Draft for Board Review; Not for Public Comment

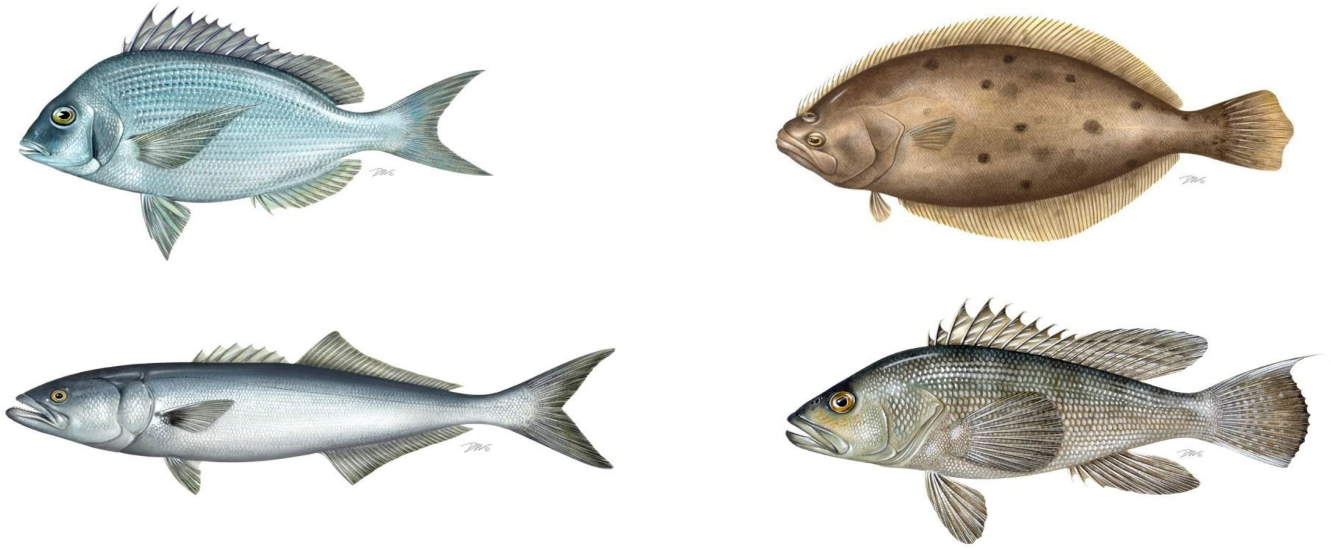
Atlantic States Marine Fisheries Commission

DRAFT OMNIBUS ADDENDUM TO THE SUMMER FLOUNDER, SCUP, AND BLACK SEA BASS FISHERY MANAGEMENT PLAN AND BLUEFISH FISHERY MANAGEMENT PLAN

FOR PUBLIC COMMENT

Harvest Control Rule for Recreational Management

This action is being developed with the Mid-Atlantic Fishery Management Council.



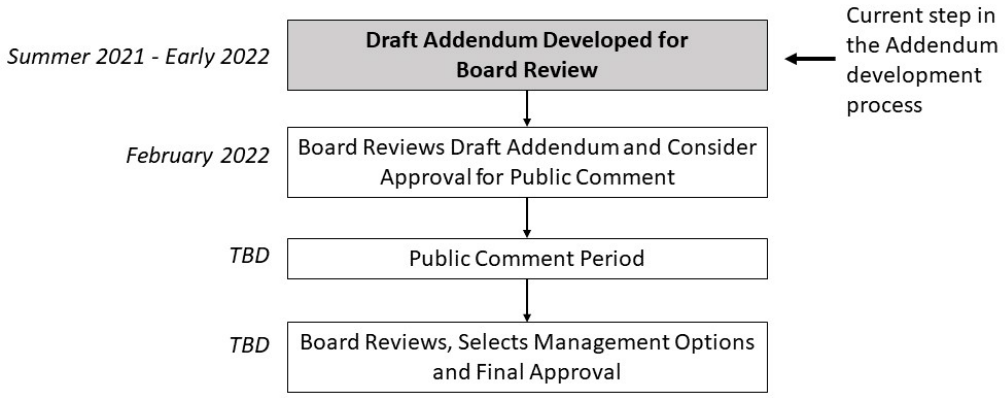
This draft document was developed for Policy Board review and discussion. This document is not intended to solicit public comments. Comments on this draft document may be given at the appropriate time on the agenda during the scheduled Policy Board and Council meeting. If approved, a public comment period will be established to solicit input on the issues contained in the document.

February 2022

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

Public Comment Process and Proposed Timeline

In October 2020, the Atlantic States Marine Fisheries Commission's (Commission's) Summer Flounder, Scup, and Black Sea Bass Management Board (Board) and the Mid-Atlantic Fishery Management Council (Council) initiated a draft addendum (for the Commission) and framework action (for the Council) to address management of the recreational summer flounder, scup, black sea bass, and bluefish fisheries. This Draft Addendum and the Council's framework consider modifications to the process for setting recreational bag, size, and season limits (i.e., "recreational measures") for all four species. The Draft Addendum and the Council's framework action consider an identical set of options and the Commission's Interstate Fisheries Management Policy Board (Policy Board) and Council will select the same management options for implementation. This document presents background on recreational management for these species and a range of options to set recreational measures for public consideration and comment. The addendum process and expected timeline are below.



The public is encouraged to submit comments regarding this document at any time during the public comment period. The final date comments will be accepted is DATE TBD at 11:59 p.m. Comments may be submitted at state public hearings or by mail, email, or fax. If you have any questions or would like to submit a comment, please use the contact information below. **All comments will be made available to both the Commission and Council for consideration; duplicate comments do not need to be submitted to both bodies.**

Tips for Providing Public Comment

We value your input. To be most effective, please include specific details as to why you support or oppose a particular proposed management option. Specifically, please address the following:

- Which proposed options do you support, and which options do you oppose?
- Why do you support or oppose the option(s)?
- Is there any additional information you think should be considered?

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Table of Contents

1.0 Introduction

Summer flounder, scup, black sea bass, and bluefish fisheries are managed cooperatively by the Commission in state waters (0-3 miles), and by the Council and NOAA Fisheries in federal waters (3-200 miles). The management unit for summer flounder in U.S. waters is the western Atlantic Ocean from the southern border of North Carolina northward to the U.S.-Canadian border. The management unit for scup and black sea bass in US waters is the western Atlantic Ocean from Cape Hatteras, North Carolina north to the Canadian border. Bluefish are managed in U.S. waters along the entire eastern US coast, from Maine to Florida.

The Council and Commission jointly agree to recreational annual catch limits (ACLs) and recreational harvest limits (RHLs) for all four species, which apply throughout the management units. They also jointly agreed to the overall approach to setting recreational bag, size, and season limits (i.e., recreational measures). Recreational measures in state waters are determined through the Commission process. The current process for setting recreational measures in state waters for summer flounder and black sea bass was established in 2018 through Addendum XXXII and for scup was established in 2004 through Addendum XI. Amendment 1 to the Bluefish Fishery Management Plan (FMP) established a process for setting recreational measures for bluefish.

In October 2020, the Commission's Policy Board and the Mid-Atlantic Fishery Management Council approved the following motion:

> *Move to initiate a joint framework/addendum to address the following topics for summer flounder, scup, black sea bass, and bluefish, as discussed today:*
>
> - *Better incorporate MRIP uncertainty into management*
> - *Develop guidelines for maintaining status quo measures*
> - *Develop a process for setting multi-year measures*
> - *Consider changes to the timing of federal waters measures recommendations*
> - *Harvest control rule*
>
> *and to also initiate an amendment to address recreational sector separation and recreational catch accounting such that scoping for the amendment would be conducted during the development of the framework/addendum.*

During their February 2021 meeting, the Council and Policy Board prioritized development of the harvest control rule referenced in the motion above prior to further development of the other topics. This Draft Addendum and the complementary Council framework address only the harvest control rule; however, as described in more detail in later sections of this document, considerations related to uncertainty in the Marine Recreational Information Program (MRIP) data, guidelines for status quo measures, and multi-year measures are incorporated into many of the options.

The goal of this Draft Addendum and the Council's framework is to establish a process for setting recreational bag, size, and season limits for summer flounder, scup, black sea bass, and bluefish such that measures aim to prevent overfishing, are reflective of stock status, appropriately account for uncertainty in the recreational data, take into consideration angler preferences, and provide an appropriate level of stability and predictability in changes from year to year.

2.0 Overview

2.1 Statement of Problem

As described in more detail in section 2.2, the Commission and Council face a number of challenges setting recreational management measures for summer flounder, scup, black sea bass, and bluefish, including concerns related to uncertainty and variability in the recreational fishery data, the need to change measures (sometimes annually) based on those data, as well as the perception that measures are not reflective of current stock status. In addition, management measures have not always had their intended effect on overall harvest.

The purpose of this document is to consider a management approach called a harvest control rule to establish a process for setting recreational bag, size, and season limits for summer flounder, scup, black sea bass, and bluefish such that measures aim to prevent overfishing, are reflective of stock status, appropriately account for uncertainty in the recreational data, take into consideration angler preferences, and provide an appropriate level of stability and predictability in changes from year to year. The management options aim to rely less on expected fishery performance and instead uses a more holistic approach with greater emphasis on traditional and non-traditional stock status indicators and trends.

Addendum XXXII established an interim management approach for summer flounder and black sea bass that addressed several key management objectives and served as a foundation for broad-based, long-term management reform. The Policy Board and Council are addressing ongoing management challenges and objectives via comprehensive, long-term management reforms over the next several years starting with this document. Those actions will draw upon improved recreational fishery data,[1] updated stock assessments, and innovative management tools.

2.2 Background

For all four species, recreational ACLs are set jointly by the species management board and the Council. ACLs account for landings and dead discards. An RHL for each species is set equal to the ACL minus expected dead discards. Recreational measures (i.e., bag, size, and season limits)

[1] MRIP is an evolving program with ongoing improvements to its methods. Several recent advancements including the transition from a telephone survey to a mail survey to estimate fishing effort have resulted in revisions to the recreational catch and harvest estimates.

are set with the goal of preventing RHL overages. In preventing RHL overages, these measures also aim to prevent ACL overages and to prevent overfishing.

The ACLs and RHLs are revised when new stock assessment information becomes available. They are based on stock assessment projections, considerations related to scientific uncertainty, and commercial/recreational allocations. The RHLs incorporate assumptions about dead discards and can be further reduced to account for management uncertainty.

The methods used to determine which measures will prevent RHL overages are not specified in the FMPs and may be modified based on annual recommendations from the Council's Monitoring Committees and the Commission's Technical Committees. MRIP harvest data from one or more recent years are typically used to predict the impacts of changes in bag, size, or season limits on harvest when setting recreational measures. This process typically relies on the assumption that if the recreational measures remain unchanged, next year's harvest will be similar to harvest in the current year or a recent multi-year average. If unchanged measures are expected to result in harvest notably above or below the RHL, then the measures are adjusted to achieve a desired percent liberalization or reduction in harvest based on an analysis of trends shown in recent years' MRIP data.

To allow for consideration of preliminary, current year MRIP data, the Commission's species management board and Council typically determine the overall approach for the upcoming year's recreational measures (e.g., status quo or an overall percentage liberalization or reduction) in December of the current year. They also agree to the federal waters measures in December with the approach for developing state waters measures typically approved by the board in February of the following year.

Of these four species, those that tend to harvest close to or more than their RHL (primarily summer flounder and black sea bass) have required frequent changes to the recreational bag, size, and season limits to prevent future RHL overages. In some cases, the required changes in measures appear to have responded to variability and uncertainty in the MRIP data rather than a clear conservation need. This challenge has been referred to as "chasing the RHL." In addition, many recreational stakeholders expressed frustration that the black sea bass measures did not seem reflective of stock status as they have generally been more restrictive in recent years compared to when the stock was under a rebuilding plan, despite the stock currently being more than double the target level and highly available to anglers.

The bluefish stock was declared overfished in 2019, triggering the development of a rebuilding plan and a need for more restrictive management measures than had previously been in place. This addendum includes special considerations for stocks in a rebuilding plan. The options in this document are not meant to replace the bluefish rebuilding measures. Any measures implemented for bluefish must comply with the rebuilding plan.

2.3 Status of the Stocks

2.3.1 Summer Flounder

The most recent summer flounder management track stock assessment was completed in June 2021, using data through 2019 (NEFSC 2021a). The assessment approach is a complex statistical catch-at-age model incorporating a broad array of fishery and survey data. Results from the 2021 assessment indicate that the summer flounder stock was not overfished, but was 14% below the biomass target, and overfishing was not occurring, in 2019 (Figure 1). Fishing mortality was 20% below the threshold level defining overfishing. More detail on the assessment can be found here.

