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Plan Development Team Report: Black Sea Bass Commercial Management 4/22/2019

Atlantic States Marine Fisheries Commission

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I. Introduction

The Commission's Summer Flounder, Scup and Black Sea Bass Management Board formed a Commercial Black Sea Bass Working Group in August 2018 to identify management issues related to changes in stock distribution and abundance, and propose potential management strategies for Board consideration. In February 2018, the Board reviewed the Working Group report, which identified two main issues: (1) state commercial allocations implemented in 2003 do not reflect the current distribution of the resource, which has expanded significantly north of Hudson Canyon, and (2) federal coastwide quota management can limit harvest opportunities for some states if another state's harvest overage results in a coastwide fishery closure (Appendix A). In February, the Board requested the Plan Development Team (PDT) perform additional analyses and further develop proposed management options related to the issue of state-by-state commercial allocations. The second issue identified by the working group will be addressed in collaboration with the Mid-Atlantic Council (Council) and NOAA Fisheries.

This document presents the analyses and findings of the PDT. For each of the proposed management strategies, the PDT discussed potential variations of the strategy that could be implemented to achieve different management objectives or outcomes. The PDT also highlighted additional considerations the Board should take into account when evaluating these approaches.

II. Potential Management Strategies for Adjusting Commercial Allocations

A. Status Quo

One potential management option is to maintain the current state allocation percentages. The current allocations were originally implemented by the Commission in 2003 as part of Amendment 13, loosely based on historical commercial landings by state from 1980-2001 (Table 1). In a complementary action, the Council adopted an annual coastwide quota system to facilitate the state-by-state quota system adopted by the Commission. Each state sets measures to achieve, but not exceed, their annual state-specific quotas. The annual coastwide quota is implemented and administered by NOAA Fisheries. The fishery is closed when the coastwide quota is projected to be taken, regardless of whether individual states still have unutilized quota.

Table 1. Current black sea bass commercial state-by-state allocations.

State	% Allocation
ME	0.5
NH	0.5
MA	13.0
RI	11.0
CT	1.0
NY	7.0
NJ	20.0
DE	5.0
MD	11.0
VA	20.0
NC	11.0

B. TMGC Approach

The first approach to adjusting the state-by-state allocations discussed by the Black Sea Bass Commercial Working Group, and then the PDT, is a dynamic approach for gradually adjusting state-specific allocations using a combination of resource utilization (historical allocations) and current levels of resource distribution. The alternative is modeled after the Transboundary Management Guidance Committee (TMGC) approach, which was developed and used for the management of Georges Bank resources shared by the United States and Canada. Though the approach proposed here for black sea bass differs from the TMGC approach used for Georges Bank, in this document the black sea bass allocation approach will also be referred to as TMGC.

This new strategy sets forth a formulaic approach that balances stability within the fishery, based on historical allocations, with gradual allocation adjustments, based on regional shifts in resource distribution derived from updated stock assessments or surveys. The former recognizes traditional involvement and investment in the development of the fishery since the beginning of black sea bass management, and the latter addresses the changing distribution of the black sea bass resource and the resulting effects within the fishery. Through incremental adjustments over time, the state allocations become less dependent on the historical allocations and more dependent on regional resource distribution.

This option proposes use of the existing state-by-state allocations to reflect initial values for historical participation (resource utilization) and proposes use of the 2016 benchmark stock assessment results (NEFSC 2017) to determine the values for resource distribution; the two values are then integrated in the form of regional allocation shares. An alternative to using the stock assessment would be to use synoptic trawl survey information. Two regions are proposed, as defined in the assessment: (1) ME - NY, (2) NJ - NC. They emanate from the spatial stratification of the stock into subunits that generally align with those used for the assessment, which used Hudson Canyon as the dividing line based on several pieces of evidence that stock dynamics had an important break in this area. The regional allocation shares are then subdivided into state-specific allocations. Appendix B includes a complete description and examples of the TMGC approach retrospectively applied to recent years.

1. TMGC Variations

The TMGC approach affords considerable flexibility, both with regard to initial configuration and application of the allocation formula over time. A key feature involves the use of control rules to guard against abrupt shifts in allocations. The overall approach can be modified by the Board and Council in various ways. For example, sub-alternatives can be developed for:

- the regional configuration (e.g., alternative regions to those proposed here);
- the values for historical participation/resource utilization (e.g., current, status quo allocations, or some variant thereof);
- the starting and ending weighting values for resource utilization and resource distribution (e.g. 90:10 to 10:90, or some variant thereof);
- the increment of change in the weighting values per year (10%/year, or some variant thereof;)
- the periodicity of adjustments (e.g., annually vs. biannually);
- the overall time horizon for the transition between starting and ending weights for resource utilization and resource distribution (e.g., 8 years vs. 16 years).
- control rule (e.g., maximum regional allocation change of 3% per year, or some variant thereof)

Of the numerous potential configurations that could be created by adjusting these parameters, the PDT focused on four examples to evaluate potential effects on state-by-state allocations. In these examples, the resource distribution information is derived from the unadjusted regional spawning stock biomass proportions from the 2016 benchmark stock assessment. The other parameters of the formula vary in each example, as follows:

1. The first example represents a configuration resulting in a more liberal change in state allocations. The parameters are set as follows: 2 regions (ME - NY; NJ - NC); resource utilization = status quo allocations; transition from 90:10 to 10:90; 10% per year change in the transition from utilization to distribution; annual adjustments; the transition time to 90% weight on the resource distribution is 9 years; 10% control rule; regional distribution assumption is based on the spawning stock biomass by region from the assessment for the time period of 2004 - 2012; distribution of adjustments to states within a region based on historic allocations.
    a. Any TMGC configuration could also be modified to distribute the allocation adjustments equally to the states within each region, instead of distributing those adjustments proportionally to the historic state allocations. An example of this modification applied to the above configuration is shown in Figure 2 below.

2. This example represents a more conservative configuration, with more limited changes to state allocations. The parameters are set as follows: 2 regions (ME - NY; NJ - NC); resource utilization = status quo allocations; transition from 90:10 to 30:70; 5% per year change in the transition from utilization to distribution; annual adjustments; the transition time to 70% weight on the resource distribution is 12 years; 3% control rule; regional distribution assumption is based on the spawning stock biomass by region from the assessment for the time period of 2004 - 2015; distribution of adjustments to states within a region based on historic allocations.

