2020. As in all years, the magnitude of the 2020 discard estimate is informed by the observer data (magnitude of catch rates) and shrimp trawl effort data (expansion factor to expand catch rates to total discards), so the magnitude of catch rates was likely also impacted by reduced observer coverage.

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

Figure 8.   Total net hours fished (left) and discards of spot (right) in the South Atlantic Shrimp Trawl Fishery.
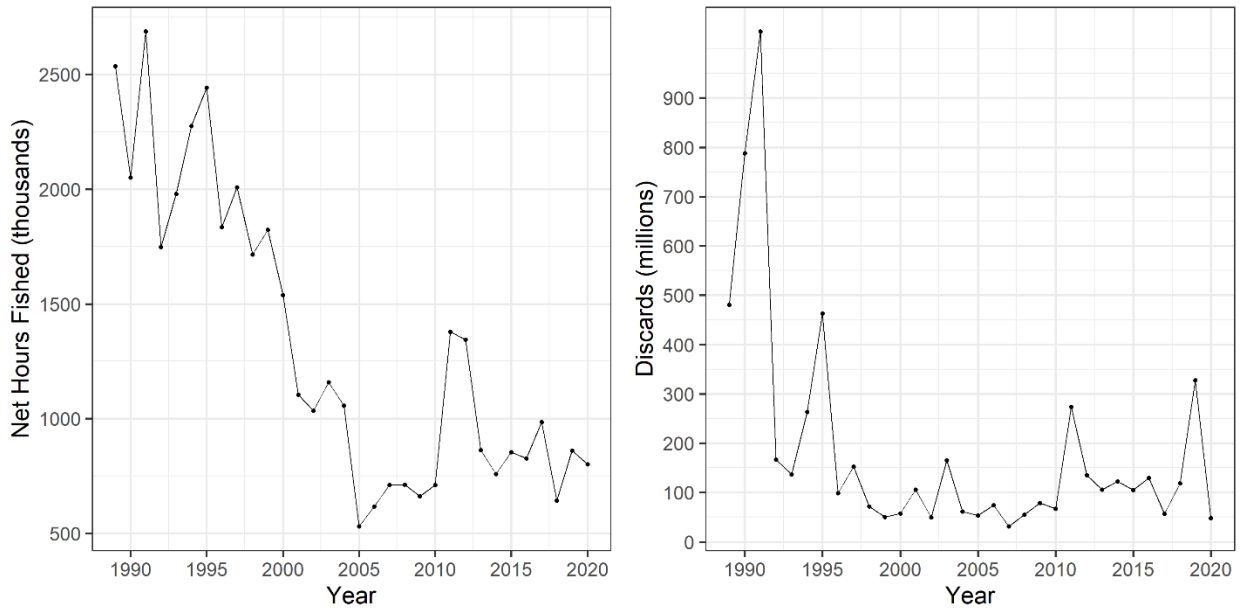
Figure 8. Comparison of spot mean-scaled catch-per-unit-effort from SEAMAP Coastal Trawl Survey data and South Atlantic Shrimp Trawl Fishery Observer data.
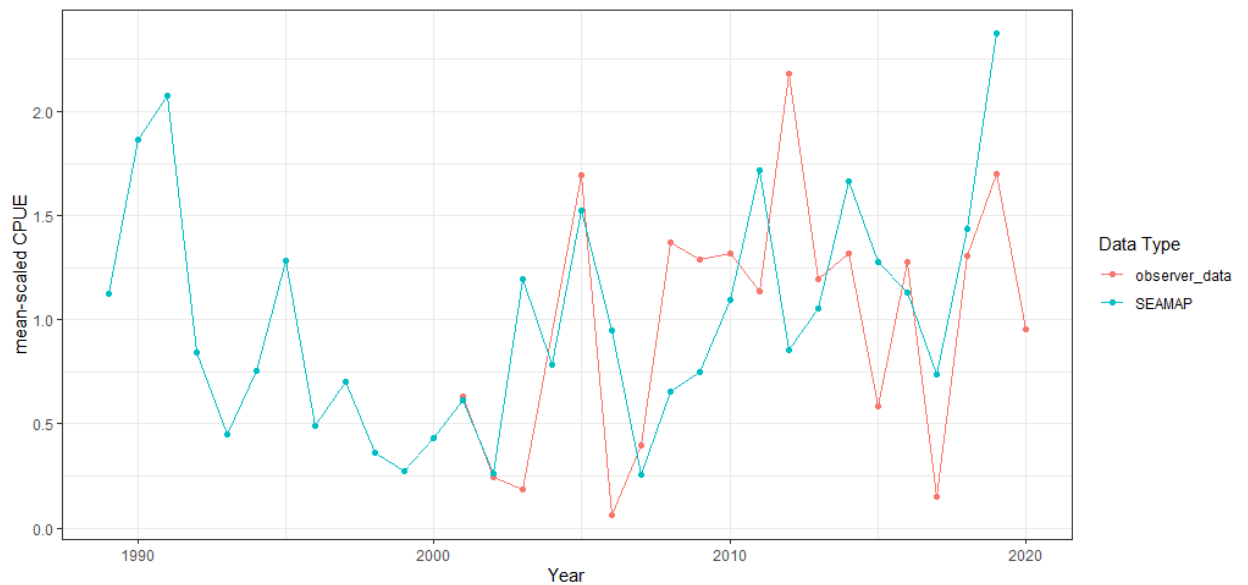
4.3 Recreational