The 2021 management track stock assessment provided the basis for setting fishery specifications for 2022–2023.

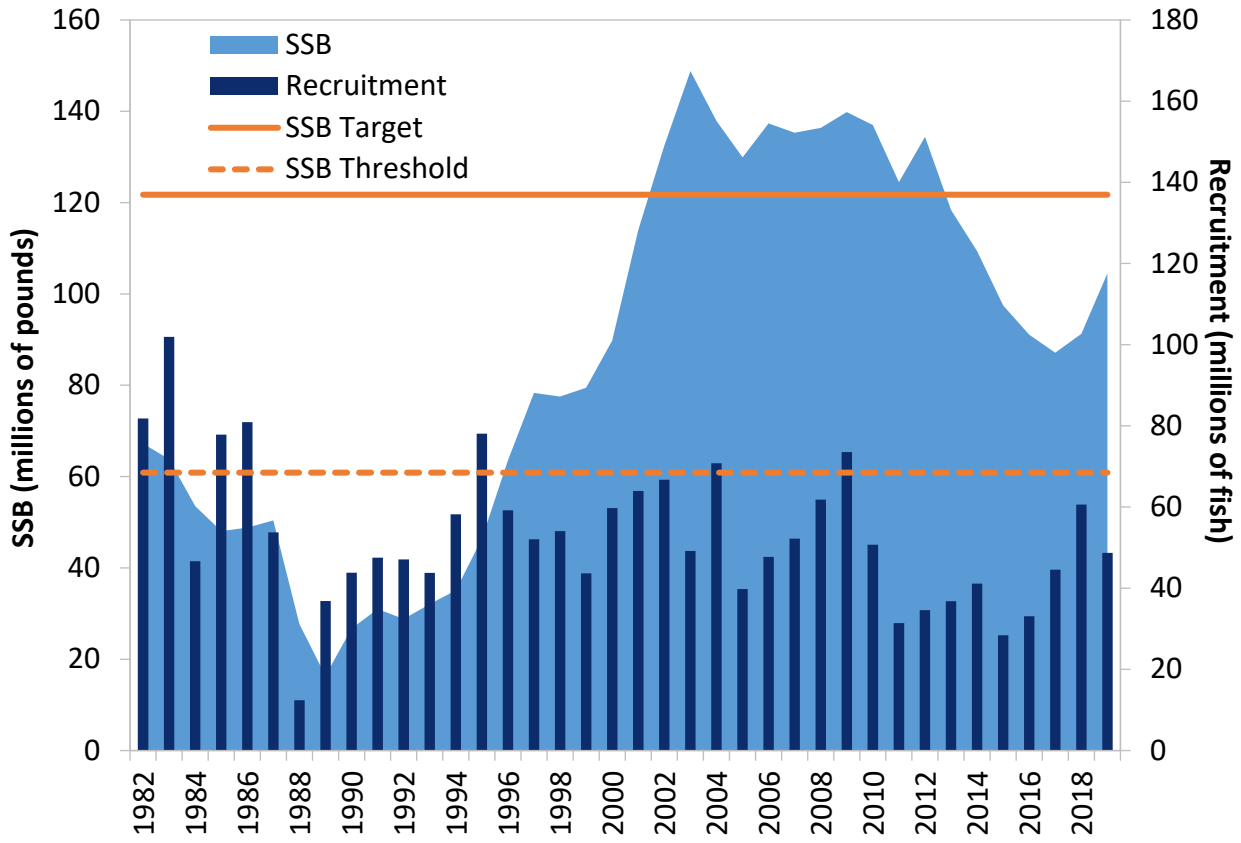


Figure 1. Summer flounder spawning stock biomass and recruitment. Source: 2021 Operational Assessment Prepublication Report, Northeast Fisheries Science Center.

2.3.2 Scup

The most recent scup management track stock assessment was completed in June 2021, using data through 2019 (NEFSC 2021b). The assessment approach is a complex statistical catch-at-age model incorporating a broad array of fishery and survey data. Results from the 2021 assessment indicate that the scup stock was not overfished and was about two times the biomass target, and overfishing was not occurring, in 2019 (Figure 2). Fishing mortality was 32% below the threshold level defining overfishing. More detail on the assessment can be found here.

The 2021 management track stock assessment provided the basis for setting fishery specifications for 2022–2023.

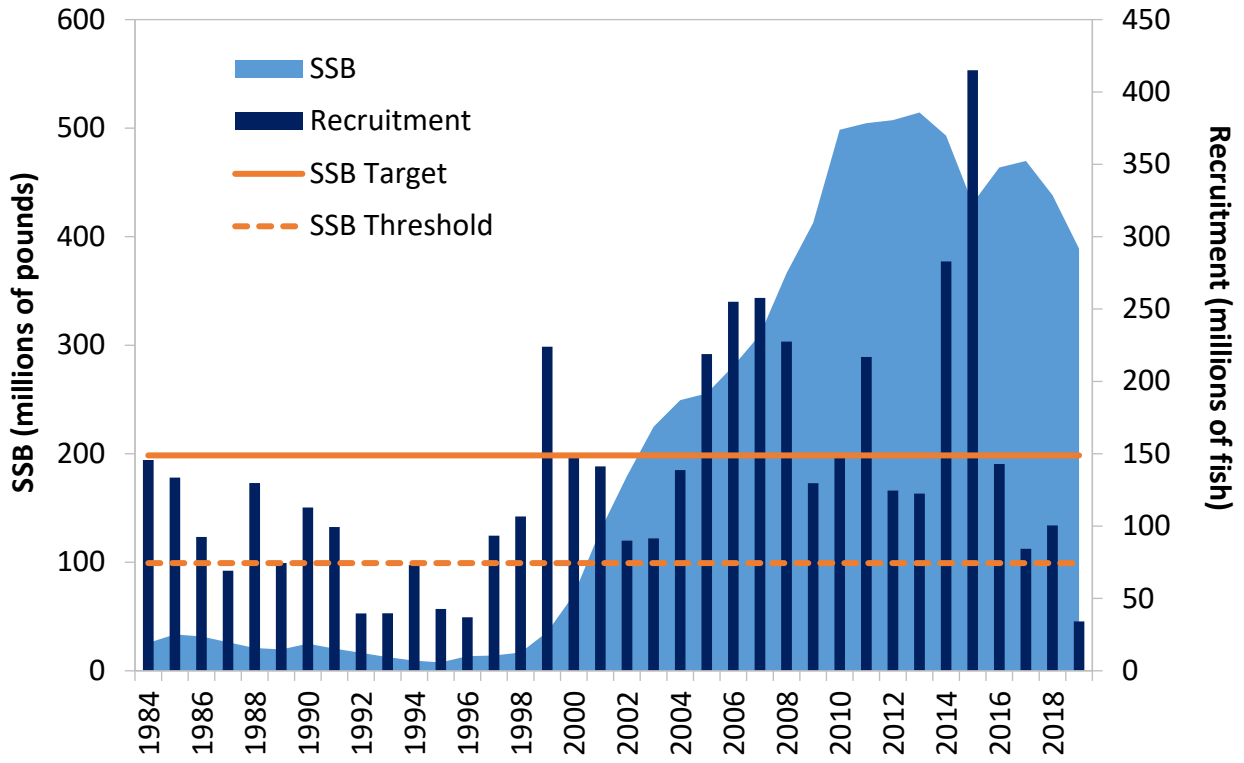


Figure 2. Scup spawning stock biomass and recruitment. Source: 2021 Operational Assessment Prepublication Report, Northeast Fisheries Science Center.

2.3.3 Black Sea Bass

The most recent black sea bass stock assessment update was completed in July 2021, using data through 2019 (NEFSC 2021c). The assessment used a combined-sex, age-structured assessment model. The assessment modeled black sea bass as two separate sub-units (North and South) divided approximately at Hudson Canyon, from which results were combined for the coastwide stock status determination. Results from the 2021 assessment indicate that the black sea bass stock was not overfished and was about 2.2 times the target level, nor was overfishing occurring, in 2019 (Figure 3). Fishing mortality was 15% below the threshold level defining overfishing. The assessment required an adjustment to account for the significant retrospective pattern. This adjustment was only applied to the terminal year of the assessment and the adjusted values are used for management. Of the four species considered in this action, only black sea bass required a retrospective adjustment in the assessment. More detail can be found here.

The 2021 management track stock assessment provided the basis for setting fishery specifications for 2022–2023.

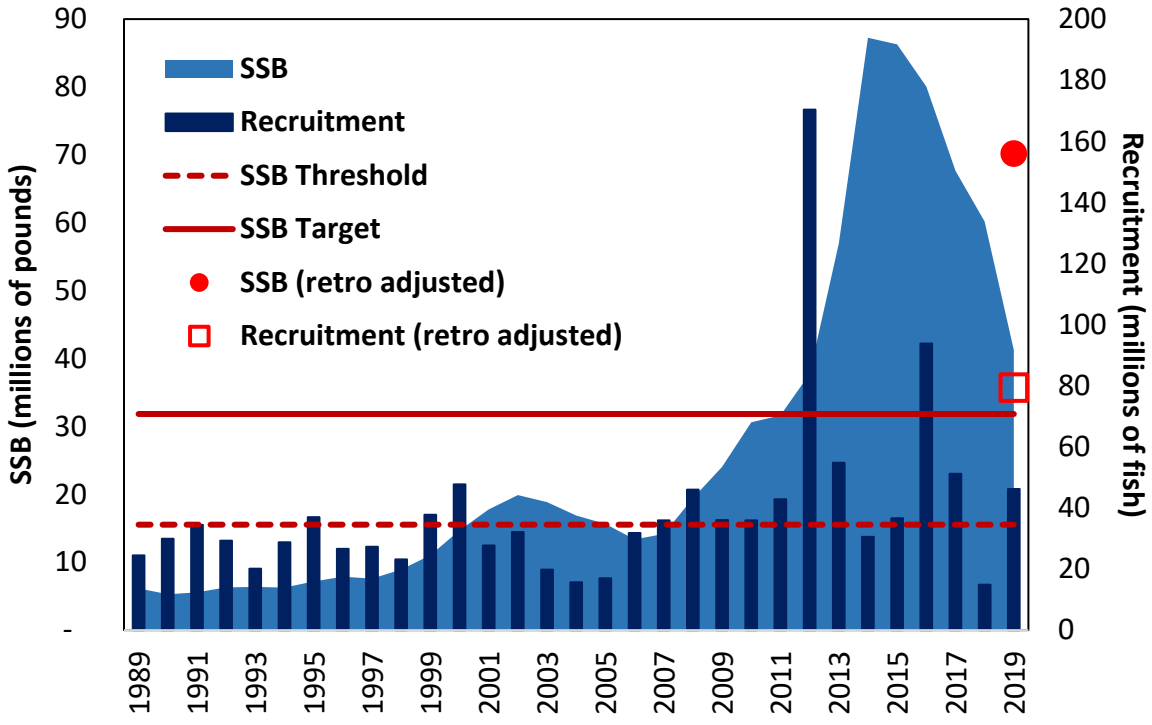


Figure 3. Black sea bass spawning stock biomass and recruitment with retrospective adjusted values. Source: 2021 Operational Assessment Prepublication Report, Northeast Fisheries Science Center.

2.3.4 Bluefish

The most recent bluefish management track stock assessment was completed in June 2021, using data through 2019 (NEFSC 2021d). The assessment approach is a complex statistical catch-at-age model incorporating a broad array of fishery and survey data. Results from the 2021 assessment indicate that the bluefish stock was overfished and was 5% below the overfished threshold, but overfishing was not occurring in 2019 (Figure 4). Fishing mortality was 5% below the threshold level defining overfishing. More detail on the assessment can be found here.

The 2021 management track stock assessment along with the preferred rebuilding plan selected jointly by the Board and Council at their June 2021 meeting provided the basis for setting fishery specifications for 2022–2023.