3. The last example is intended to showcase a number of additional modifications that could be made to the approach to achieve certain objectives. In discussions amongst the PDT (and previously the Board regarding recreational black sea bass) it has been noted that it may be appropriate to treat New Jersey as an individual region due to its geographic position straddling the division of the Northern and Southern regions adjacent to Hudson Canyon. Additionally, some Board members have suggested modifying the "resource utilization" part of the equation to increase the allocations for Connecticut and New York due to their disproportionate allocations compared to their current resource availability. Lastly, the PDT discussed the option of holding Maine and New Hampshire's current allocations static throughout the transition.

    To demonstrate these modifications, the parameters are set as follows: 4 regions (ME and NH remaining as a non-dynamic region with static allocations; MA - NY; NJ as a stand-alone region; and DE - NC); resource utilization = CT and NY base allocations increased by 1% in each of the first three years; transition from 90:10 to 10:90; 10% per year change in the transition from utilization to distribution; annual adjustments; the transition time to 90% weight on the resource distribution is 9 years; 10% control rule; regional distribution assumption is based on spawning stock biomass by region from the assessment for the time period of 2004 - 2012, and assumes NJ is consistently 60% of the southern region distribution; distribution of adjustments to states within a region based on historic allocations.

The changes to the state allocations resulting in each of these examples are shown in Figures 1-4. A more detailed description of the methods applied in each example is included in Appendix B. It is important to note that the TMGC approach continually adjusts the state-by-state allocations beyond the time period over which the transition of the weights of resource utilization and resource distribution occurs. These adjustments would be made according to updated regional resource distribution information from either the stock assessment or synoptic trawl survey information as it becomes available, depending on which data source is selected.

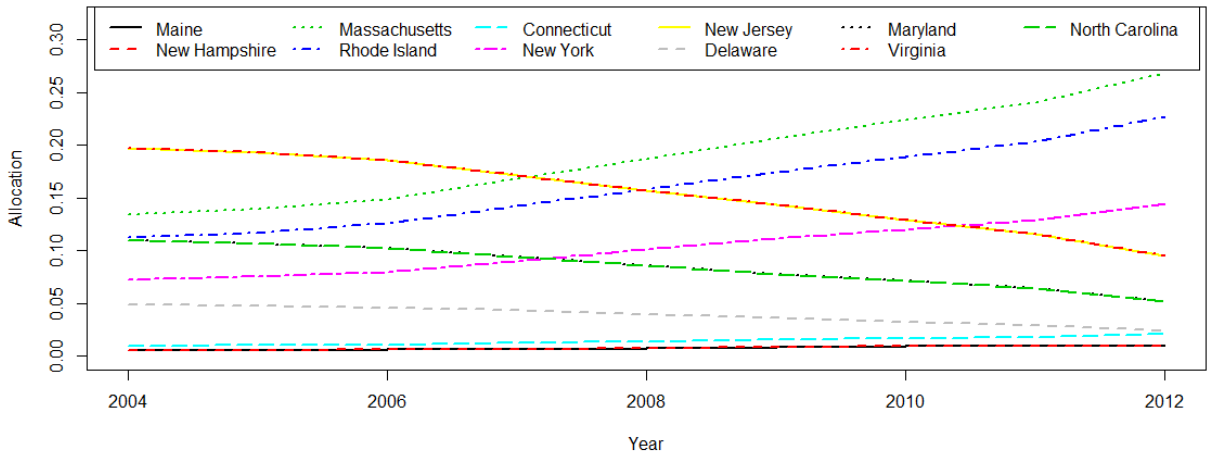

Figure 1. Allocation trajectory for all states under the parameters outlined in example 1 above. The control rule is not triggered in any year in this example. This is a retrospective analysis as if this method were in place beginning in 2004.

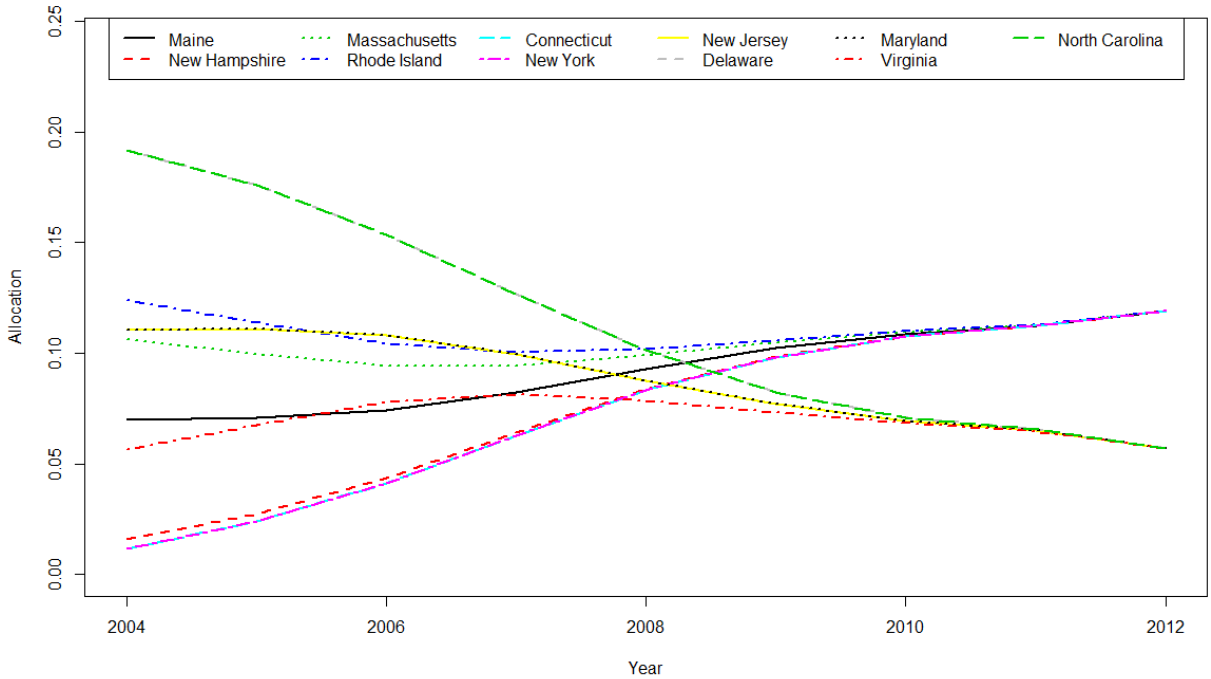

Figure 2. Allocation trajectory for all states under the parameters outlined in example 1a above (equal distribution to the states of regional allocation adjustments). The control rule is not triggered in any year in this example. This is a retrospective analysis as if this method were in place beginning in 2004.