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.

- The recreational harvest of spot on the Mid-Atlantic coast increased 94.4% in 2020 from 2019, with values of 5,814,976 pounds and 2,991,200 pounds, respectively.

- Annual harvest in the recreational fishery has been above the long term mean (LTM) for the second time since 2015 (Figure 9).

- 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).

- In the South Atlantic, recreational harvest decreased 55% in 2020 (676,727 lbs) from 2019 (1,531,869 lbs) and represented the lowest value in the time series.
- Recreational harvest in 2020 was below the long term mean as evidenced by a red proportion of 55%. Red proportions have been above the 30% threshold since 2016 (Figure 10) and the index did trip since it continued to exceeded the 30% red threshold in 2 of the three terminal years.

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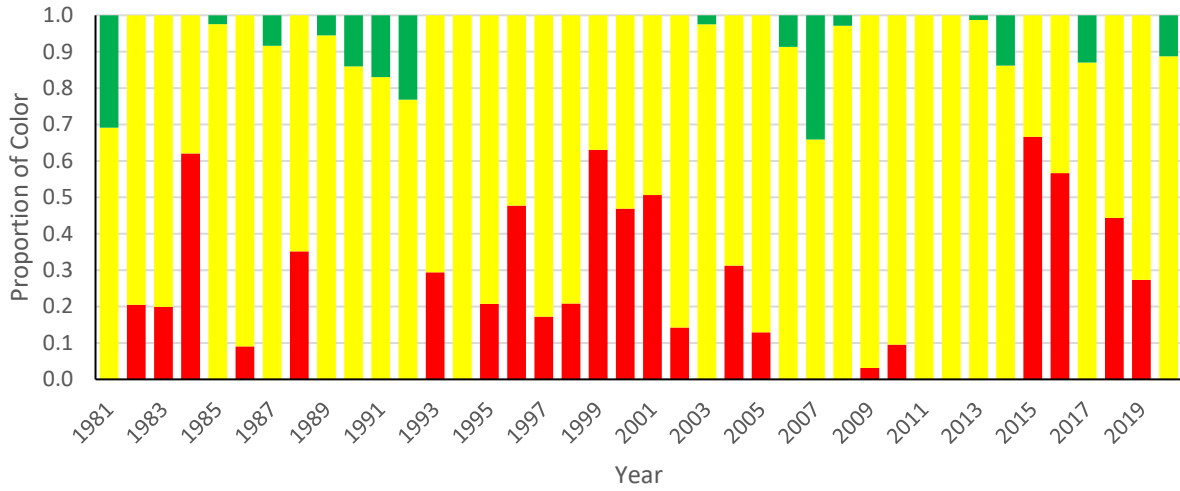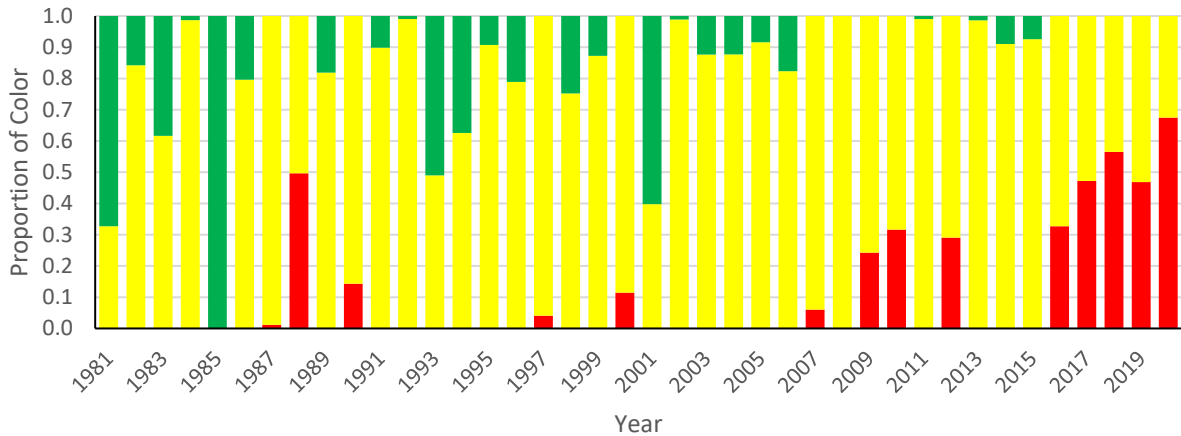

Figure 10. Annual color proportions for the South Atlantic (NC-FL) coast of the US for recreationally harvested spot using a 2002-2012 reference period.