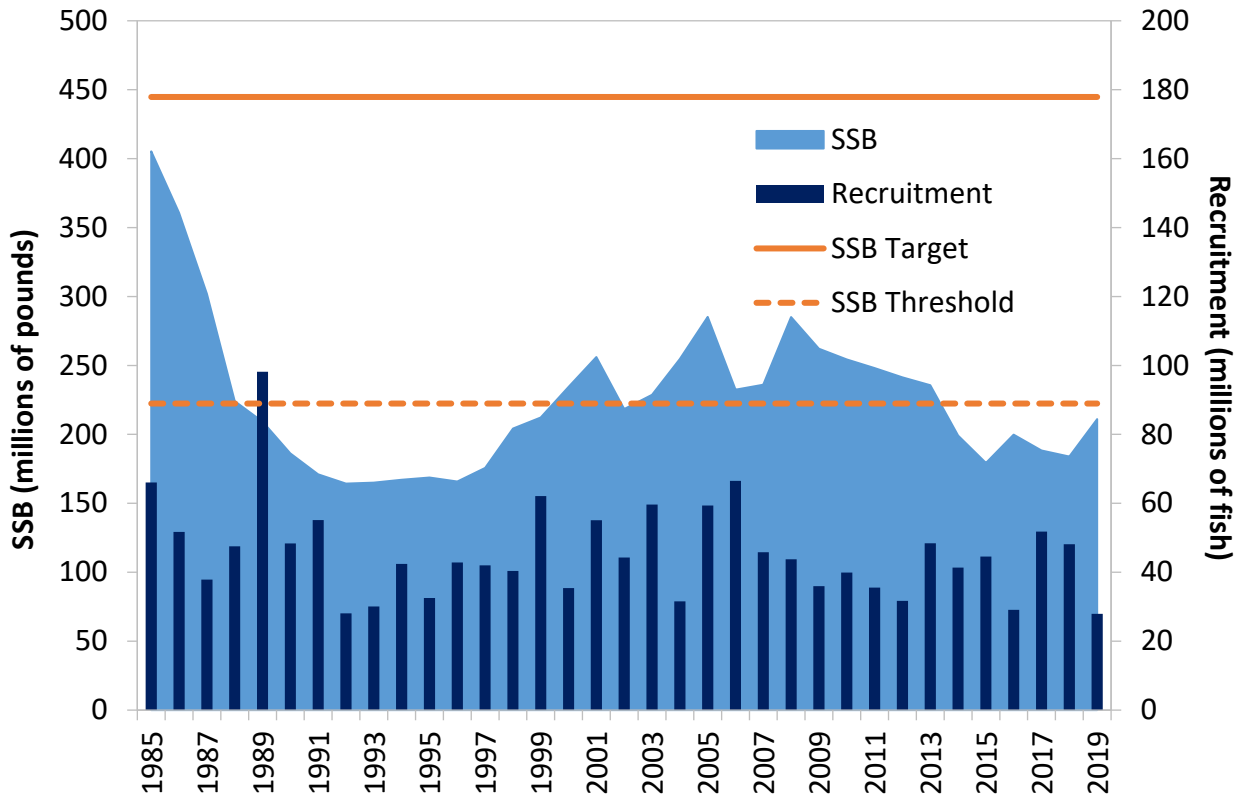


Figure 4. Bluefish spawning stock biomass and recruitment. Source: 2021 Operational Assessment Prepublication Report, Northeast Fisheries Science Center.

2.4 Status of the Fishery

2.4.1 Summer Flounder

Recreational harvest peaked in 1983 at 36.74 million pounds, and declined to a time series low of 5.66 million pounds in 1989. A more recent review of recreational fishery performance from 2011 to present reveals an average of 12.59 million pounds with a high of 19.41 million pounds in 2013 and a low of 7.60 million pounds in 2018. Recreational harvest in 2020 was 10.06 million pounds, a 29% increase from the prior year's harvest of 7.80 million pounds. The total recreational catch (harvest plus live and dead releases) of summer flounder in 2020 was 33.32 million fish, slightly lower than the time series average of 34.46 million fish. The assumed discard mortality rate in the recreational fishery is 10%. In 2020, an estimated 80% of the harvest (in numbers of fish) originated from private/rental boats, while shore-based anglers and party/charter boats accounted for an average of 18% and 2% of the harvest, respectively. In addition, 61% of summer flounder harvested by recreational fishermen (in numbers of fish) were caught in state waters and about 39% in federal waters.

2.4.2 Scup

Most recreational scup catches are taken in states of Massachusetts through New York. From 2011 to 2020, recreational harvest has ranged from 8.27 million pounds in 2012 to 14.12 million pounds in 2019. In 2020, recreational harvest was 12.91 million pounds. The total catch (harvest plus releases) of scup in 2020 were 27.27 million fish, slightly higher than the ten year average of 27.07 million fish. The assumed discard mortality rate in the recreational fishery is 15%. In 2020, an estimated 62% of the harvest (in numbers of fish) originated from private/rental boats, while shore-based anglers and party/charter boats accounted for an average of 28% and 10% of the harvest, respectively. In addition, 90% of scup harvested by recreational fishermen (in numbers of fish) were caught in state waters and about 10% in federal waters.

2.4.3 Black Sea Bass

After a drastic peak in 1986 at 11.19 million pounds, recreational harvest averaged 5.02 million pounds annually from 1987 to 1997. Recreational harvest limits were put in place in 1998 and harvest generally increased from 1.92 million pounds in 1998 to 9.06 million pounds in 2015. In 2016 and 2017 harvest jumped up to 12.05 and 11.48 million pounds, respectively; however the 2016 and 2017 estimates are regarded as implausibly high outliers by the Technical Committee. In 2020, recreational harvest was estimated at 9.12 million pounds with recreational live discards from Maine to Virginia estimated to be 29.79 million fish. Assuming 15% hook and release mortality, estimated recreational dead discards are 4.47 million fish, equal to 51% of the total recreational removals (harvest plus dead discards).

2.4.4 Bluefish

From 2011-2020, recreational catch (harvest plus fish caught and released) of bluefish in U.S. waters of the Atlantic coast averaged 44.46 million fish annually. In 2020, recreational catch was estimated at 30.68 million fish. In 2020, recreational anglers harvested an estimated 9.34

million fish weighing 13.58 million pounds (6,160 metric tons). Harvest during 2018-2020 was exceptionally low compared to the ten year average of 25.69 million lbs. The 2020 average weight of landed fish is 1.45 pounds, which is also lower than the ten year average of 1.65 pounds. This lower average weight is due to the regional distribution of state landings in 2020. The majority of the recreational harvest (pounds) came from Florida (42%), North Carolina (16%), New Jersey (13%), and New York (11%). Fish from southern states (NC-FL) made up 59% of the landings and are typically smaller on average than fish caught in northern states (ME-VA). In 2020, recreational dead releases (15% of released alive fish) were estimated at 3.20 million fish.

3.0 Proposed Management Program

The Policy Board and Council are considering changes to the process of setting recreational management measures for summer flounder, scup, black sea bass, and bluefish. As such, both bodies are seeking public comment on each of the options below. As previously stated, the Council is considering the same options through a framework action.

These management changes are considered through the management programs of the Commission and the Council. The Council is bound by the requirements of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), including requirements for ACLs, accountability measures, and prevention of overfishing. NOAA Fisheries, which has final approval authority for Council management documents, will not approve measures that are inconsistent with the MSA. NOAA Fisheries provides guidance throughout development of Council actions to ensure that the preferred options selected for implementation are consistent with the MSA and other applicable laws.

As proposed, the same options would be selected for all four species. It is not intended that one harvest control rule option would be used for some species and a different option for others. However, depending on considerations such as ongoing development of statistical models to predict recreational harvest, the Policy Board and Council may consider approving different implementation dates by species for any change to the FMPs. All harvest control rule approaches involve various combinations of input metrics, flexibilities, and accountability measures with the goal of standardizing management measure setting and providing stability to these recreational fisheries. A table for comparison across all options can be found in Appendix 1.

Stocks under an approved rebuilding plan are subject to the measures of that rebuilding plan, which may differ from the measures under the options below. None of the options in this document are meant to replace rebuilding plan measures. In some instances, measures implemented through the options below may be used as temporary measures until a rebuilding plan is implemented, which can take up to two years after the stock is declared overfished.

3.1 Management Options to Set Recreational Management Measures

A. No Action (Current Recreational Measures Setting Process)

Section 2.2 describes the process used in recent years to set recreational measures. The details of this process are not defined in the FMPs and can be modified without an addendum or other change to the FMPs. The following sections summarize the language currently in the Commission's FMPs regarding recreational measures for each species. Under the no action option, these sections of the FMPs could remain unchanged.[2]

1. Summer Flounder

As outlined in section 3.1 of Addendum XXXII, management measures are set annually through a specification process. The process involves the following steps:

- At the joint meeting with the Council typically in December, the Board and Council will decide whether to specify coastwide measures to achieve the coastwide RHL or conservation equivalent management measures using guidelines agreed upon by both management authorities. If the latter, the Board will then be responsible for establishing recreational measures to constrain harvest to the RHL.

- The Technical Committee (TC) will continue to evaluate harvest estimates as they are released, and project how suites of possession limits, size limits and seasons might impact recreational landings in each region. In recommending adjustments to measures (reductions, liberalizations or no change), the TC will examine several factors and suggest a set of regional regulations, which when combined, would not exceed the RHL. These factors could include but are not limited to stock status, resource availability (based on survey and assessment data), and fishery performance (harvest, discards, effort, estimate uncertainty, inter-annual variability), as well as the standards and guiding principles set forth below. The Board will use information provided by the TC to approve a methodology for the states to use in developing regional proposals, typically at the Commission's Winter Meeting.

- The states will collaborate to develop regional proposals for the current year's recreational measures that include possession limits, size limits and season length pursuant to the Board-approved methodology. These

[2] Under the no action option, predicted harvest under any combination of measures could continue to rely on the methods described above, or alternative methods could be used if deemed appropriate. For example, the Council and Commission are supporting the development of statistical models for predicting harvest based on management measures and other factors. These models could be used under the no action option.

proposals will be reviewed by the TC to ensure the data and analysis are technically sound.

- The Board will review state proposals, TC recommendations, and establish final measures at a Summer Flounder, Scup, and Black Sea Bass Board meeting following the release of wave 6 MRIP estimates from the previous year.

- Once the Board has approved the measures and the states have promulgated them, the Commission will send a letter to the Regional Administrator certifying the Board approved measures, in combination, will achieve but not exceed the RHL.

The Board also uses a set of standards and guiding principles to structure the development of measures during specification setting (Addendum XXXII Section 3.1.1).

2. Scup

Addendum XI provides the ability for the Board and Council to establish management measures annually through a specification process. The process involves the following steps:

- At the joint meeting with the Council typically in December, the Board and Council will determine whether to maintain status quo measures or a liberalization or reduction in measures are needed to achieve the coastwide RHL.

- States will then proceed to develop proposals, typically the states MA-NY, but other states could have adjustments, for the upcoming year's recreational measures that include possession limits, size limits and season length. These proposals will be reviewed by the TC to ensure the data and analysis are technically sound.

- The Board will review state proposals, TC recommendations, and establish final measures at the Commission's winter meeting.

3. Black Sea Bass

As outlined in section 3.2 of Addendum XXXII, management measures are set annually through a specification process. The process involves the following steps:

- At the joint meeting with the Council typically in December, the Board and Council will decide whether to adopt coastwide measures or if the states will implement measures to constrain harvest to the RHL. If the latter, the Board

will then be responsible for establishing recreational measures to be implemented in state waters to constrain harvest to the RHL.

- The TC will continue to evaluate harvest estimates as they are released, and project how suites of possession limits, size limits and seasons might impact recreational landings in each region. In recommending adjustments to measures (reductions, liberalizations or no change), the TC will examine several factors and suggest a set of regulations for regions, which when combined, would not exceed the RHL. These factors can include but are not limited to stock status, resource availability (based on survey and assessment data), and fishery performance (harvest, discards, effort, estimate uncertainty, inter-annual variability), as well as the standards and guiding principles set forth below. The Board will use information provided by the TC to approve a methodology for the states to use in developing regional proposals, typically at the Commission's Winter Meeting.

- The states will collaborate to develop regional proposals for the current year's recreational measures that include possession limits, size limits and season length pursuant to the Board-approved methodology. These proposals will be reviewed by the TC to ensure the data and analysis are technically sound

- The Board will review state proposals, TC recommendations, and establish final measures at a Summer Flounder, Scup, and Black Sea Bass Board meeting following the release of wave 6 MRIP estimates from the previous year.

- Once the Board has approved the measures and the states have promulgated them, the Commission will send a letter to the Regional Administrator certifying the Board approved measures in combination will achieve but not exceed the RHL.

The Board also uses a set of standards and guiding principles to structure the development of measures during specification setting (Addendum XXXII Section 3.2.1).

4. Bluefish

As outlined in section 5.1.4.1.3 of Amendment 1, management measures are set annually through a specifications process. The process typically involves the following steps:

- At the joint meeting with the Council typically in December, the Board will determine whether to maintain status quo coastwide measures or a

liberalization or reduction in measures are needed to achieve the coastwide RHL.