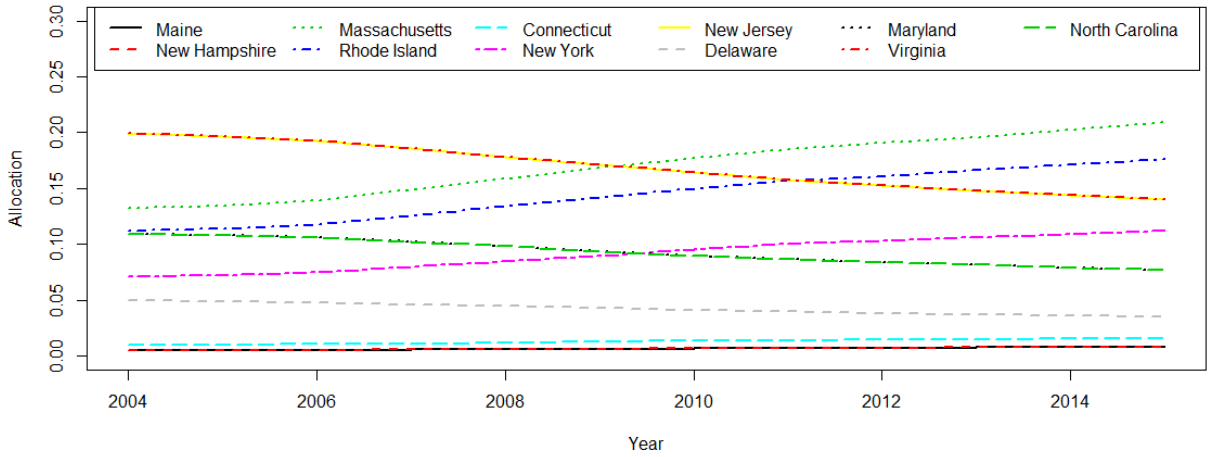

Figure 3. Allocation trajectory for all states under the parameters outlined in example 2 above. The control rule is triggered in each year from 2012 through 2015 in this example. This is a retrospective analysis as if this method were in place beginning in 2004.

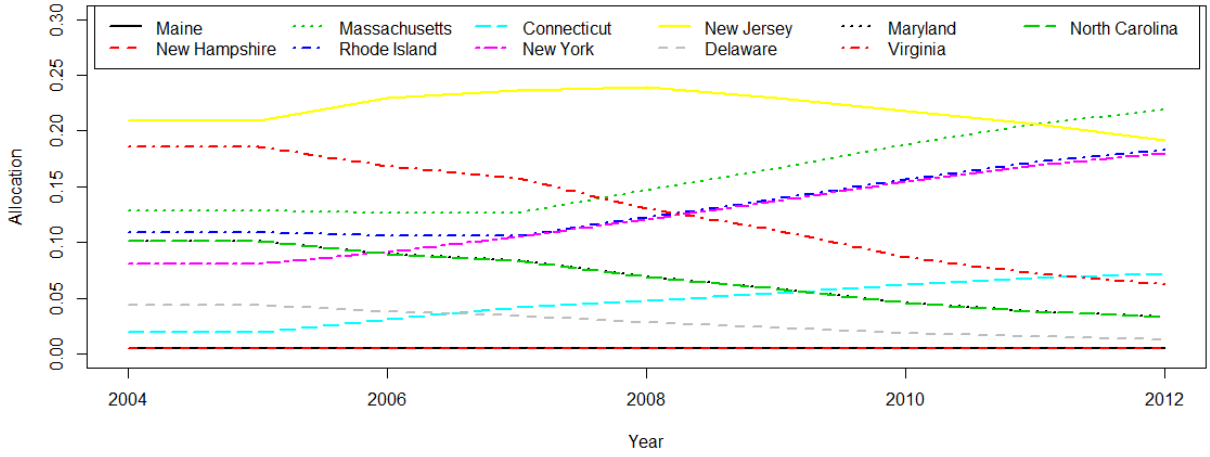

Figure 4. Allocation trajectory for all states under the parameters outlined in example 3 above. The control rule is not triggered in any year in this example. This is a retrospective analysis as if this method were in place beginning in 2004.

2. TMGC Considerations

There are two options for calculating the resource distribution. The first option is to use the spatial stock assessment to determine the amount of resource in each region (north = NY, CT, RI, MA, NH, ME; south = NJ, DE, MD, VA, NC). The spatial stock assessment calculates north and south spawning stock biomass values, which can then be turned in to a proportion. The benefit of this approach is the regional biomass values are calculated through a synthesis of many biological parameters and represent the best available science for the population. The drawback is that the assessment is updated periodically (not

every year); thus updated resource distribution could not be produced annually but would depend on the assessment cycle[1]. Additionally, if the spatial stock assessment were to fail at some point in the future, this could impact the ability to implement the dynamic allocation calculations.

As an alternative to using the stock assessment information, values for resource distribution could be obtained and calculated using scientific surveys, with results apportioned into regions. Since surveys are undertaken annually, the values for regional resource distribution could be recalculated and updated annually, biannually, or upon whatever timeframe is deemed most appropriate, affording an opportunity to regularly adjust allocations in sync with shifts in resource distribution. Such shifts may, or may not, follow consistent trends. Accordingly, the technique affords a dynamic approach, consistent with actual changes in resource distribution as defined by the survey information. There are more options with regard to the regional configurations that could be established with this approach, whereas a two-region configuration is the only option with the assessment. The overall benefit of this approach is that it could be performed annually with the most contemporary data. The drawback is that survey data are prone to variability. Smoothing techniques and the proposed control rule are designed to account for some of this variability and prevent it from causing unreasonable changes in a single year.

C. Trigger Approach

The second approach the PDT discussed is a quota trigger approach. In this approach, a minimum coastwide quota would be established as a trigger for a change in allocations to the states. If the coastwide quota established by NOAA Fisheries in a given year were higher than the established quota trigger, then the quota would be distributed to the states in two steps: 1) the amount of coastwide quota up to and including the trigger is distributed to the states according to the current state-by-state allocations, as set forth in Amendment 13 in 2003; and 2) the amount of quota exceeding the established trigger is distributed equally to the states of Massachusetts through North Carolina, with Maine and New Hampshire receiving a smaller percentage based on their historically low participation in the fishery. Should the annual coastwide quota be less than or equal to the established quota trigger, allocation percentages would default to the current state-by-state allocations. This method limits fishery disruption by guaranteeing states some minimum level of quota based upon the 2003 allocations.