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, the TLA data is the same as the 2019 report.

- The CPUE for spot in 2019 increased 4.4% from 2018 and was in a similar range to the series peak value seen in 2012.

- There was no red in the TLA index for 2019, so this index did not exceed the 30% threshold (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.

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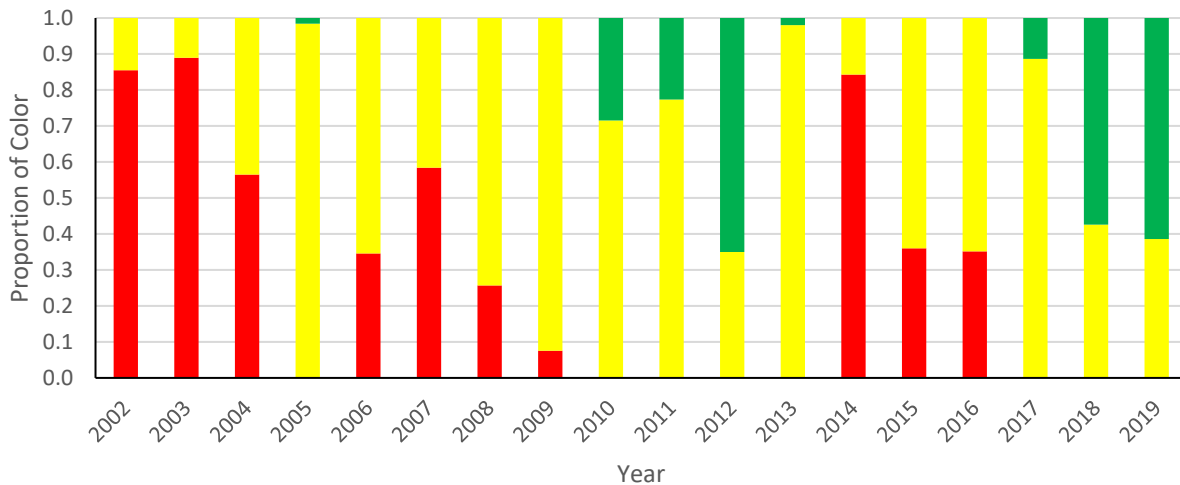
5.2 ChesMMAP Trawl Survey

- 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 were 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 2022, 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).

- With the currently missing values for 2019-2020, whether or not the ChesMMAP index would have exceeded either the 30% or 60% thresholds of concern is unclear (Figure 12 and 13). These index values will be available in the future (likely 2022), but until then any estimate of whether the ChesMMAP index triggered in 2020 is speculative.