- In order to achieve the annual RHL, recreational fisheries will be constrained by a coastwide regime of coastwide size limits, bag limits, and seasons. Once a basic regime for these limits is established, typically at the joint meeting with the Council in December, states will be given the opportunity to vary these measures in accordance with the Commission's Conservation Equivalency process[3].

- A state may submit a proposal for a change to its regulatory program to the Commission. Such changes shall be submitted to the ASMFC staff, which will distribute the proposal to the Management Board, the Plan Review Team, the Technical Committee, the Stock Assessment Subcommittee, and the Advisory Panel.
- States must submit proposals at least two weeks prior to a planned meeting of the Technical Committee.
- The ASMFC staff is responsible for gathering the comments of the Technical Committee, the Stock Assessment Subcommittee, and the Advisory Panel and presenting these comments to the Management Board at the Commission's winter meeting.
- The Management Board will decide whether to approve the state proposal for an option management program if it determines that it is consistent with the harvest target and the goals and objectives of the FMP.

5. Current Accountability Measures for Summer Flounder, Scup, Black Sea Bass, and Bluefish

The MSA requires Council FMPs to contain provisions for ACLs and "measures to ensure accountability." The National Standards Guidelines state that accountability measures (AMs) "are management controls to prevent ACLs, including sector-ACLs, from being exceeded, and to correct or mitigate overages of the ACL if they occur. AMs should address and minimize both the frequency and magnitude of overages and correct the problems that caused the overage in as short a time as possible." (50 CFR 600.310 (g)).

The current recreational AMs for these species were implemented through an omnibus amendment in 2013 (Amendment 19 to the Summer Flounder, Scup, and Black Sea Bass FMP and Amendment 4 to the Bluefish FMP). The AMs are included in the Council's FMP. They are not included in the Commission's FMP; however, any changes to the AMs considered through this action will be considered by both the Council and Commission.

[3] http://www.asmfc.org/files/pub/ConservationEquivalencyGuidance_2016.pdf

Proactive AMs include adjustments to the management measures for the upcoming fishing year (as described in previous sections), if necessary, to prevent the RHL and ACL from being exceeded. Measures to prevent the RHL from being exceeded are ultimately intended to also prevent ACL overages, which in turn prevents overfishing.

Given the timing of MRIP data availability, the regulations do not allow for in-season closure of the recreational fishery if the RHL or ACL is expected to be exceeded. Therefore, measures must be set in a manner that is reasonably expected to constrain harvest to the RHL.

Reactive recreational AMs include a set of possible responses to exceeding the recreational ACL, depending on stock status and which limits are exceeded. Paybacks of ACL overages may be required in a subsequent fishing year, depending on stock status and the scale of the overage, as described below. ACL overages in the summer flounder, scup, and black sea bass recreational fisheries are evaluated by comparing the most recent 3-year average recreational ACL against the most recent 3-year average of recreational catch (i.e., landings and dead discards). If average catch exceeds the average ACL, then the appropriate AM is determined based on the following criteria:

1. If the stock is overfished ($B < ½ B_{MSY}$), under a rebuilding plan, or the stock status is unknown:

   The exact amount, in pounds, by which the most recent year's recreational ACL has been exceeded will be deducted in the following fishing year, or as soon as possible once catch data are available.

2. If biomass is above the threshold, but below the target ($½ B_{MSY} < B < B_{MSY}$), and the stock is not under a rebuilding plan:

   a. If only the recreational ACL has been exceeded, then adjustments to the recreational management measures (bag, size, and seasonal limits) would be made in the following year, or as soon as possible once catch data are available. These adjustments would take into account the performance of the measures and conditions that precipitated the overage.

   b. If the ABC is exceeded in addition to the recreational ACL, then a single year deduction will be made as a payback, scaled based on stock biomass. The calculation for the payback amount is: *(overage amount) * (B_{MSY}-B)/½ B_{MSY}*.

3. If biomass is above the target ($B > B_{MSY}$):

   Adjustments to the recreational management measures (bag, size, and seasonal limits) will be made for the following year, or as soon as possible once catch data

are available. These adjustments would take into account the performance of the measures and conditions that precipitated the overage.

Reactive recreational AMs for the bluefish recreational fishery are very similar to the process described above with a few key differences. First, ACL overages are evaluated on a 1-year basis as opposed to a 3-year average. Second, if a transfer between the commercial and recreational sectors caused the transferring sector to register an ACL overage, then instead of applying an overage payback to the transferring sector, a transfer in a subsequent year would be reduced by the amount of the ACL overage.

B. Percent Change Approach

This option differs from the no action option in that it includes additional consideration of biomass compared to the target level (B/B_{MSY}) when determining if the recreational management measures should be liberalized, restricted, or remain unchanged. The amount of change varies based on the magnitude of the difference between a confidence interval (CI)[4] around an estimate of expected harvest and the average RHL for the upcoming two years, as well as considerations related to biomass compared to the target level (B/B_{MSY}).

Specifically, the first step in determining the overall percent change in harvest would be to compare the average RHL for the upcoming two years to the CI[5] of the most recent two years of MRIP estimates, or to a CI around an alternative predictor of harvest based on a robust statistical methodology approved by the Technical and Monitoring Committees. The MRIP estimates (or approved alternative estimates) are intended as a proxy for expected harvest in the upcoming years under status quo measures, similar to the current process. Depending on whether the average RHL is above the upper bound of the CI, within the CI, or below the lower bound of the CI around the estimate of expected harvest, the management responses are narrowed down to those illustrated in rows A, B, and C in Table 1 (p. 13), respectively.

The second step narrows down the suite of management responses further by taking into consideration the B/B_{MSY} ratio. The third column in Table 1 displays the resulting percent change in measures required for the upcoming two years. A range of sub-options is under consideration for the resulting percent change when the RHL is above or below the bounds of the CI, as described below. Regardless of the sub-options chosen, when the RHL is within the CI, no change in measures would be made if the B/B_{MSY} ratio is between 1 and 1.5 (i.e., the stock is between the target biomass level and 150% of the target level). A 10% liberalization in harvest would be allowed when the B/B_{MSY} ratio exceeds 1.5 (i.e., the stock

[4] A confidence interval provides an upper and lower bound around a point estimate to indicate the range of possible true parameter values in accordance with a specific confidence level. In this case, it represents a range of potential harvest estimates that can be reasonably expected to encompass the true harvest value.

[5] Specifically, an 80% joint distribution CI has been suggested as this method takes into consideration the percent standard error (PSE) of each individual years' MRIP estimate and the variability of the estimates between years.

is greater than 150% of the target biomass level). A 10% reduction in harvest would be required when the B/B_{MSY} ratio is less than 1 (i.e., biomass is below the target level).

It is important to note that this option considers changes from a starting point. If the current measures have resulted in notable differences between harvest and the RHL in recent years, then they may not be an appropriate starting point under this option and an alternative starting point may be required.

Under this option, the Council and Board would consider adjusting the recreational management measures in sync with the setting of catch and landings limits in response to updated stock assessment information. It is anticipated that updated stock assessments will be available every other year. In interim years, the Council and Board would review the catch and landings limits compared to the measures. They may revise the measures in interim years if new data such as a research track stock assessment or other technical reports suggest that the measures are not performing as expected or if a change is needed for other reasons. The intent would be to only change the measures in interim years if new information suggests strong concerns with the current measures.

Sub-Options for Percent Change When the RHL is Outside the Bounds of the Expected Harvest Estimate CI

If the Policy Board and Council adopt the percent change approach, they must also select either sub-option B-1A or B-1B. In addition, they must also select either sub-option B-2A or B-2B.

Sub-Option B-1A: Percent Change Capped at Difference Between 2 Year Average RHL and Harvest Estimate

If selected, this sub-option would be used in the following two situations: 1) the average two-year RHL is above the upper bound of the harvest estimate CI (Row A in Table 1) and biomass is at or above the target (B/B_{MSY} is at least 1), or 2) the average two-year RHL is below the lower bound of the harvest estimate CI (Row C in Table 1) and biomass is at or below 150% of the target (B/B_{MSY} is less than or equal to 1.5). Other situations either do not have sub-options (RHL is within the CI; Row B in Table 1) or are covered by sub-options B-2A and B-2B, below.

Under this sub-option, the percent liberalization or reduction in harvest would be defined as the percent difference between the two-year average RHL and a point value harvest estimate. The point value harvest estimate would be either a two-year average of recent MRIP harvest estimates or an alternative estimate based on a robust statistical methodology approved by the Monitoring/Technical Committees. The intent behind this sub-option is to scale liberalizations or reductions proportionately when there are large differences between the harvest estimate and the RHL. For example, if there is a 15% difference between the two-year average RHL and the point value harvest estimate,

then the reduction would be 15%. The outcome of this sub-option could be very similar to the no action option (section 3.1.A).

Sub-Option B-1B: 20% or 40% Change (Depending on B/B_{MSY})

Under this sub-option, management measures would aim to achieve the following percentage liberalizations or reductions in overall harvest, as illustrated in Table 1:

- **40% liberalization** when the average two-year RHL is above the upper bound of the harvest estimate CI (Row A in Table 1) and biomass is more than 150% of the target level (B/B_{MSY} greater than 1.5).
- **20% liberalization** when the average two-year RHL is above the upper bound of the harvest estimate CI (Row A in Table 1) and biomass is above the target level but less than 150% of the target level (B/B_{MSY} of 1 - 1.5).
- **20% reduction** when the average two-year RHL is below the lower bound of the harvest estimate CI (Row C in Table 1) and biomass is above the target level but less than 150% of the target level (B/B_{MSY} of 1 - 1.5).
- **40% reduction** when the average two-year RHL is below the lower bound of the harvest estimate CI (Row C in Table 1) and biomass is below the target level (B/B_{MSY} less than 1).

Other situations either do not have sub-options (RHL is within the CI) or are covered by sub-options B-2A and B-2B, below.

The intent of this sub-option is to provide predictable changes in harvest based on the percentage amount applied historically in management.

Sub-Options for Percent Change When the RHL is Below the Lower Bound of the CI And B/B_{MSY} exceeds 1.5.

Sub-Option B-2A: 10% Reduction

Under this sub-option, when the upcoming 2-year average RHL is below the lower bound of the CI around the harvest estimate (i.e., an RHL overage is expected), measures would be modified such that expected harvest is reduced by 10%, regardless of the scale of the expected overage. The rationale behind this alternative is that a reduction is needed to ensure that continued overages do not contribute to overfishing as required by the MSA; however, the assumption is that the reduction need not be greater than 10% per cycle given that biomass is very high compared to the target level. An analysis of potential impacts on stock status under this, as with all other options in this document, has not been performed.

Sub-Option B-2B: No Change in Measures

Under this sub-option, when the upcoming 2 year average RHL is below the lower bound of the CI around the harvest estimate (meaning an RHL overage is expected under status quo measures), no change in the measures would be made, regardless of the scale of the expected overage. The assumption behind this alternative is that

reductions are not needed because biomass is very high compared to the target level. However, it should be noted that harvest overages can contribute to overfishing, even at high biomass levels, and, as previously stated, in order to comply with the MSA, any adopted options must prevent overfishing. An analysis of potential impacts on stock status under this, as will all other options in this document, has not been performed.

Table 1. Process for determining the appropriate percent change in harvest when developing management measures under the percent change approach.

Row	Future RHL vs Harvest Estimate[6]	B/B_{MSY}[7]	Change in Harvest	
A	Future 2-year avg. RHL greater than upper bound of harvest estimate CI	> 1.5	Sub-Option B-1A: Liberalization percent equivalent to difference between harvest estimate and 2-year avg. RHL	Sub-Option B-1B: 40% Liberalization
		1 - 1.5	Sub-Option B-1A: Liberalization percent equivalent to difference between harvest estimate and 2-year avg. RHL	Sub-Option B-1B: 20% Liberalization
		< 1	Sub-Option B-2A: 10% Liberalization	Sub-Option B-2B: 0%
B	Future 2-YR avg. RHL within CI of harvest estimate	> 1.5	10% Liberalization	
		1-1.5	0%	
		< 1	10% Reduction	
C	Future 2-YR avg. RHL less than lower bound of harvest estimate CI	> 1.5	Sub-Option B-2A: 10% Reduction	Sub-Option B-2B: 0%
		1-1.5	Sub-Option B-1A: Reduction percent equivalent to difference between harvest estimate and 2-year avg. RHL	Sub-Option B-1B: 20% Reduction
		< 1	Sub-Option B-1A: Reduction percent equivalent to difference between harvest estimate and 2-year avg. RHL	Sub-Option B-1B: 40% Reduction

Accountability Measures under the Percent Change Approach

Background information on AMs is provided in section 3.1-A-5. Under the Percent Change Approach, measures would be more restrictive when stock status is poor and more liberal when stock status is good. In addition, when RHL overages are expected

[6] The two year average MRIP estimate with associated CI is intended as a predictor of future harvest under status quo measures. This may be replaced with statistical model based approaches for predicting harvest.