Two potential quota trigger options have been proposed: 3 million pounds, or 4 million pounds. The 3 million pound trigger represents approximately the average coastwide commercial quota from 2003 through 2018. Years in which specifications were set using a constant catch approach were excluded from the average (i.e., 2010-2015). Commercial quotas remained essentially the same from 2010 until 2013 when there was a slight change in the coast-wide quota established by the SSC in 2013 however, that was merely an extension of the constant catch that extended until 2016. The average commercial quota from 2003 through 2018 is 3.12 million pounds.

The 4 million pound trigger represents approximately the highest commercial quota from 2003 through 2017. The highest commercial quota was 4.12 million pounds in 2017. A 3 million pound trigger is lower than 10 out of the last 13 years (2008-2019) of coastwide commercial quotas established by the

[1] The Northeast Region Coordinating Council approved an assessment prioritization process and management assessment track schedule in November 2018 that would provide management assessments for black sea bass every two years. Following the upcoming operational assessment, the next assessment would be available in 2021, with information available for management in 2022-2023.

National Marine Fisheries Service. A 4 million pound trigger is higher than all but one year of coastwide commercial quotas in the last 13 years (Figure 5). Table 2 shows an example of the quota trigger approach using a 3 million pound trigger and the 2017 coastwide quota of 4.12 million pounds. Additional quota trigger examples are provided in Appendix C.

Figure 5. Commercial BSB Quota over Time Compared to 3M Pound and 4M Pound Triggers

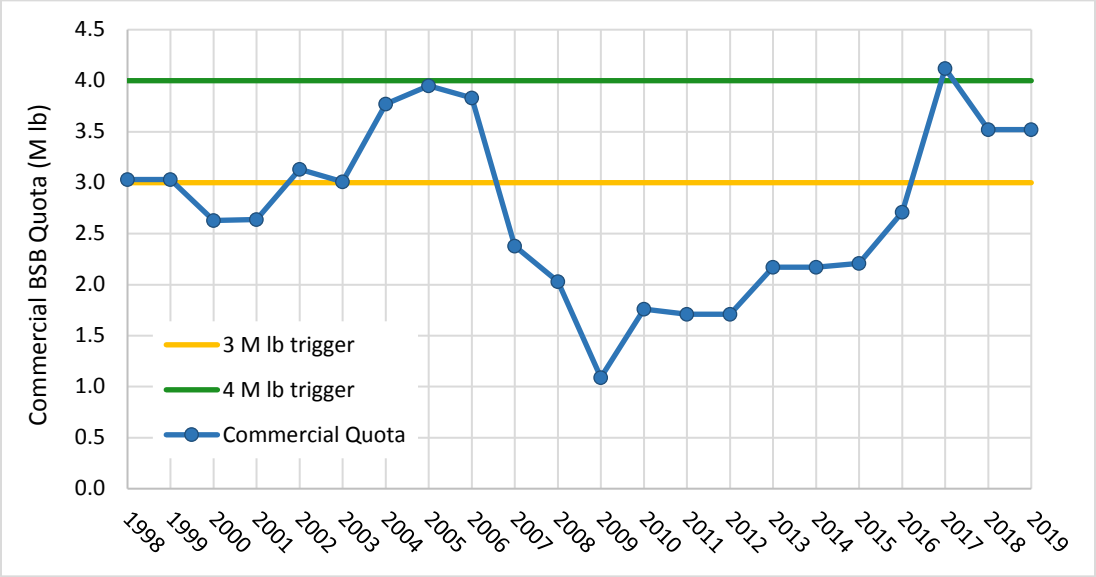

Table 2. Reallocation of black sea bass commercial quota above a 3 million pound trigger, based on the 2017 coastwide quota of 4.12 million pounds.

3 Million Pound Trigger					
State	**Current allocation (%) of quotas up to and including 3 million lbs**	**Status Quo distribution of first 3 million lbs of quota**	**Allocation (%) of additional quota beyond 3 million lb**	**Example state allocations (lbs) under a 4.12 million lb quota**	**Example state allocations (%) under a 4.12 million lb quota**
ME	0.5%	15,000	1.00%	26,200	0.64%
NH	0.5%	15,000	1.00%	26,200	0.64%
MA	13.0%	390,000	10.89%	511,956	12.43%
RI	11.0%	330,000	10.89%	451,956	10.97%
CT	1.0%	30,000	10.89%	151,956	3.69%
NY	7.0%	210,000	10.89%	331,956	8.06%
NJ	20.0%	600,000	10.89%	721,956	17.52%
DE	5.0%	150,000	10.89%	271,956	6.60%
MD	11.0%	330,000	10.89%	451,956	10.97%
VA	20.0%	600,000	10.89%	721,956	17.52%
NC	11.0%	330,000	10.89%	451,956	10.97%
Total	**100.0%**	**3,000,000**	**100%**	**4,120,000**	**100.00%**

1. Trigger Approach Variations

The PDT noted that the initial trigger approach proposals do not directly address the first problem identified in the Working Group's Report: the distribution of biomass has changed significantly since the state allocations were established in 2003, and the allocations do not reflect these changes. Changes in biomass distribution are supported by the 2016 stock assessment and peer reviewed literature.

To better address these changes within a trigger approach, the PDT discussed a modification that would distribute quota above the trigger based upon the proportion of coastwide biomass in each region, as informed either by the assessment models or fishery independent survey data. Fishery independent survey data may be required if the benchmark assessment regional model framework cannot produce valid regional results after inclusion of the updated MRIP estimates. The terminal year of the assessment can be used if retrospective bias adjustments to the assessment outputs of SSB are required, or the last three years of the assessment can be averaged if no adjustment is necessary. Tables 3-4 in Appendix C show examples of allocation above the trigger based on regional biomass, using the Rho adjusted regional model outputs from the terminal year of the 2016 benchmark assessment (2015). It should be noted that if this approach were selected, the Board would need to specify which regional biomass values to use. In the event that regional assessment outputs cannot or should not be used, a method to use fishery independent survey data must be developed – preferably one that utilizes a multi-year average or a smoothing approach (for instance, the approach described in the TMGC methods in Appendix B). The regional proportions used to distribute quota above the trigger should be updated every time appropriate new data is available.

Within the regions, quota above the trigger can also be distributed to individual states in different ways. One approach is to distribute quota above the trigger in equal shares to all states within the region (ME and NH receive a flat 1% of this additional quota from the northern region pool; this could be modified if they express increased interest in participating in the fishery) (Table 3, Appendix C). A second method would be to distribute quota above the trigger to all states within the region in proportion to their 2003 allocations (Table 4, Appendix C).