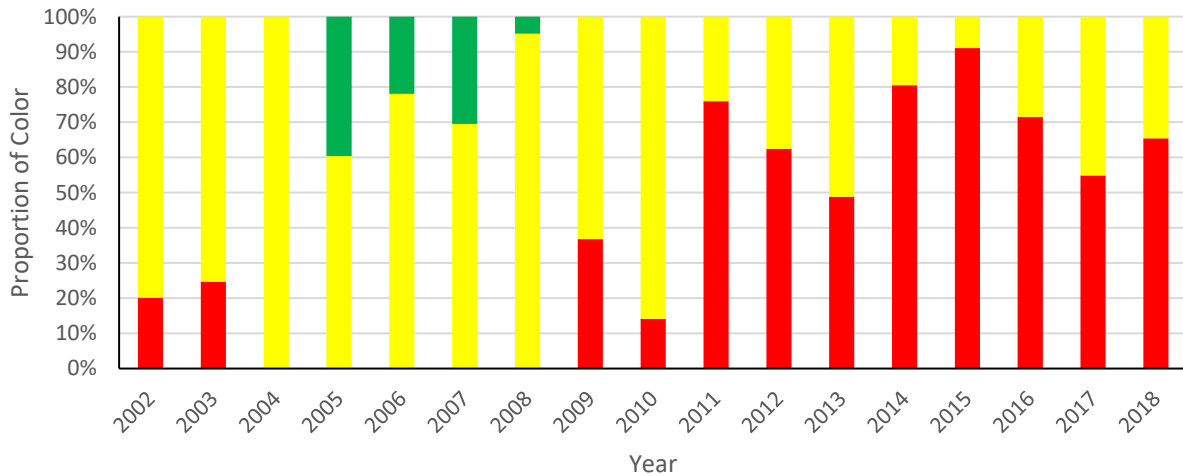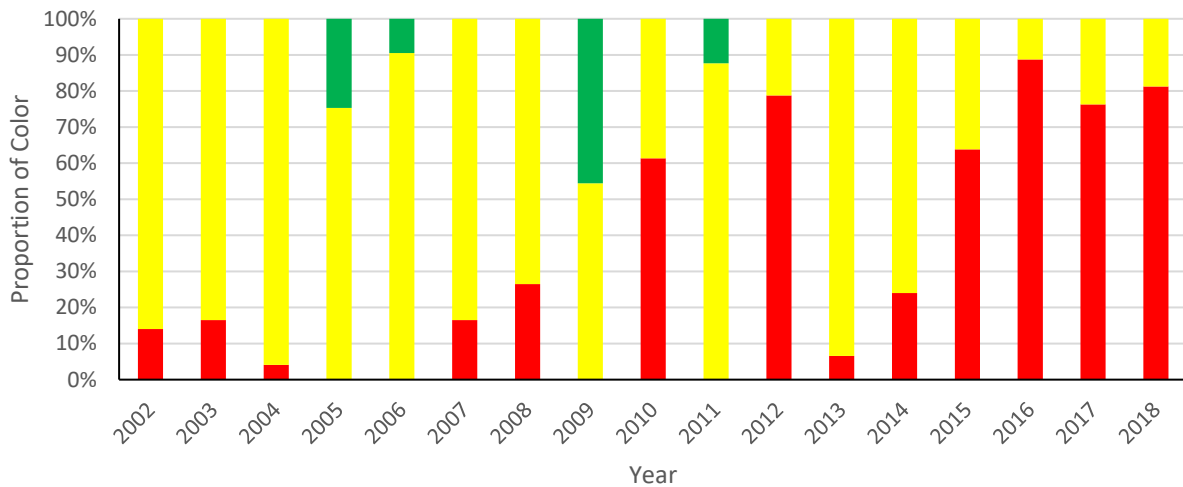**Figure 12. Annual TLA color proportions for juvenile spot (age 0) from the Mid-Atlantic ChesMMAP survey using a 2002-2012 reference period.**

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


5.3 Maryland Juvenile Fish Seine Survey
- The Maryland CPUE increased 165% in 2020 from 2019, and was above the long-term mean for the first time since 2010 (see green proportions in Figure 14).

- CPUE was above the long-term mean for the first time since 2010, indicating annual recruitment was up in the Maryland portion of the Chesapeake Bay in 2020.

- Although the TLA did not have any red in 2020, the index still exceeded the 30% threshold for two of the three terminal years and tripped in 2020.

- While spot numbers were up in 2020, 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 using a 2002-2012 reference period.
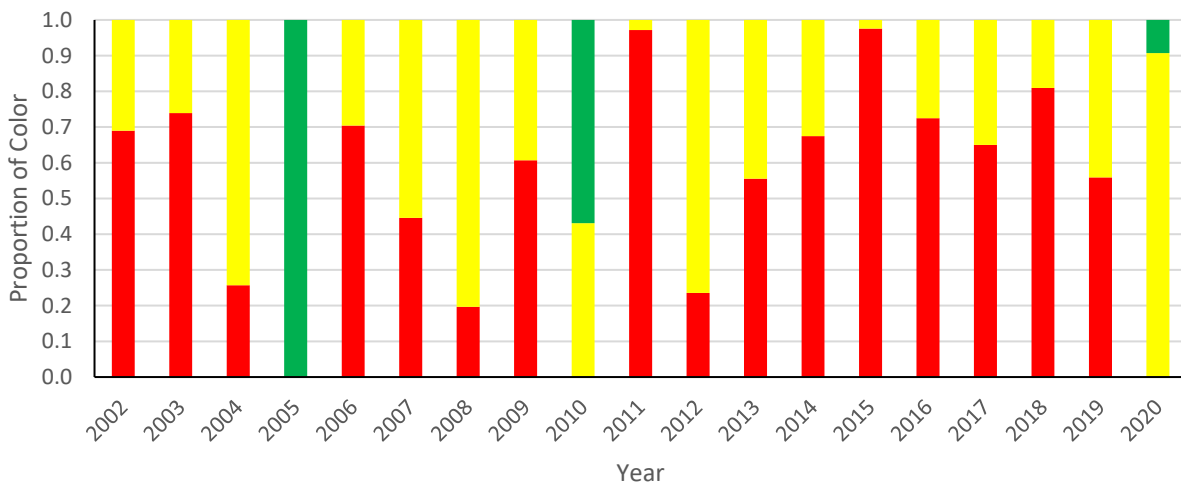
5.4 NCDMF Program 195 (Pamlico Sound Survey)

- The NCDMF Program 195 survey saw declines in juveniles as indicated by increasing red proportions in the juvenile TLA (Figure 15) in 2020. The adult TLA in indicates a slight increase in abundance indicated by the decreasing red proportions in 2020, but remained above the 30% threshold (Figure 16).