[7] The proposed B/B_{MSY} inflection points are based on the Council's Risk Policy. Future changes to the Council risk policy may warrant reconsideration of this proposed process.

(based on the CI comparison described above), measures would be proactively reduced by a predetermined percent when the stock is less than 150% of the target level. Reductions would also be taken if the stock is below the target even when the RHL is within the CI, helping to rebuild the stock back to the target. These aspects of this option could all be considered proactive AMs.

This option requires minimal changes from the current reactive AMs described in section 3.1-A-5. The current reactive AMs would be modified such that when paybacks are required, the payback could be spread evenly across two years to help facilitate the use of constant measures across two years. When a payback is applied, the percent change would be determined based on the reduced ACL.

Consideration could also be given to options A and B listed in section 3.4. These options consider modifications to the metrics considered when biomass is above the threshold but below the target and a scaled payback of a past overage may be needed.

C. Fishery Score Approach

The fishery score is a formulaic method that combines multiple metrics into one value which is used to determine the appropriate management measures. Based on the score, the stock would be placed into one of four bins with corresponding management measures. The fishery score would be based on four metrics: biomass (B) relative to the target (B_{MSY}), recruitment (R), fishing mortality (F), and fishery performance, as described in more detail below and in Appendix 3. Each metric has a weight assigned to it, determined by the Technical/Monitoring Committees such that metrics with a stronger relationship to harvest would have more weight in the fishery score while still accounting for metrics that impact harvest but may not drive harvest. Additional metrics may be added and weighting schemes adjusted as more data become, based on the recommendations of the Monitoring/ Technical Committees.

The fishery score would be calculated using the following formula:

$$B/B_{MSY}(W_B) + F/F_{MSY}(W_F) + R\ (W_R) + \text{Fishery performance } (W_{FP}) = \text{Fishery Score}$$

Where W refers to the weight of each factor. The fishery score value corresponds to a predetermined bin. The fishery score would range from 1 to 5 and the bins are defined as displayed in Table 2.

Weights would have a minimum of 0.1 and maximum of 0.5 to prevent any one metric from being weighed too heavily in relation to the others. The intent is to allow the Monitoring/Technical Committees to recommend changes to the weights through the specifications process based on their expert judgement and empirical methods when possible. Changes should be limited to provide stability in comparisons over time.

Table 2. Fishery score bins and the associated level of concern, stock status, and measures that are associated with each bin.

Bin	Fishery Score	Stock Status and Fishery Performance Outlook	Measures
1	4-5	Good	Most Liberal
2	3-3.99	Moderate	Liberal
3	2-2.99	Poor	Restrictive
4	1-1.99	Very Poor	Most Restrictive

A declining fishery score over time could indicate negative trends in stock status and an examination of the individual fishery score metrics can provide insight into why the overall score is declining. This can also serve as an early warning of the need to use more restrictive measures in the future if the trend continues.

Measures associated with each of the four bins would aim to achieve a target level of harvest, catch, or fishing mortality, depending on the option selected from section 3.2. The target would be a point value, but the measures in each bin would be anticipated to produce a range of possible harvest, catch or fishing mortality, given uncertainty and variability in the data. Considerations related to confidence intervals and other statistical metrics and models could be used to determine the appropriate measures for each bin.

Although the fishery score would be calculated based on multiple factors, the management measures associated with each bin could be defined based on four categories of biomass. For example, the most liberal bin (Bin 1, fishery score of 4-5) could have measures based on a target level of harvest, catch, or fishing mortality (depending on the option selected from section 3.2) which is appropriate for biomass that is double the target level. The next most liberal bin (Bin 2, fishery score of 3-3.99) could have measures that are appropriate for biomass at 125% of the target. The next lowest bin (Bin 3, fishery score of 2-2.99) could have measures that are appropriate for biomass at 75% of the target level. The most restrictive bin (Bin 4, fishery score less than 2) could have measures that are appropriate for biomass at 25% of the target level (however; if the stock is under a rebuilding plan, the most restrictive fishery score measures may be temporary until replaced by rebuilding plan measures).

While the measures associated with each bin would be based on biomass compared to the target, placement of a year's measures within one of the four bins would be driven by multiple factors. For example, if the recruitment and fishery performance metrics have low scores, then the stock may be placed in a more restrictive bin with more restrictive

measures than would occur based on biomass considerations alone. The opposite could occur if multiple metrics have high scores. In this way, the measures would be reflective of a combination of biomass relative to the target and assumed future conditions (e.g., high recruitment assumed to result in higher biomass in the future, allowing for more liberal measures).

Under this option, the Council and Board would consider adjusting the recreational management measures in sync with the setting of catch and landings limits in response to updated assessment information. It is anticipated that updated stock assessments will be available every other year. In interim years, the Council and Board would review the catch and landings limits and the measures. As part of this review, the fishery score could be re-calculated with updated fishery performance data; however, updated estimates for the other fishery score metrics would not be available. The Council and Board may revise the measures in interim years if new data, such as a research track assessment or other technical reports, suggest that the measures are not performing as expected or if a change is needed for other reasons. The intent would be to only change the measures in interim years if new information suggests strong concerns with the current measures.

Sub-Options for Accountability Measures under the Fishery Score Approach

Background information on AMs is provided in section 3.1-A-5. For both sub-options in this section, measures are set based on a variety of factors such that they are more restrictive when stock status is poor and more liberal when stock status is healthy. In addition, as described above, this method can provide an early warning of deteriorating stock conditions which can inform the setting of measures. The measures for all bins will be regularly reviewed to ensure that they remain appropriate and prevent overfishing. These aspects of this approach can be considered proactive AMs.

Sub-Option C-1: Reactive AMs Similar to Current AMs

As under this sub-option, ACL overages would be evaluated by comparing the most recent 3-year average recreational ACL against the most recent 3-year average of recreational catch (i.e., landings and dead discards). If average catch exceeds the average ACL, then the appropriate AM is determined based on the following criteria:

1. If the stock is overfished ($B < ½ B_{MSY}$), under a rebuilding plan, or the stock status is unknown:

    a. The stock is placed in the most restrictive bin. These may be temporary measures until replaced by measures required by a rebuilding plan, which can take up to two years to implement.

    b. If the stock was already in the most restrictive bin or the measures in the most restrictive bin are otherwise expected to continue to result in overages, then those measures must be modified as soon as possible following the

determination of the overage such that they are reasonably expected to prevent future overages.

2. If biomass is above the threshold, but below the target (½ B_{MSY} < B < B_{MSY}), and the stock is not under a rebuilding plan:

a. If only the recreational ACL has been exceeded, then the stock would remain in its current bin, but the measures associated with that bin and all other bins, will be re-evaluated with the goal of preventing future ACL overages.

b. If the ABC or F_{MSY} (as determined through section 3.4) is exceeded in addition to the recreational ACL, and the stock has not already moved to a more restrictive bin due to a decrease in the fishery score, then the measures associated with the next more restrictive bin would be implemented. In addition, measures in all bins would be re-evaluated and revised as appropriate. If the stock moves to a more restrictive bin based on a decrease in the fishery score, then an additional AM is not needed as the negative impacts on stock status have already been accounted for in the movement to the more restrictive bin.

3. If biomass is above the target (B > B_{MSY}):

The management measures associated with each bin will be adjusted, taking into account the performance of the measures and the conditions that precipitated the overage.

Sub-Option C-2: Reactive AMs Based on Overfishing Status to Evaluate Measures

If overfishing is occurring (F is greater than F_{MSY}), even if a change in bin was not triggered through re-calculation of the fishery score as described above, the management measures for all bins will be re-evaluated and modified as needed to appropriately constrain recreational catch and end overfishing.

D. Biological Reference Point Approach

Under this option, the primary metrics of terminal year B/B_{MSY} and F/F_{MSY} from the most recent stock assessment would be used to guide selection of management measures. Management measures would be grouped into seven bins, as illustrated in Table 3. Each bin would have a set of default measures which would be implemented the first time the stock is placed in that bin.

To define the bins under this option, fishing mortality (F) would be considered in two states: overfishing (F greater than F_{MSY}) or not overfishing (F equal to or below F_{MSY}). B/B_{MSY} would be further divided to provide more responsive levels of access based on the following:

- Biomass is greater than or equal to 150% of the target.
- Biomass is greater than or equal to the target but less than 150% of the target.

- Biomass is less than the target, but greater than or equal to the threshold (the threshold is ½ the target).
- Biomass is less than the threshold (the stock is overfished).

Recruitment and trends in biomass are secondary metrics under this option which are used to fine tune default measures only when stock conditions (F/F_{MSY} and B/B_{MSY}) relative to the categories above have not changed between the prior and most recent assessments. In this case, biomass trend and a recruitment metric, describe in Appendix 3, can be used to further relax, restrict, or re-evaluate measures. As such, biomass trends and recruitment would impact the management measures, but to a lesser extent than F/F_{MSY} and B/B_{MSY}.

Changes to the measures would be considered based on the following process when updated stock assessment information is available (anticipated to be every other year). The first time a stock is in a new bin, the fishery would be subject to the default measures. If the bin remains unchanged after a subsequent stock assessment update, then recruitment and biomass trend would be considered to determine if measures remain unchanged or if limited liberalizations or reductions can be permitted. As described below, liberalizations within a bin are only allowed in Bins 1 and 2, which are associated with a healthy stock status. Restrictions and/or re-evaluation within a bin can be required based on secondary metrics for Bins 3-6. This allows for relative stability if stock status is unchanged, but also room for tuning of measures if warranted based on biomass trend and/or recruitment. It is intended that the changes within a bin would be based on predetermined guidelines. However, the Council and Board may revise the measures in interim years if new data, such as a research track assessment or other technical reports, suggest that the measures are not performing as expected or if a change is needed for other reasons. The intent would be to only change the measures in interim years if new information suggests strong concerns with the current measures.

Liberalizations within a bin are not permitted when biomass is below the target level or when F exceeds F_{MSY}. For example, if a stock in Bin 2 (F below F_{MSY} and biomass above B_{MSY}, but below 150% of B_{MSY}) remains in Bin 2 based on an updated stock assessment, then measures may be liberalized to preset measures if recruitment and/or biomass trends show positive signs (see Appendix 3). If either of those metrics shown negative signs, then measures would stay status quo. If the updated stock assessment information indicates biomass exceeds 150% of B_{MSY}, then the stock would move into Bin 1, triggering a new set of default measures more liberal than those from Bin 2. Alternatively, if biomass is below the target, then the stock would move to a more restrictive bin (Bins 3-6).

Stocks in Bin 3 are not subject to overfishing and are not overfished but are below their target biomass level. Stocks in Bins 4-6 are experiencing overfishing. The goal of the management measures in Bins 3-6 is to improve stock status by ending overfishing and/or increasing biomass. If the initial default measures do not accomplish this, but the primary metrics of F/F_{MSY} and B/B_{MSY} do not change, then secondary measures can inform how to better adjust regulations to reach the target through additional restrictions. This differs

from stocks in Bins 1-2, where measures would not be adjusted in this circumstance. Additionally, when a stock is in Bins 4-6 (F exceeds F_{MSY}) and the current measures produce catch or harvest that exceed the ACL or RHL (e.g., based on a multi-year average), then the default measures should be re-evaluated.

Any overfished stock (biomass below ½ B/B_{MSY}) would automatically fall into Bin 7 until an approved rebuilding plan is implemented. Stocks under a rebuilding plan must comply with the requirements of the rebuilding plan, and the rebuilding plan measures may differ from the pre-defined measures in this option.

Measures for Bins 1-7 would aim to achieve a target level of harvest, catch, or fishing mortality, depending on the option selected from section 3.2. Although placement in Bins 1-7 would be based on a combination of biomass and fishing mortality, the recreational management measures associated with each bin could be defined based on six categories of biomass and the target level of harvest, catch, or fishing mortality deemed appropriate for that biomass level. The following biomass levels are provided as examples which may be further refined. These examples were constructed such that more risk is allowed when stock status is good compared to when stock status is poor.