2. Trigger Approach Considerations

If a trigger-based approach is of interest, the Board would need to consider the most appropriate configuration based on the objective of reallocating black sea bass commercial quota. First, a quota trigger should be selected based on the amount of quota the Board feels should be distributed under the current allocations, versus the amount of quota that should be made available to the states using an alternative allocation scheme. The Board should also choose an allocation method for quota above the trigger that best addresses the issues facing the fishery (i.e. equal distribution of additional quota or distribution based on regional resource availability).

While the trigger approach as proposed establishes a hard quota of three or four million pounds, the PDT discussed the possibility of using a soft trigger, which would allocate a percentage of the quota using historical allocation, rather than a set number of pounds. Fluctuations in annual quota values would result in similar fluctuations in the poundage being allocated using historical values. For example, if a trigger is set at 50% of the quota, the historical allocations would apply to two million pounds of a 4 million pound quota, and 3 million pounds of a 6 million pound quota. Using a hard trigger, if the annual coastwide quota is below the trigger, then the full quota is allocated using the historic allocations. With

a soft trigger, lower quotas would still allow some portion of the quota to be allocated using a distribution other than the historic allocations.

The PDT has explored several options for potential quota triggers, and allocation schemes for additional quota above the trigger. However, the Board may wish to consider alternative trigger levels or allocation schemes that are deemed more appropriate. Additionally, the size of the population and subsequent quota amounts may change due to the 2019 operational assessment for black sea bass. This should also be considered before selecting a trigger value if this method is eventually adopted.

D. Auctioned Seasonal Quota

The Auctioned Seasonal Quota (ASQ) approach was proposed by a Board member in February 2019. The proposed management strategy is to annually auction off part of the total commercial allocation under an ASQ. While all of the allocation could be auctioned, that would be disruptive to the current fishery, so it was proposed that this strategy could be applied only to 10-20% of the coastwide quota. The portion of the quota to be auctioned would be divided into auction blocks (e.g. 2,000 pounds, 5,000 pounds) by the agency charged with holding the auction. The proposal suggests the auction should be open to all fishers in the black sea bass management unit with the required federal and/or state permits. Rules could be set to limit the number of blocks that any one permittee can acquire. High bidders would be awarded the auction blocks. The proposal also indicated that auction funds received by the administrating agency should be used to administer and enforce the auction.

The rationale presented by the Board member who proposed the ASQ strategy is that it responds to several problems with the current quota allocation method:

- Quota allocated among states loosely based on landings from 1980-2001, so more recent shifts in black sea bass distribution are not reflected in state allocations.
- Quota allocation among states is a 'zero-sum game' – one state can only increase its allocation if another state(s) decreases its allocation.
- States have treated their allocations as permanent property and each state has stakeholders that depend on getting their share of the allocation, making it difficult for a state to agree to a reallocation plan that does not provide its stakeholders the same benefit.
- In three states, quota is allocated to individual permittees through Individual Transferable Quotas (ITQ). Participants in the fishery at the time the state allocations were established were grandfathered into the fishery and received ITQ. The distribution of ITQ makes it difficult for new participant to enter the fishery.

1. ASQ Considerations

a) Administration

The PDT discussed a number of considerations regarding administration of an ASQ program. For one, the group noted that because the auction would be open to harvesters from all states in the management unit, such a program could not be administered at the state level. Thus, either NOAA Fisheries or the Commission would need to manage the program.

Administering an ASQ program would pose numerous challenges for both bodies. From GARFO's perspective, initial concerns include the following:

- The limited access privilege program (LAPP) provisions of Magnuson-Stevens Fishery Conservation and Management Act (MSA) allow for auctions to establish allocations. GARFO has significant concerns about the resource and staffing needs it would take to host and monitor such an auction.
- The MSA allows funds from these auctions to be deposited into a Limited Access System Administration fund and would require a cost recovery fee (up to 3% of ex-vessel value of fish harvested) that would be applied to the costs of management, data collection, analysis, and enforcement activities related to this program. However, NOAA Fisheries would not be able to transfer this money to state agencies or state law enforcement to assist with monitoring and enforcing the program.
- GARFO is only able to establish this type of program for Federal moratorium permit holders, which would place state-only permitted vessels at a disadvantage. GARFO is unable to monitor vessel-specific landings for state-only permitted vessels. If the entire quota were eventually moved to an ASQ system, this would prevent state-only vessels from fishing for black sea bass. Even if a transfer program were to be developed that allowed state-only permitted vessels to lease in quota, GARFO would not be able to monitor that quota.
- Any ASQ or Individual Fishing Quota (IFQ) program requires very robust monitoring and reporting, and GARFO believes the current system in place for black sea bass is inadequate to support an ASQ system. Other similar IFQ/ITQ fisheries in the region and country require systems such as vessel monitoring systems and pre-landing reporting for effective monitoring.
- Having part of the quota be allocated coastwide and part of it available for auction is also problematic:
    - Without a more robust system to track individual allocations at a vessel level, it would be difficult to track which landings should be counted against the coastwide quota and which should count against the ASQ.
    - It has not yet been specified how vessels could use this additional quota. For example, would they use the purchased quota only if the coastwide quota was harvested and Federal waters were closed? If so, what if the coastwide fishery does not close? Or would the additional quota allow for increased possession limits for certain individuals? This would be very difficult to monitor and enforce.
    - Past experiences with the research set-aside quota auction system demonstrated that it can be very difficult to effectively monitor and enforce additional allocated landings beyond a coastwide/state-managed quota.
- Though the term ASQ implies that there are seasonal quotas, GARFO assumes the intent is to hold one auction per year. If the intent were to have multiple seasonal auctions, this increases the complexity and concerns mentioned above.

There is also uncertainty regarding the Commission's ability to administer an ASQ program. The Commission has concerns about the resource and staffing needs required to host and monitor such an auction. Currently, the Commission does not have a staff member that would be able to take on this role. In addition, the Commission does not have experience in administering ASQ or IFQ/ITQ systems; therefore a significant amount of staff time would be needed to determine the details of administering an auction. Based on past experiences, a quota auction system would likely be very difficult to monitor and enforce, therefore the Commission would need to determine if it would be possible to administer such a program with its current resources and authority.

b) Data Concerns

It has been suggested that commercial fishery efficiency may increase under the ASQ approach because the fishermen/vessels with the lowest operating costs relative to potential revenues may be most willing to purchase additional quota. The PDT noted that potential changes in fishery efficiency will be difficult to analyze based on available economic data and given that a variety of factors will likely influence fishermen's decisions regarding purchasing additional quota.