- The juveniles abundance declined 55.6% in 2020 (240.6 fish per set) versus 2019 (542.4 fish per set) with the red proportion exceeding the 30% threshold for the first time since 2016 (Figure 15).

- The adult abundance increased slightly (21.4%) in 2020 compared to the decline seen in 2019 (33.0%) (Figure 15). The adult TLA red proportions exceeded the 30% threshold for four of the last five years (2016-2017 and 2019-2020).

- The adult TLA did trigger at the 30% in 2020 with two of the previous three years exceeding that threshold (2019-2020)

- Note sampling during June 2020 was limited to day trips and only the sites accessible from a nearby port were sampled – which primarily included the river strata (Neuse

River, Pamlico River, and Pungo River) and those sites close to the mouth of the rivers. A total of 28 stations were towed during June 2020 (54 stations are sampled each June under normal conditions)

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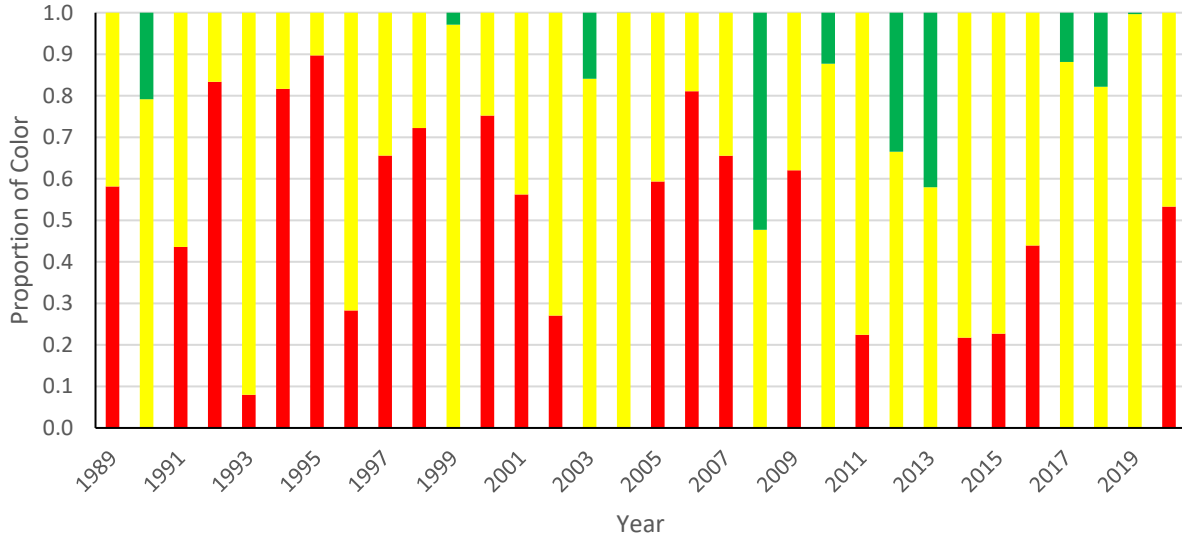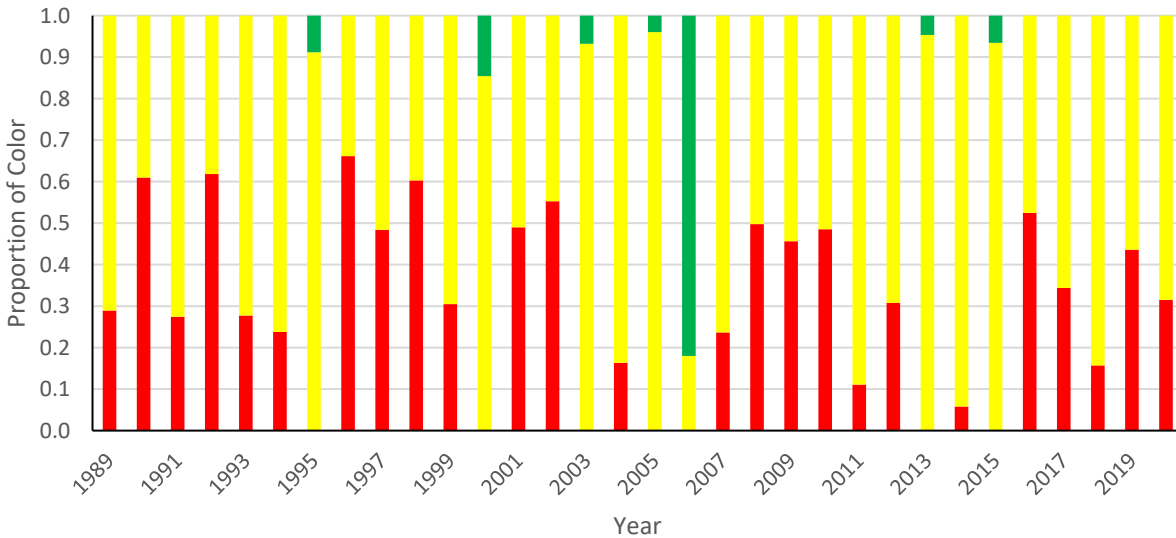