- **Bin 1** (biomass greater than or equal to 150% of the target and F below F_{MSY}): default measures are based on biomass that is double the target level.
- **Bin 2** (biomass above the target level but less than 150% of the target and F below F_{MSY}): default measures based on biomass that is 140% of the target level.
- **Bin 3** (biomass between the target and threshold and F below F_{MSY}): default measures based on biomass that is 75% of the target level.
- **Bin 4** (biomass greater than or equal to 150% of the target and F above F_{MSY}): default measures based on a biomass that is at the target level.
- **Bin 5** (biomass above the target level but less than 150% of the target and F above F_{MSY}): default measures based on biomass that is at the target level.
- **Bin 6** (biomass between the target and threshold and F above F_{MSY}): default measures based on biomass that is 60% of the target level.
- **Bin 7** (biomass below the threshold): default measures based on biomass that is 25% of the target level, until replaced by rebuilding plan measures.

The measures in each bin would be anticipated to produce a range of possible harvest, catch, or fishing mortality, given uncertainty and variability in the data. Considerations related to confidence intervals and other statistical metrics and models could be used to define the measures associated with each bin. Measures within each bin would take into consideration small changes to allow for liberalizations or reduction to allow for the flexibility to fine tune measures based on both recruitment and biomass trends in addition to the current biomass and fishing mortality levels.

Table 3. Summary of the biological reference point option illustrating bins of measures associated with different combinations of stock conditions.

	F ≤ Fmsy	F > Fmsy
B >= 150% Btarget	R↑ / R↓ B↑: liberal / liberal B↓: default / default **1**	R↑ / R↓ MRIP ≤ RHL/ACL, B↑: default / restrictive MRIP ≤ RHL/ACL, B↓: restrictive / restrictive MRIP > RHL/ACL: restrictive & re-evaluate measures **4**
Btarget ≤ B < 150% Btarget	R↑ / R↓ B↑: liberal / liberal B↓: default / default **2**	R↑ / R↓ MRIP ≤ RHL/ACL, B↑: default / restrictive MRIP ≤ RHL/ACL, B↓: restrictive / restrictive MRIP > RHL/ACL: restrictive & re-evaluate measures **5**
Bthreshold ≤ B < Btarget	R↑ / R↓ B↑: default / restrictive B↓: restrictive / restrictive **3**	R↑ / R↓ MRIP ≤ RHL/ACL, B↑: default / restrictive MRIP ≤ RHL/ACL, B↓: restrictive / restrictive MRIP > RHL/ACL: restrictive & re-evaluate measures **6**
B < Bthreshold	**MOST RESTRICTIVE/REBUILDING PLAN** **7**	

<u>Accountability Measures under the Biological Reference Point Approach</u>

Background information on AMs is provided in section 3.1-A-5. Under the Biological Reference Point approach, measures are set based on a variety of factors such that they are more restrictive when stock status is poor and more liberal when stock status is healthy. Each bin has two sets of measures: a default set and either a more liberal or more restrictive set of measures. The measures for all bins will be regularly reviewed to ensure that they remain appropriate and prevent overfishing. These aspects of this approach can be considered proactive AMs.

The Biological Reference Point option is unique in that it includes reactive AMs built into the bins to respond to declining stock status (i.e., more restrictive measures implemented when biomass is below the target or F exceeds F_{MSY} and biomass trend and/or recruitment show negative signs or recreational overages have occurred; Bins 3-6). Therefore, no additional reactive AMs are needed under this approach.

E. Biomass Based Matrix Approach

This option uses a matrix to set recreational measures based on two factors: B/B_{MSY} and the most recent trend in biomass (increasing, stable, or decreasing) described in Appendix 3. Using these two factors and four parameters for each, as described below, provides a three-by-four matrix to determine the appropriate management measure bin. Bin A represents the optimal conditions, while Bin F represents the worst conditions. Certain pairs of conditions (e.g., a healthy stock that is increasing or an abundant stock with any biomass trend) are treated as equivalent to reduce the number of bins to six.

The specific combination of management measures that are appropriate for each bin will be species specific. However, the conditions that drive the bins can be the same across all species.

Definitions:

- Abundant = Stock is at least 150% of the target level (B_{MSY})
- Healthy = Stock is above the target, but less than 150% of the target
- Below Target = Stock is below the target, but above the threshold (the threshold is half of the target and defines an overfished condition)
- Overfished = The stock is below the threshold

When biomass exceeds 150% of the target level, regardless of the biomass trend, Bin A measures are selected. This is aimed at providing an opportunity to keep recreational management measures aligned with stock status, which in this case, is significantly above the target. When a stock is fished at F_{MSY} it is expected that stock size will decrease towards the biomass target unless above average recruitment events occur. Thus, it is not necessarily a negative sign if the stock at such high biomass levels experiences a declining trend.

Measures associated with each of the six bins (A-F) would aim to achieve a target level of harvest, catch, or fishing mortality, depending on the option selected from section 3.2. The measures in each bin would be anticipated to produce a range of possible harvest, catch, or fishing mortality, given uncertainty and variability in the data. Considerations related to confidence intervals and other statistical metrics and models could be used to define the measures associated with each bin.

Although placement in Bins A-F would be based on a combination of B/B_{MSY} and biomass trend, the management measures associated with each bin could be defined based on six categories of biomass and the target level of harvest, catch, or fishing mortality deemed appropriate for that biomass level. The following biomass levels are provided as examples which may be further refined. These examples were constructed such that more risk is allowed when stock status is good compared to when stock status is poor.

- **Bin A** (biomass greater than or equal to 150% of target level or biomass above target but less than 150% of target with increasing trend): measures are based on biomass that is 150% of the target level.
- **Bin B** (biomass above the target level but less than 150% of the target with stable or decreasing trend): measures based on biomass that is at the target level.
- **Bin C** (biomass between the target and threshold and increasing trend): measures based on biomass that is 75% of the target level.
- **Bin D** (biomass between the target and threshold and stable or decreasing trend): measures based on biomass that is 60% of the target level.
- **Bin E** (biomass below the threshold and increasing trend): measures based on biomass that is 40% of the target level.
- **Bin F** (biomass below the threshold and stable or decreasing trend): measures based on biomass that is 20% of the target level.

Table 4. Recreational management measure matrix under the Biomass Based Matrix approach.

Stock Status	**Biomass Trend**		
	Increasing	**Stable**	**Decreasing**
Abundant At least 150% of target	Bin A		
Healthy Above target, but less than 150% of target	Bin A	Bin B	
Below Target but above threshold	Bin C	Bin D	
Overfished Below threshold	Bin E	Bin F	

Sub-Options for Accountability Measures Under the Biomass Based Matrix

Background information on AMs is provided in section 3.1-A-5. For both sub-options below, measures are set based on a variety of factors such that they are more restrictive when stock status is poor and more liberal when stock status is healthy. The measures for all bins will be regularly reviewed to ensure that they remain appropriate and prevent overfishing. These aspects of this approach can be considered proactive AMs.

Sub-Option E-1: Reactive AMs Similar to Current AMs

As under this sub-option, ACL overages would be evaluated by comparing the most recent 3-year average recreational ACL against the most recent 3-year average of

recreational catch (i.e., landings and dead discards). If average catch exceeds the average ACL, then the appropriate AM is determined based on the following criteria:

1. If the stock is overfished ($B < ½ B_{MSY}$), under a rebuilding plan, or the stock status is unknown:

   a. The most restrictive measures (Bin F) would be implemented. These may be temporary measures until replaced by measures required by a rebuilding plan, which can take up to two years to implement.

   b. If the most restrictive measures were already in place or are otherwise expected to continue to result in overages, then those measures must be modified for the upcoming fishing year such that they are reasonably expected to prevent future overages.

2. If biomass is above the threshold, but below the target ($½ B_{MSY} < B < B_{MSY}$), and the stock is not under a rebuilding plan:

   a. If only the recreational ACL has been exceeded, then the stock would remain in its current bin, but the measures associated with that bin and all other bins, will be re-evaluated with the goal of preventing future ACL overages.

   b. If the ABC or F_{MSY} (as determined through section 3.4) is exceeded in addition to the recreational ACL, and the stock has not already moved to a more restrictive bin due to a decrease in biomass, then measures associated with the next more restrictive bin would be implemented. In addition, measures in all bins would be re-evaluated and revised as appropriate. If the stock moves to a more restrictive bin based on a decrease in biomass, then an additional AM is not needed as the negative impacts on stock status have already been accounted for in the movement to the more restrictive bin.

3. If biomass is above the target ($B > B_{MSY}$):

   The management measures associated with all bins will be adjusted, taking into account the performance of the measures and the conditions that precipitated the overage.

Sub-Option E-2: Reactive AMs with a Trigger Based on Overfishing Status to Evaluate Measures

Under this sub-option, if overfishing is occurring (F is greater than F_{MSY}), even if a change between bins was not triggered through an updated comparison of the Biomass Based Matrix metrics as described above, the management measures for all bins will be re-

evaluated and modified as needed to appropriately constrain recreational catch and end overfishing.

3.2 Target Metric for Setting Measures

The options in this section define the target metric which would be used when setting measures appropriate for the set of stock conditions that define the bin under options C-E in section 3.1. The options in section 3.2 do not apply if either options A or B in section 3.1 are selected. While the PDT/FMAT has not come to a consensus on which method was preferable, they did agree that if option C is selected, a secondary option should also be selected if the primary option cannot be calculated for any reason.

A. Recreational Harvest Limit

Under this option, the measures associated with each bin in options C-E under section 3.1 would aim to achieve but not exceed a target level of harvest which is informed by the RHL. Options C-E in section 3.1 use a binned approach to setting recreational management measures, with each bin representing a range of stock conditions. For this reason, the target level of harvest for each bin may not always be equivalent to the RHL under the no action alternative as a range of RHLs could fall under the same bin.

The RHL is calculated by removing projected dead discards from the Recreational ACL. Both the RHL and ACL are based on stock assessment projections, considerations related to scientific uncertainty, and commercial/recreational allocations. The RHLs can also be adjusted to account for management uncertainty.

B. Annual Catch Limit

Under this option, the measures associated with each bin in options C-E under section 3.1 would aim to achieve but not exceed a target level of dead catch (i.e., harvest and dead discards) which is informed by the recreational ACL. Options C-E in section 3.1 use a binned approach to setting recreational management measures, with each bin representing a range of stock conditions. For this reason, the target level of catch for each bin may not always be equivalent to the recreational ACL under the no action alternative as a range of ACLs could fall under the same bin.

The ACL is based on stock assessment projections, considerations related to scientific uncertainty, and commercial/recreational allocations.

C. Recreational Fishing Mortality Target

Under this option, the measures associated with each bin in options C-E under section 3.1 would aim to achieve but not exceed a target level of fishing mortality (F) for the recreational fishery. It remains to be determined how a recreational fishing mortality target would be calculated. The stock assessments for each species calculate a fishing mortality reference point (F_{MSY}) for the commercial and recreational fisheries combined. Overfishing occurs at the stock level when fishing mortality exceeds this reference point.

There are no fishing mortality reference points specific to the recreational fisheries. Furthermore, although the current stock assessment models for summer flounder, scup, and bluefish generate estimates of recreational fishing mortality, the current stock assessment model for black sea bass does not model the recreational fishery separately from the commercial fishery. Therefore, unless the model structure changes, it would not be possible to generate a fishing mortality estimate for black sea bass to compare against a recreational fishing mortality target. For these reasons, if this sub-option is selected as preferred by the Policy Board and Council, a secondarily preferred sub-option may also be selected for use in the event that a recreational fishery F target or F estimate cannot be generated.

3.3 Conservation Equivalency Options

The options in this section consider how the Commission's conservation equivalency policy would apply to the management options listed under section 3.1. The options in this section may only be considered if a harvest control rule management option other than Option A (No Action) in section 3.1 is selected.

A. No Action (States Retain Ability to Propose Conservation Equivalent Measures)

This option maintains the ability for states to submit proposals for alternative recreational management measures that are expected to achieve an equivalent level of recreational harvest, catch, or F (as determined by the sub-options in section 3.2). If a state submits a proposal outside of an implementation plan process, it must provide the proposal two months in advance of the next Board meeting to allow committees sufficient time to review the proposal and to allow states to respond to any requests for additional data or analyses. Further details describing the process and procedures can be found in the Commission's conservation equivalency policy noted above.

B. Regional Conservation Equivalency

This option allows for regions, as defined by the pre-determined species regions in Appendix 4, to submit proposals for alternative recreational management measures which are expected to achieve an equivalent level of recreational harvest, catch, or fishing mortality (depending on the option chosen from section 3.2) as the pre-defined measures of the bin. If a region is submitting a proposal, it must provide the proposal two months in advance of the next Board meeting to allow committees sufficient time to review the proposal and to allow the regions to respond to any requests for additional data or analyses.