The PDT noted that some states may be better positioned to take advantage of additional black sea bass quota than others, depending on the scale of the increase in quota. For example, states with higher numbers of Federal black sea bass moratorium permits may be better able to utilize additional quota than states with lower numbers of moratorium permits. However, given the high demand for black sea bass and the high ex-vessel price compared to many other species (averaging $3.05 per pound in 2017), even states with lower numbers of permits may fully harvest additional quota. The PDT reviewed preliminary data on the number of federal moratorium permits issued each year from 1997 through 2017, as shown in Figure 6 below. The PDT cautioned that this analysis does not account for state-only permitted vessels, and some states may have robust fisheries in state waters.

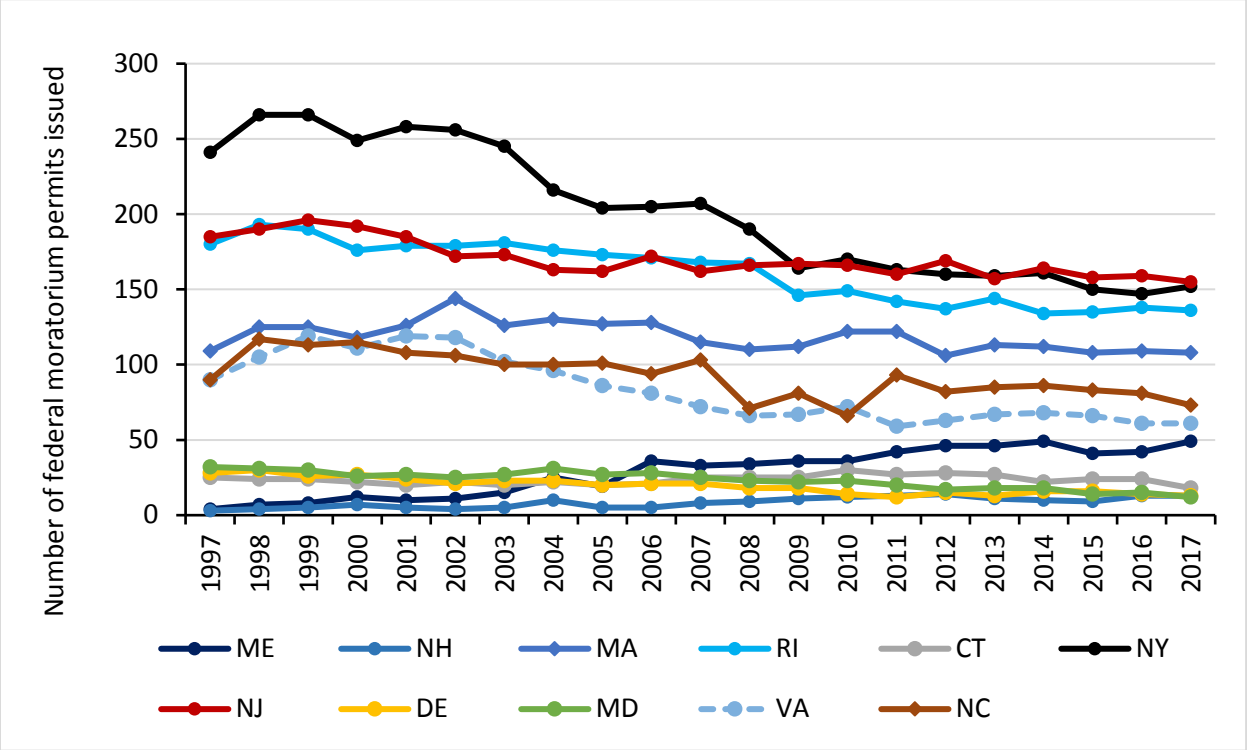

Figure 6. Number of vessels issued Federal moratorium black sea bass permits issued by state and year, 1997-2017. State is defined as the home port of the permitted vessel. Values should be considered approximate as they do not account for mid-year permit transfers and, as a result, may indicate higher numbers of moratorium permits than actually exist in a given year. Vessels in confirmation of permit history (i.e., eligible for a permit, but not issued a permit in a given year) are not accounted for.

c) Impacts of an ASQ Approach

As mentioned above, impacts of the ASQ approach to the black sea bass commercial fishery are inherently difficult to predict. The resulting quota distribution would be dependent on a number of

factors, which could be related to economic forces as well as changes in the stock and the fishery. If the auction were to occur annually, there could be significant differences in the resulting ASQ allocations from year to year. Without reliable economic information on individual operations, it is difficult to estimate potential outcomes of this approach.

Some theoretical positive impacts that have been suggested are that an ASQ program could increase efficiency in the fishery, as top bidders would likely be those best able to catch the quota, and that it could provide more flexibility in allocation. Some possible negative impacts are: 1) it could allow for concentration of quota among those with more financial resources and/or larger operations which could disrupt the economies of many fishing communities; 2) states may want to consider an ITQ 'buy back' to compensate current ITQ holders, as ITQ has been a dependable source of income for these participants; 3) it would disadvantage state-only permitted vessels who would not be able to participate in an auction managed at the Federal level; and 4) increased complications of monitoring and enforcing such a program could result in compliance issues and exceeding the commercial quota without a clear way to pinpoint responsibility for the overage.

Considering the uncertainty and administrative concerns surrounding the ASQ approach, the PDT recommends careful consideration of this strategy. If the Board were interested in further developing the ASQ approach, the PDT feels it would have to focus *solely* on this approach, as adequately developing it will require an all-encompassing effort, and could not be done in parallel with multiple other options. It should also be noted that implementation of an ASQ program would require a joint amendment with the Council.

E. Hybrid Approaches

In addition to the individual methods presented above, the PDT discussed hybrid approaches where the coastwide quota is allocated among the states using two or more methods. This could essentially be an extension of the trigger approach (a portion of the quota, either a fixed amount or a percentage, up to the trigger value is distributed using historic allocation, and any remaining quota is distributed using equal allocation or biomass distribution), but could incorporate other options as the Board wishes. Use of a hybrid approach may offer flexibility and compromise for different perspectives, but at the cost of increased complexity. For example, a hybrid approach that incorporates a trigger, equal allocation, and regional allocation could be developed that assigns a portion of the coastwide quota using historic allocation to account for existing markets and fishing communities, a portion distributed equally to each state, and a portion to each region based on biomass distribution. Considerations and decision points for any hybrid approach would include all the considerations and decision points of each of the individual methods being combined. Additionally, depending on how a hybrid approach is developed, the drivers behind allocation adjustments could become unclear and difficult to track. Consideration of transparency is needed if selecting a hybrid approach, and additional work by the PDT may be required to clearly identify the impacts of each element of the approach.