Figure 16. Annual TLA color proportions for adult spot (age 1+) from the South Atlantic NCDMF Program 195 Survey using a 2002-2012 reference period.


5.5 SEAMAP Trawl Survey

- Since there were no SEAMAP cruises in 2020, the current TLA only reflects data through 2019.

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

- The annual CPUE increased 265% in 2019 (48.6 kg/tow) from 2018 (13.3 kg/tow) 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 using a 2002-2012 reference period.
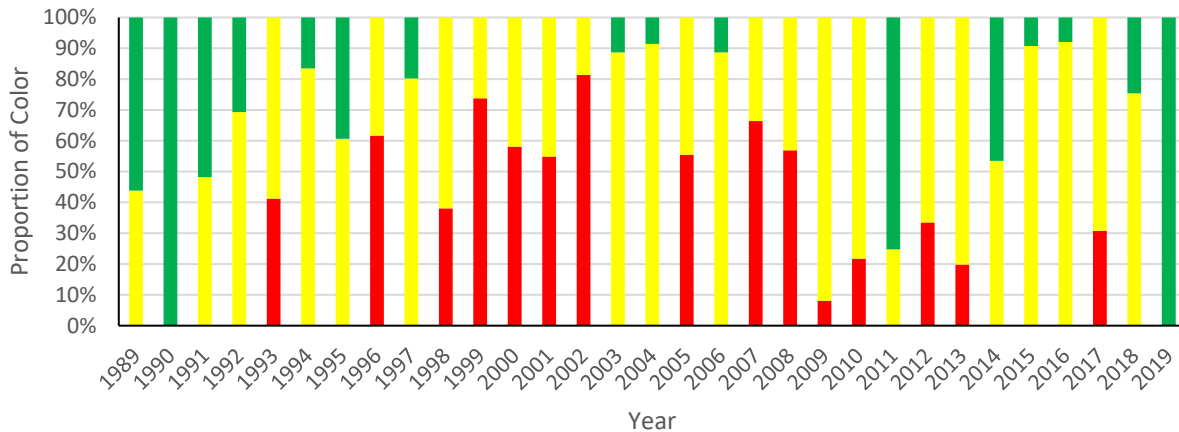

5.6 Juvenile Abundance Composite Indices

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 ChesMAPP 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 8 years (Figure 18).

- The juvenile composite index was above the 30% threshold in two of the three terminal years (Figure 18).

- The South Atlantic juvenile spot index (NCDMF Program 195), CPUE declined 55.6% in 2020 (240.6 fish per set) versus 2019 (542.4 fish per set) with the red proportion exceeding the 30% threshold for the first time since 2016 (See Figure 15).

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) using a 2002-2012 reference period.
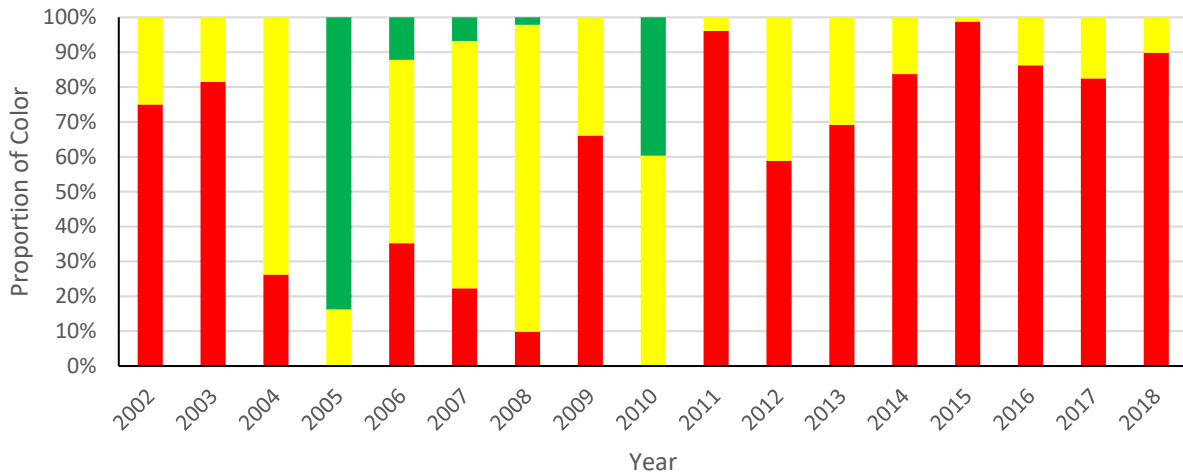
6 SUPPLEMENTAL MATERIALS