C. Conservation Equivalency is Disallowed

Under this option, conservation equivalency under the Commission process will not be permitted for any of the four species on a state or regional level. This would reduce the flexibility afforded to states/regions compared to the previous two options, but would help achieve the goals of stability and predictability in measures. Several of the options

proposed in this document have mechanisms in place to allow for the revision of management measures at different bins if they are not working as intended.

3.4 Accountability Measures Comparisons

The options in this section consider a change to one component of the reactive AMs under options A, B, C-1, and E-1 in section 3.1. Specifically, they address situations when a reactive AM has been triggered and biomass is above the threshold but below the target level. All other components of the AMs are summarized along with options A-E in section 3.1. These changes are only considered for the recreational AMs. No changes to the commercial AMs are considered through this action. Regardless of option chosen, AMs should be regularly revaluated following the provisions of the MSA.

A. Catch compared to the ABC

Under this sub-option, when a reactive AM has been triggered by a recreational ACL overage and the most recent biomass estimate is between the target and the threshold, catch relative to the ABC would also be considered. The response to the overage would be stricter if the ABC was also exceeded (e.g., a payback would be required or the stock would be placed in a more restrictive bin, depending on the option). If only the recreational ACL was exceeded, the response to the overage would be less strict (e.g., measures would be revised but a payback would not be required or the stock would remain in its current bin, depending on the option).

B. Fishing mortality compared to an F threshold

This sub-option maintains ACL evaluations within the AMs, but rather than considering if the ABC was also exceeded (see previous section), consideration would be given to if the fishing mortality threshold (F_{MSY}) was also exceeded. The intent behind this option is that it considers if total fishery removals negatively impacted the stock based on the most recent information. For example, catch in a past year may have exceeded the recreational ACL, but a subsequent stock assessment update may indicate that the stock did not suffer notable negative impacts if the fishing mortality threshold was not exceeded. The most recent fishing mortality estimate considers more recent information than the information used to set a previous year's ACL. To set the ACL and ABC, projections must be made that make assumptions about how the fishery may perform. This approach using a fishing mortality comparison would look at data that represents what transpired in the fishery or stock during the time being evaluated, according to the most recent stock assessment. If regularly updated estimates of total fishing mortality compared to the threshold are not available, then this comparison would default to the ABC comparison described above.

4.0 Compliance

TBD

5.0 Literature Cited

NEFSC. 2021a. Summer Flounder Management Track Assessment Report.

NEFSC. 2021b. Scup Management Track Assessment for 2021. Prepublication copies prepared for use by Fishery Management Council staff and SSC. Available at https://www.mafmc.org/ssc-meetings/2021/july21-23.

NEFSC. 2021c. Black Sea Bass Management Track Assessment for 2021. Prepublication copies prepared for use by Fishery Management Council staff and SSC. Available at https://www.mafmc.org/ssc-meetings/2021/july21-23.

NEFSC. 2021d. Atlantic Bluefish Management Track Assessment for 2021. Prepublication copies prepared for use by Fishery Management Council staff and SSC. Available at https://www.mafmc.org/ssc-meetings/2021/july21-23.

4.0 APPENDICES

Appendix 1. Comparison of Options and Current Stock Status

The following table summarizes metrics considered when setting recreational measures under each option in this Draft Addendum/Framework. Primary metrics determine in the appropriate bin (see section 3.1 for more details); secondary metrics are only used if, through the evaluation of the primary metrics, the stock stays in the current bin. Metrics considered through accountability measures may differ from those shown below. See section 3.1 for more details on the options.

Option	Metrics used to set measures					Measures are pre-determined	Expected number of sets pre-determined measures	Measures specified for 1 or 2 years
	Expected harvest*	Biomass compared to target level (B/B_{MSY})	Fishing mortality compared to threshold level (F/F_{MSY})	Recent recruitment	Biomass trend			
No action	Primary					No	N/A	1
Percent change	Primary	Primary				No	N/A	2
Fishery score	Primary**	Primary**	Primary**	Primary**		Yes	4	2
Biological reference point	Only when $F>F_{MSY}$	Primary	Primary	Secondary	Secondary	Yes	13	2
Biomass based matrix		Primary			Primary	Yes	6	2

*Expected harvest refers to expected harvest under status quo measures compared to the upcoming year(s)' RHL and could be based on past MRIP estimates, including consideration of confidence intervals for those estimates, or a model-based estimate of harvest, including considerations related to uncertainty in that estimate.

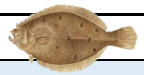
**As described in section 3.1-C, the fishery score metrics may not be weighted evenly. The Monitoring/Technical Committees will recommend the appropriate weight for each metric. These weights can be modified through the specifications process.

Appendix 2. Placement of Each Species in Each Option with Current Data

Option B: Percent Change Approach

As illustrated in the figure below, for summer flounder, the 2022 RHL is within the CI of the 2019-2020 MRIP harvest estimates and the most recent B/B_{MSY} ratio is 0.85. Therefore, a 10% reduction would be needed under the Percent Change Approach.

For black sea bass and scup, the 2022 RHL is below the CI of the 2019-2020 MRIP harvest estimates and the most recent B/B_{MSY} ratio exceeds 1.5. Therefore, depending on sub-option selected, either a 10% reduction would be needed or no change in measures would be made under the Percent Change Approach.

Row	Future RHL vs Harvest Estimate	$B/_{BMSY}$	Change in Harvest	
A	Future 2-year avg. RHL greater than upper bound of harvest estimate CI	> 1.5	Sub-Option B-1A: Liberalization percent equivalent to difference between harvest estimate and 2-year avg. RHL	Sub-Option B-1B: 40% Liberalization
		1 - 1.5	Sub-Option B-1A: Liberalization percent equivalent to difference between harvest estimate and 2-year avg. RHL	Sub-Option B-1B: 20% Liberalization
		< 1	Sub-Option B-2A: 10% Liberalization	Sub-Option B-2B: 0%
B	Future 2-YR avg. RHL within CI of harvest estimate	> 1.5	10% Liberalization	
		1-1.5	0%	
		< 1	 10% Reduction	
C	Future 2-YR avg. RHL less than lower bound of harvest estimate CI	> 1.5	Sub-Option B-2A: 10% Reduction 	Sub-Option B-2B: 0% 
		1-1.5	Sub-Option B-1A: Reduction percent equivalent to difference between harvest estimate and 2-year avg. RHL	Sub-Option B-1B: 20% Reduction
		< 1	Sub-Option B-1A: Reduction percent equivalent to difference between harvest estimate and 2-year avg. RHL	Sub-Option B-1B: 40% Reduction

Option C: Fishery Score Approach

The Monitoring/Technical Committees will recommend the appropriate weight for each metric within the fishery score approach. These weights can be modified through the specifications process. In this example the weighting for each metric was assigned as follows:

B/B_{MSY} = 40% F/F_{MSY} = 20% Recruitment = 20% Fishery Performance = 20%

Summer Flounder

Using the results of the 2021 management track assessment for summer flounder we calculated the current fishery score as follows, assuming the weighting described above:

- B/B_{MSY} = 47,397/55,217 = 0.85 (FS=3)
- F/F_{MSY} = 0.340/0.422 = 0.81 (FS=5)
- Recruitment Percentile: 81-100% (FS=5)
- Landings: 2019-2020 avg. RHL within CI (FS=3)

3(.4) +5(.2) + 5(.2) + 3(.2) = 3.8

Given a fishery score of 3.8, summer would be considered at medium risk with a moderate stock status and the corresponding management measures would be liberal.

Fishery Score	Level of Concern	Stock Status	Measures
1-1.99	Highest Risk	Very Poor	Most Restrictive
2-2.99	High Risk	Poor	Restrictive
3-3.99	Medium Risk	Moderate	Liberal
4-5	Low Risk	Healthy	Most Liberal

Scup

Using the results of the 2021 management track assessment for scup we calculated the current fishery score as follows, assuming the weighting described above:

- B/Bmsy=176,404/90,019 = 1.95 (FS=5)
- F/Fmsy = 0.136/0.200 = .68 (FS=5);
- Recruitment Percentile: <20% (FS= 1)
- Landings: 2019-2020 avg. RHL below lower bound of CI (FS=1)

5(.4) +5(.2) + 1(.2) + 1(.2) = 3.4

Given a fishery score of 3.4, scup would be considered at medium risk with a moderate stock status and the corresponding management measures would be liberal.

Fishery Score	Level of Concern	Stock Status	Measures
1-1.99	Highest Risk	Very Poor	Most Restrictive
2-2.99	High Risk	Poor	Restrictive
3-3.99	Medium Risk	Moderate	Liberal
4-5	Low Risk	Healthy	Most Liberal

Black Sea Bass

Using the results of the 2021 management track assessment for black sea bass we calculated the current fishery score as follows, assuming the weighting described above:

- B/Bmsy= 30,774/14,441 = 2.1 (FS=5)
- F/Fmsy =.5 (FS=5)
- Recruitment Percentile: 61-80% (FS= 4)
- Landings: 2019-2020 avg. RHL below lower bound of CI (FS=1)

5(.4) +5(.2) + 4(.2) + 1(.2) = 4

Given a fishery score of 4, black sea bass would be considered at low risk with a healthy stock status and the corresponding management measures would be the most liberal.

Fishery Score	Level of Concern	Stock Status	Measures
1-1.99	Highest Risk	Very Poor	Most Restrictive
2-2.99	High Risk	Poor	Restrictive
3-3.99	Medium Risk	Moderate	Liberal
4-5	Low Risk	Healthy	Most Liberal

Bluefish

Using the results of the 2021 management track assessment for bluefish we calculated the current fishery score as follows, assuming the weighting described above:

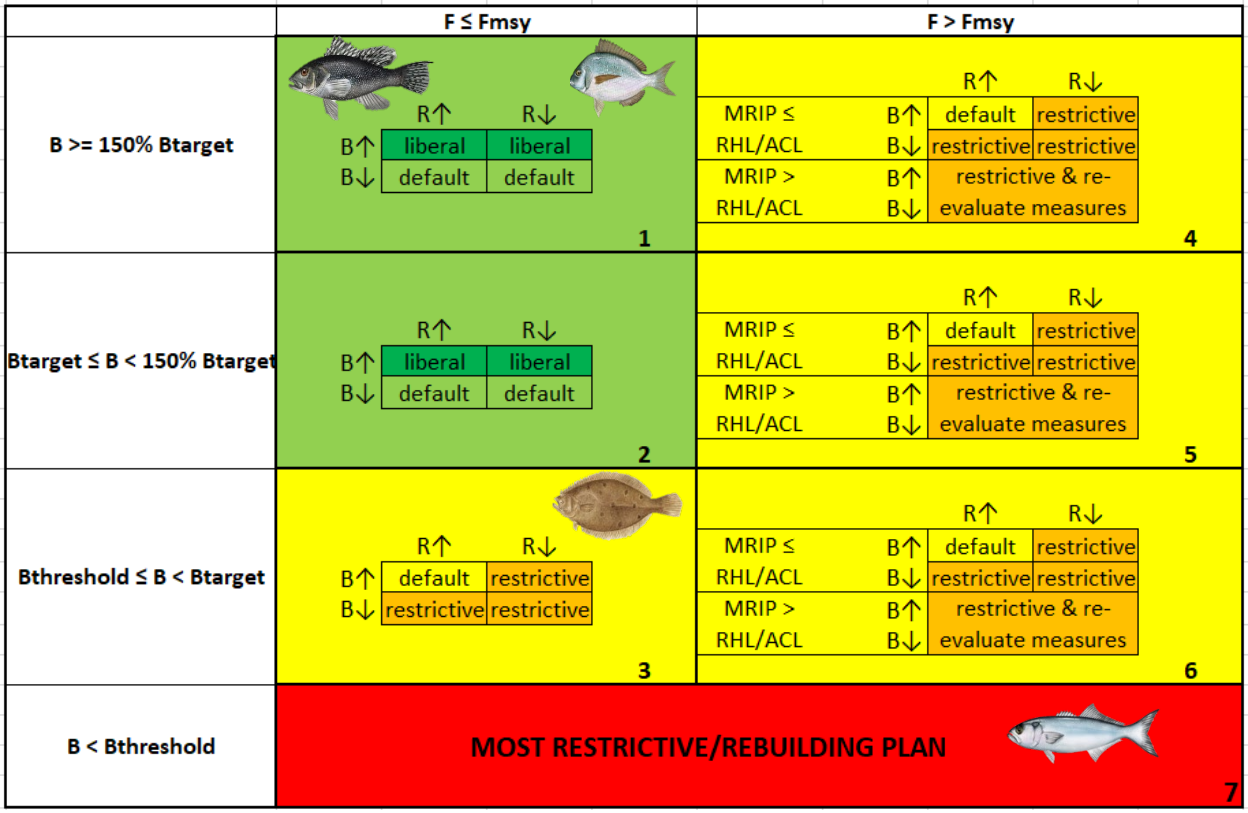
- B/Bmsy= 95,742 /201,729 = 0.47 (FS=1)
- F/Fmsy =.95 (FS=3)
- Recruitment Percentile: 41-60% (FS= 3)
- Landings: 2019-2020 avg. RHL below lower bound of CI (FS=1)

1(.4) +3(.2) + 3(.2) + 1(.2) = 1.8

Given a fishery score of 1.8, bluefish would be considered at the highest risk with a very poor stock status and the corresponding management measures would be the most restrictive.