III. Discussion

Throughout their discussions of each management strategy described above, the PDT highlighted a number of decision points the Board may need to consider in selecting the appropriate management

programs for continued development. To come to a decision on some of these issues, it may be helpful to first define the Board's intention in considering changes to the black sea bass state-by-state allocations. Agreeing on a clear intention may guide the Board in focusing on the management strategies that best align with the objectives the Board seeks to meet.

Thus, the first general decision point would be to determine what the Board's goals are with regard to considering reallocation of the state-by-state commercial quotas. The key issue identified by the Commercial Working Group is that state commercial allocations implemented in 2003 do not reflect the current distribution of the resource. If the Board's goal is to address this issue by adjusting state-by-state commercial allocations to be more reflective of the current distribution of the resource, then the Board may want to focus on those strategies that incorporate regional information on resource distribution. If the Board's primary goal is to maintain historic access to the fishery, then it could consider options that place more weight on historic landings.

When considering approaches that address changes in resource distribution, another decision point arises in both the TMGC approach and the modified trigger approach: how to distribute quota to states within regions. Two general methods were discussed: equal distribution of regional quota, or distribution based on historic allocation. Though the PDT did not explore additional methods, it may be appropriate to consider distributing quota to states within the regions in a different way, depending on the purpose of reallocation. For example, if the Board aims to create more equality within the regions with regard to state quotas, then equal allocations of additional quota to the states in each region may be more appropriate (see TMGC Example 1a, and trigger Table 3, Appendix C). Alternatively, if the Board aims to maintain state access based on historic landings, it may be preferable to distribute quota to the states within each region based on their current allocations (see TMGC Examples 1 and 2, and trigger Table 4, Appendix C). Some compromises between these two goals could be addressed through a hybrid approach.

As mentioned in the considerations for the TMGC and modified trigger approaches, the ability to use regional biomass information from the stock assessment may change. It is uncertain whether incorporation of the new MRIP data will still produce biomass estimates for the northern and southern stock subareas. If not, it may be necessary to use survey information to do any resource distribution based approach. The Board should consider the implications of using either source of information to adjust allocations according to regional biomass. If regional biomass information from the stock assessment is available, the Board may need technical guidance on the most appropriate method for calculating regional proportions.

Another decision point the PDT discussed is regional configuration. In particular the group focused on how to incorporate Maine and New Hampshire, considering their historically low participation in the fishery, and how to incorporate New Jersey, as its geographic location adjacent to Hudson Canyon makes it difficult to place it in either the northern or southern spatial subarea of the stock. The PDT analyzed options that maintain static or proportionally lower allocations for Maine and New Hampshire, but these could be modified if the states were to express an interest in increased participation. The PDT also discussed potential methods for treating New Jersey as a stand-alone region, if deemed more

appropriate than including it in the Southern Region. If a regional approach is taken, the Board should determine the most appropriate regional configuration.

The PDT also discussed the issue of stability in state commercial allocations. In prior discussions at the Working Group and Board level, some states expressed concerns about abrupt allocation changes that could disrupt the fishery. To better understand what constitutes abrupt change in order to avoid such disruptions, it may be helpful to define minimum quotas, or the maximum percent change per year with which the states would be comfortable. For comparison, Table 3 shows the coastwide quotas, and magnitude of change in quotas from year to year since 2003. On average, the coastwide quotas (and therefore the state quotas) have changed by 22% per year, excluding years where the constant catch approach was applied. It is important to bear in mind that state-by-state and coastwide quotas will continue to vary depending on the status of the stock, regardless of whether state-by-state allocations are modified.

Lastly, the PDT noted it could be important to establish a better understanding of where the fishery is occurring, and whether that has changed over time. Due to time limitations, the PDT was only able to analyze estimated commercial landings by state, year, and statistical area provided by the ACCSP. Preliminary results of this analysis are provided in Appendix D. If desired, the Board may request additional analysis of spatial data on black sea bass landings and or trips.

Table 3. Magnitude of annual change in black sea bass commercial quotas.

Year	Coastwide Quota (pounds)	% Change from Previous Year (absolute value)
2003	3,024,545	-
2004	3,768,575	25%
2005	3,966,345	5%
2006	3,832,312	3%
2007	2,385,390	38%
2008	2,025,763	15%
2009	1,093,190	46%
2010	1,758,610	61%
2011	1,711,080	3%
2012	1,710,000	0%
2013	2,174,312	27%
2014	2,174,312	0%
2015	2,212,923	2%
2016	2,702,867	22%
2017	4,120,000	52%
2018	3,520,000	15%
2019	3,520,000	0%
Average (excl. constant catch years)**		**22%**
Average (2016-2019)		**22%**

* Final adjusted quota after RSA

**Constant catch approach was used from 2010 to 2015

Appendix A. Black Sea Bass Commercial Working Group Report, February 2019

Working Group Members: David Borden (Chair, RI), Nichola Meserve (MA), Matthew Gates (CT), Joe Cimino (NJ), Rob O'Reilly (VA)

ASMFC Staff: Caitlin Starks, Toni Kerns

Additional Attendees: Julia Beaty (MAFMC), Greg Wojcik (CT), Jason McNamee (RI), Tiffany Vidal (MA)

Statement of the Problem

The working group has identified two problems associated with the current FMP. First, the commercial black sea bass allocations to the states were originally implemented in 2003 as part of Amendment 13, loosely based on historical landings from 1980-2001. The state shares in Amendment 13 allocated 67% of the coast-wide commercial quota among the states of New Jersey through North Carolina (North of Cape Hatteras) and 33% among the states of New York through Maine. These state commercial allocations have been unchanged for 15 years. Meanwhile, the resource has experienced shifts in distribution and abundance, and changes in fishing effort and fishing behaviors have occurred.

There is scientific information to support these shifts. For example, according to the last black sea bass stock assessment, which modeled fish north and south of Hudson Canyon separately, the majority of the stock occurred in the south prior to the mid-2000s. Since then the biomass in the north has grown considerably and currently accounts for the majority of spawning stock biomass (Figure 1). While the region specific models created for the assessment were never intended to be stand-alone, this shift in black sea biomass distribution has been supported by peer reviewed journal articles (e.g., Bell et al., 2015).