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 (2007-2020) compared to the other surveys. This section describes the trends in the NEAMAP survey and gives composite characteristics that include NEAMAP.

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

- Red proportions in 2020 exceeded the 30% threshold (Figure 19).

- The adult spot TLA index showed a generally declining trend from 2010 through 2018 with red proportions exceeding the 60% threshold but has increased above the long term mean with green proportions in the last two years (Figure 20). 2020 showed a significant increase in spot abundance.

- The trend in higher red proportions was very similar to the trends seen in the ChesMMAP survey across years prior to 2019, but did not correlate with the NEFSC survey in terms of general trends.

- The juvenile TLA did exceed the 30% threshold in 2018 and 2020 but not in 2019, thus would have triggered in two of the three terminal years. The adult index did not trigger in 2020.

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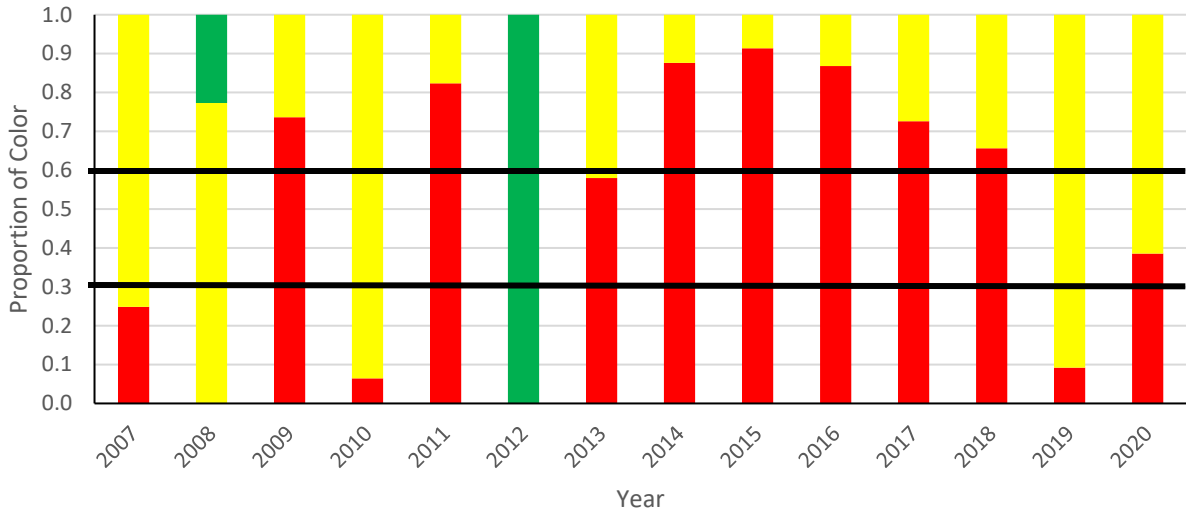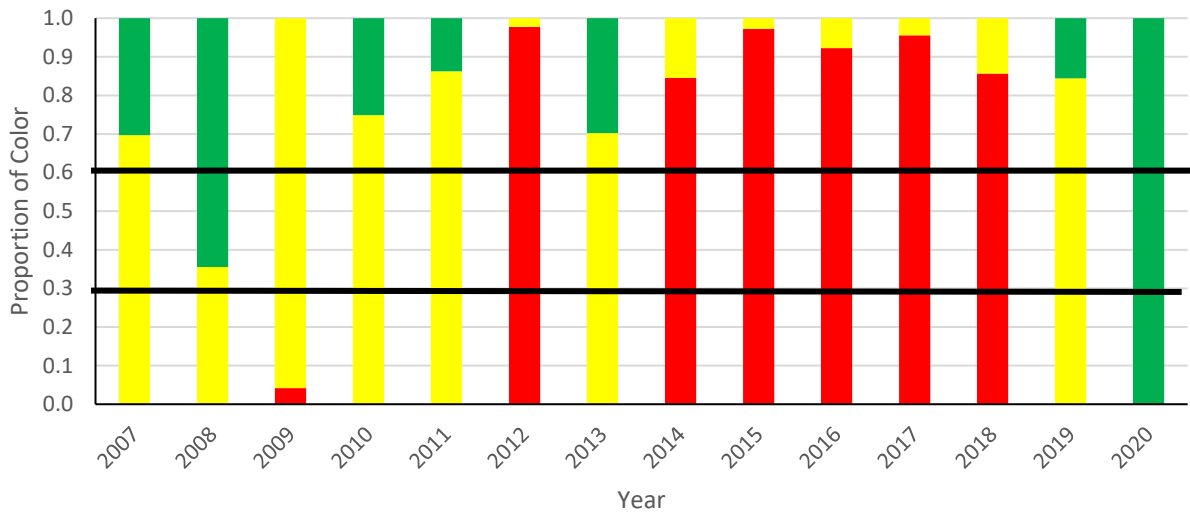