Fishery Score	Level of Concern	Stock Status	Measures
1-1.99	Highest Risk	Very Poor	Most Restrictive
2-2.99	High Risk	Poor	Restrictive
3-3.99	Medium Risk	Moderate	Liberal
4-5	Low Risk	Healthy	Most Liberal

Option D: Biological Reference Point Approach

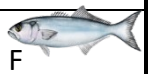


As illustrated in the figure above, under the Biological Reference Point option, each stock under consideration is shown in the respective bin based on the most recent stock assessment results (summarized under the fishery score alternative)

- Both scup and black sea bass would be in Bin 1, with the default measures. If the 2023 stock assessment update indicates that both recruitment and biomass have increasing trends with no change to biomass or fishing mortality, then measures would be liberalized.
- For summer flounder, the stock is placed in Bin 3. This bin indicates a low biomass without overfishing occurring, and measures would be the default measures of this bin. If in the 2023 stock assessment, biomass and fishing mortality show stable trends but either recruitment or biomass showed a decline, measures would be restricted. If biomass improves, then the stock will move from Bin 3 to Bin 2 – as long as overfishing isn't occurring.
- For bluefish, the stock is under a rebuilding plan and defaults to Bin 7. The stock will remain here until the Board/Council determine if can once again enter into the harvest control rule.

Option E: Biomass Based Matrix Approach

According to the most recent stock assessment information, both scup and black sea bass have biomass levels that are over 150% of the target with a decreasing biomass trend. This places them in Bin A under the Biomass Based Matrix Option. Summer flounder has a biomass below the target and an increasing biomass trend. Therefore, the stock is in Bin C. Bluefish is in Bin F because it is in a rebuilding plan.

<table>
<tr><th rowspan="2">Stock Status</th><th colspan="3">Biomass Trend</th></tr>
<tr><th>Increasing</th><th>Stable</th><th>Decreasing</th></tr>
<tr><td>Abundant
At least 150% of target</td><td colspan="3">Bin A  </td></tr>
<tr><td>Healthy
Above target, but less than 150% of target</td><td>Bin A</td><td colspan="2">Bin B</td></tr>
<tr><td>Below Target
but above threshold</td><td>Bin C  </td><td colspan="2">Bin D</td></tr>
<tr><td>Overfished
Below threshold</td><td>Bin E</td><td colspan="2">Bin F  </td></tr>
</table>

Appendix 3. Determining Metrics for Each Option

Confidence Intervals for MRIP Comparison

For options that incorporate comparison of harvest to recent MRIP estimates, the FMAT/PDT recommends using an 80% confidence interval (CI) around the most recent two years of MRIP harvest estimates. An 80% CI balances concerns related to certainty (higher CI %) and precaution when reductions might be needed or economic opportunity when liberalizations could be allowed (lower CI %). As described in section 3.1, the intent of this CI is to serve as a proxy for expected future harvest under status quo measures. This proxy could be replaced by an alternative estimate and associated CI generated from a robust statistical methodology approved by the Monitoring/Technical Committees.

Option C: Fishery Score Approach

Determining Metric Values for the Fishery Score

The following section provides an example of how the metrics listed above could be used to generate a fishery score value ranging from 1 to 5.

$$B/B_{MSY}(W_B)$$

Biomass from the most recent stock assessment would be given a value of 1-5 based on the following criteria, which are loosely based on other aspects of the management program (e.g., the Council's risk policy).

- 5: Biomass is equal to or greater than 150% of the target
- 4: Biomass is less than 150% of the target, and equal to or greater than the target
- 3: Biomass is below the target, and equal to or greater than 75% of the target
- 2: Biomass is below 75% of the target, and equal to or above the threshold (which is ½ the target and defines an overfished state)
- 1: Biomass is below the threshold

$$F/F_{MSY}(W_F)$$

Fishing mortality could be scored based on whether the most recent fishing mortality estimate is at, above, or below the threshold level. Only three increments were selected for fishing mortality as other aspects of the management program consider only

whether F is at, above, or below the target. This scoring methodology may be revised based on further analysis and additional stock assessment considerations.[8]

- 5: F/F_{MSY} is at least 5% less than 1
- 3: F/F_{MSY} within 5% of 1
- 1: F/F_{MSY} is at least 5% greater than 1

Recruitment(W_R)

To determine the recruitment metric, the most recent three year average estimate of recruitment will be compared to the 20th, 40th, 60th, 80th, and 100th percentiles of the distribution of the time series of recruitment used in stock projections. This percentile categorization of the relative strength of an incoming year class was deemed more informative than measuring trends in recruitment, especially given the highly variable nature of recruitment from year to year. Assessing where recruitment fell in the percentile distribution was determined a more appropriate measure of recruitment's impact on future levels of biomass.

- 5: terminal year R in the 81-100 percentile
- 4: terminal year R in the 61-80 percentile
- 3: terminal year R in the 41-60 percentile
- 2: terminal year R in the 21-40 percentile
- 1: terminal year R is in the 0-20 percentile

Fishery performance (W_{FP})

Fishery performance is evaluated by comparing the confidence interval derived from the most recent two years of MRIP harvest estimates to the two-year average RHL. The score is determined by where the average RHL appears in relation to the 2 year MRIP CI.[9] The following three categories are used for this metric:

[8] An alternative scoring method which may be further developed by the FMAT/PDT is to consider the probability that the terminal year fishing mortality estimate (F) from the most recent stock assessment exceeds the threshold level defining overfishing (F_{MSY}). The following four categories are provided as examples.

- 5: 0-24% probability that terminal year F exceeds F_{MSY}
- 4: 25-49% probability that terminal year F exceeds F_{MSY}
- 2: 50-74% probability that terminal year F exceeds F_{MSY}
- 1: 75-100% probability that terminal year F exceeds F_{MSY}

[9] When developing a CI from two years of MRIP data, the PDT/FMAT recommends the use of a joint distribution 80% confidence interval that takes into consideration the PSE of each individual years' MRIP estimate and the variability of the estimates between years. This recommendation is based on an analysis of several years of MRIP

- 5: 2-yr avg. RHL above upper bound of CI
- 3: 2-yr avg. RHL within CI
- 1: 2-yr avg. RHL below lower bound of CI

Option D and E: Biological Reference Point and Biomass Based Matrix

Evaluating B/Bmsy and F/Fmsy

Fishing Mortality (F)

- F ≤ Fmsy - *Fishing mortality is less than or equal to the target.*
- F > Fmsy - *Fishing mortality is greater than the target (overfishing is occurring)*

Biomass (B)

- 150% B_{MSY} target ≤ B - *Biomass is greater than or equal to 1.5x the target*
- B_{MSY} target ≤ B < 150%B_{MSY} target - *Biomass is greater than or equal to the target but less than 1.5x the target*
- B_{MSY} threshold ≤ B < B_{MSY} target - *Biomass is less than the target but greater than or equal to the threshold*
- B < B_{MSY} threshold – *Biomass is less than the threshold (Overfished), a management response (Rebuilding Plan) is required under the MSA. See Accountability Measures for more information.*

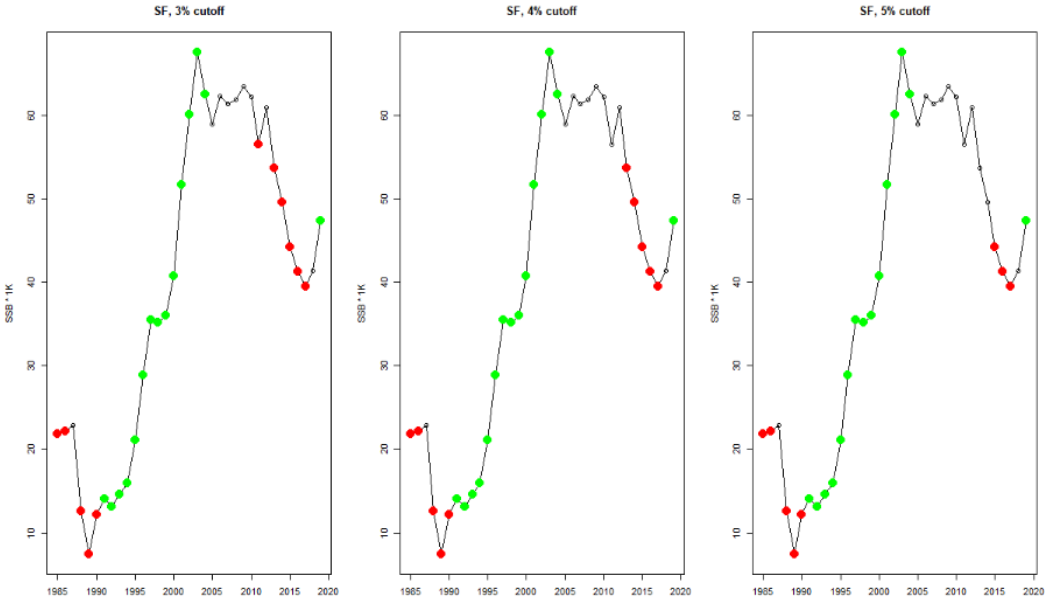
Evaluating Biomass Trends

Evaluating biomass trends can be accomplished using a variety of statistical methods. The PDT/FMAT is working on a number of potential options.

One possible approach would use the average percent change in biomass (or spawning stock biomass) from the three most recent years in the assessment. The average percent change would then be compared to a pre-defined breakpoint. In the figure below we have tested three potential breakpoints 3, 4, and 5 percent. For a 3 percent breakpoint a biomass trend would be considered stable if the percent change was between -3 percent and 3 percent change; considered increasing if the percent change was greater than 3 percent; and, decreasing if the percent change was greater than -3 percent. The number of years in the average, and the breakpoint selected will influence the resulting trend.

data for each species. The use of MRIP data in this context is intended as a proxy for expected future harvest under status quo measures. This may be replaced with statistical modelling approaches for predicting harvest, with associated CIs, if such approaches are available in the future.

Summer flounder Trend Sensitivity Analysis



An alternative approach to derive a biomass trend would combine survey indices into a biomass index that could be used to determine the trend. The approach was designed to combine multiple indices and generate a single value to use as a catch-multiplier to provide catch advice in plan-B assessment approaches. We could use a similar approach to combine information from multiple indices and get a single quantitative metric to judge biomass trends. The following steps would be followed: 1) Create an average biomass index from one or more surveys; 2) apply a LOESS smooth to average; 3) fit log linear model to the most recent three years of smoothed data; and 4) transform slope back to normal scale to get a value. This approach may also be considered a back-up approach if an analytical model with biomass estimates is unavailable.

Recruitment Trend and Harvest Performance

Recruitment will be evaluated as the median or the average over the most recent three years. For harvest performance, a comparison of multi-year MRIP recreational catch and/or harvest (w/ CI) under current default measures relative to the appropriate catch specifications.

- This secondary metric comes into play when overfishing is occurring ($F > F_{MSY}$)
- If current measures are producing catch and/or harvest greater than the specified limit, then default measures must be re-evaluated for the combination of F/F_{MSY} and B/B_{MSY} conditions.

Appendix 4: Regions for Each Stock

Under Addendum XXXII, summer flounder and black sea bass were divided into the following regions:

Summer Flounder: Section 3.1.1

Measures will be developed using a six-region approach, where the regions are defined as: 1) Massachusetts, 2) Rhode Island, 3) Connecticut-New York, 4) New Jersey, 5) Delaware-Virginia, and 6) North Carolina.

Black Sea Bass: Section 3.2.1

Measures will be developed using a three-region approach, where the regions are defined as Massachusetts through New York; New Jersey; and Delaware through North Carolina (north of Cape Hatteras).

Regions have not been established for management of the recreational scup and bluefish fisheries. The Board and Council can develop regions for these species during final action on this addendum or through a separate action.