Figure 20. Annual color proportion from TLA for adult (age 1+) spot from the Mid-Atlantic NEAMAP survey using a 2007-2019 reference period.

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 2019-2020, 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 2019-2020 and NEFSC was not available in 2020 the TLA

presented only goes through 2019 and is the composite TLA using NEFSC and NEAMAP only (as this was the data available).

- The juvenile spot composite characteristic (Figure 21) supported the general decline in recruitment in the Mid-Atlantic region with red proportions in excess of the 60% threshold from 2013 through 2019. The increase in the MD index in 2020 put the composite TLA below the 30% threshold for the first time since 2012.

- The adult spot composite characteristic (Figure 22) showed a similar overall low abundance trends from 2012, with red proportions above the 30% threshold from in all but two years and exceeding the 60% threshold three years. 2019 was the first year the TLA dropped below the 30% threshold since 2013.

- Both the juvenile and adult indices tripped in the terminal years presented for each TLA (2020 for juveniles and 2019 for adults) since two of the three terminal years exceeded the 30% threshold.

6.3 Summary

The addition of the NEAMAP survey generally supported the declining trends in recent years seen in the harvest composite characteristic as well as the fishery-independent surveys (with the exception of the NEFSC survey). The TC might consider adding the NEAMAP survey to the Traffic Light Analysis after the next scheduled benchmark assessment for spot and re-evaluate the use of the NEFSC survey 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 considering changes to the TLA until report year 2022.

Figure 21. Juvenile spot (age 0) TLA composite characteristic index for the Mid-Atlantic (NJ-VA) using NEAMAP and MD Seine surveys with a 2007-2019 reference period.
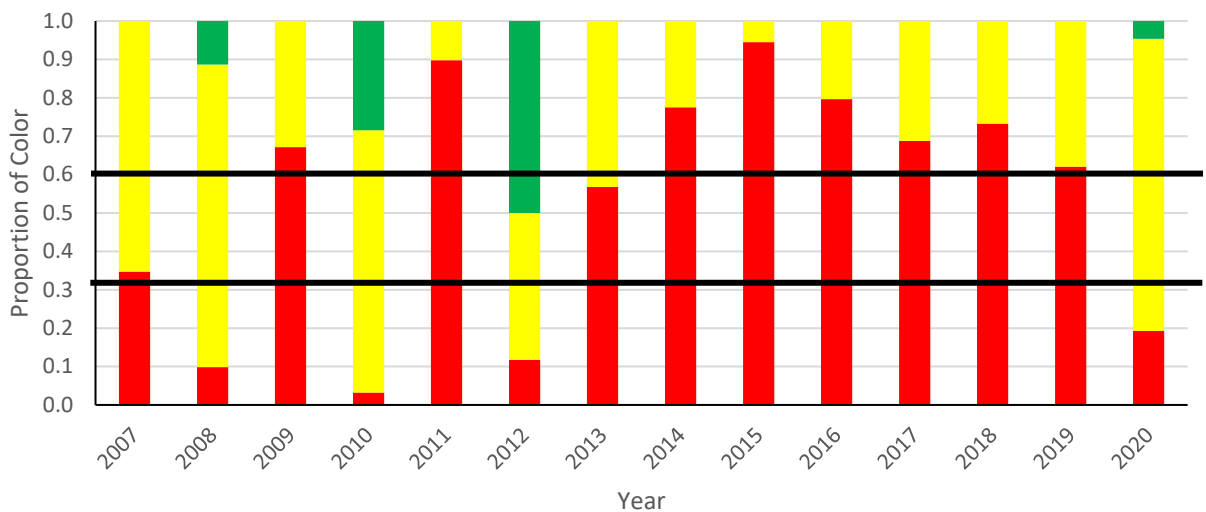
Figure 22. Adult spot (age 1+) TLA composite characteristic index for Mid-Atlantic (NJ-VA) using NEFSC and NEAMAP surveys with a 2007-2019 reference period.