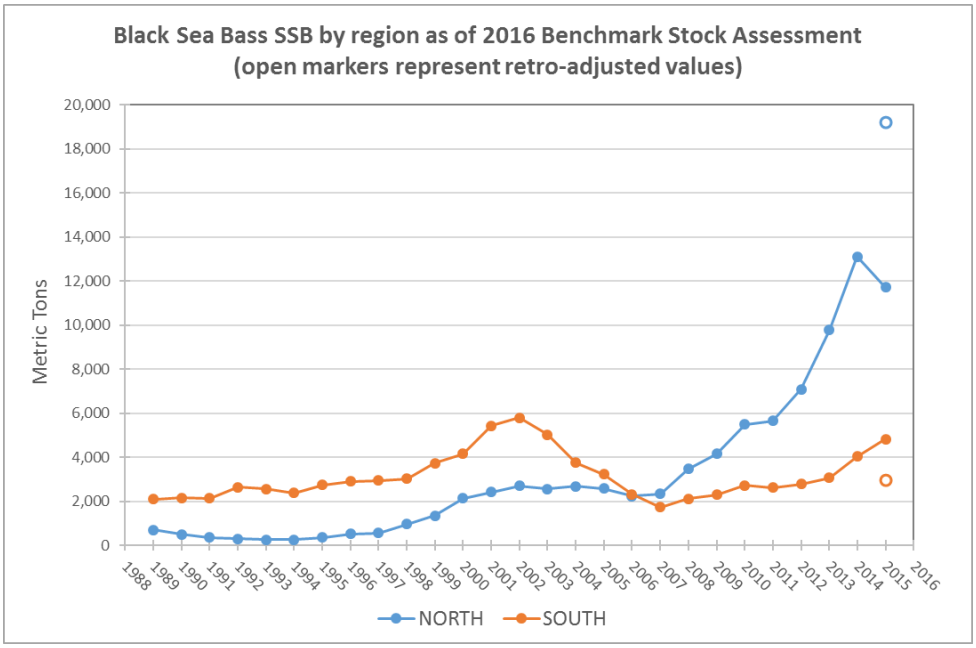

Figure 1: Black Sea Bass SSB by Region, 1989-2016. Source: 2016 Black Sea Bass Stock Assessment.

In some cases, expansion of the black sea bass stock into areas with historically minimal fishing effort has created significant disparities between state allocations and current abundance and resource availability. The most noteworthy example is Connecticut, which has experienced significant increases in black sea bass abundance and fishery availability in Long Island Sound in recent years but was only allocated 1% of the coastwide commercial quota based on landings from 1980-2001.

Any consideration of management changes by the Commission should be responsive to shifts in in black sea bass distribution, abundance, behavior, fishing effort and harvest by gear type. However, there are many additional factors requiring rigorous discussion and evaluation should reallocation be considered. Changes in allocations should take into account the following considerations and issues:

1. Allocations should be reviewed and revised on a regular basis to ensure equity of access and improve fishery efficiency (human safety, fuel use, and discards), using the latest and most appropriate data sources.
2. Changes in allocations should be linked to stock assessments to the extent practicable, or use other peer reviewed data sources. If such sources are unavailable, other scientific information such as state and federal survey indices could be used.
3. The relatively recent shift in spawning stock biomass does not mean that future abundance dynamics will proceed in the same manner, especially since a strong or weak year-class can provide an increase or decrease in abundance throughout the range or a portion of the range.
4. For states where resource availability has shifted significantly in recent years, the current allocations may provide either a disproportionate advantage or disadvantage if used as the basis for allocation adjustments (e.g. Connecticut's 1% allocation). Small changes to the original allocations may not reflect resource abundance, thus, adjustments may need to be made using a formula other than a simple percent change.
5. Participants in different areas have invested in the commercial fishery based on historic landing patterns as well as state management programs. For example, some mid-Atlantic states have adopted management through Individual Transferrable Quotas (ITQs), and the industry has invested in these fishing rights and infrastructure. To avoid unnecessary economic hardships and enhance the ability of the industry to respond and make long term business decisions, slow or gradual implementation of allocation changes should be considered.
6. Due to the high abundance relative to current allocations in the northern area, some states have lengthy closures that promote discards. Any reallocation formula should consider these factors and attempt to reduce closures and discards.
7. Review and reevaluation of commercial quota allocations should not occur in a vacuum and should take into account changes in recreational information. In particular, new recreational harvest estimates should be incorporated into the stock assessment before commercial changes are adopted.

A second problem relates to the provision in the FMP that prescribes a coastwide black sea bass quota managed by NOAA Fisheries. Under the current regulations, all states in the management unit are subject to fishery closures if a coastwide quota overage occurs, despite state-by-state quota management by the ASMFC. These closures can leave states with remaining commercial quota, especially ITQ, unable to utilize their full allocation of the resource. Management should aim to reduce impacts of state-specific commercial quota overages to other states. The working group recommends that the Mid-Atlantic Council consider actions to address this issue. For example, the working group

suggested the Council consider allowing conservation equivalency for the commercial fishery, similar to what is allowed for recreational black sea bass and summer flounder.

Objectives and Goals to Address the Problem

The WG identified the following as management objectives for commercial black sea bass:

- Ensure fishing mortality and spawning stock biomass are maintained within established thresholds and targets, and the stock is not overfished nor experiencing overfishing
- Improve equity in access to the fishery among the states
- Improve fishery efficiency (e.g. use of time, fuel and other resources; reducing discards)

The WG discussed the need to determine what metric(s) would be used to evaluate equity in access to the fishery. Some ideas discussed were socioeconomic benefits or opportunities, as well as resource availability related to the distribution of exploitable biomass and abundance. The WG noted discard reductions and increased efficiency would likely result from allocations based on more current information on the resource's distribution along the coast. However it was noted that fishery efficiency may also be impacted by factors other than resource allocation (e.g., allowances to possess multiple states' limits in the same trip).

The WG proposed the following information, particularly for recent years, should guide further development of management objectives and strategies.

- Descriptions of each state's fishery including but not limited to: management program, participation, effort, landings by gear, distribution of landings and trips, commercial size distribution, and socioeconomic information
- A comprehensive review of survey data for black sea bass to inform understanding of stock biomass/abundance distribution and availability to state commercial fisheries
- Current scientific information on the geographic shifts in black sea bass biomass

Potential Management Strategies

The WG agreed a wide range of options should be considered, and that some management strategies may require coordination with the Mid-Atlantic Fishery Management Council. Some of the ideas the WG supported exploring further included:

1. Adjustments to the state-by-state allocations. Potential options include:
    a. Status quo
    b. Dynamic approach modeled after the Transboundary Management Guidance Committee (TMGC) approach (Appendix I)
2. Defined timeline or trigger for reevaluation of allocations
    a. Future consideration of a strategy similar to the scup model to increase equitability in access for federal vessels (i.e. winter coastwide quota management and summer state-by-state quota management) (Appendix II)

As indicated in the problem statement, consideration should be given to how management approaches may impact fishery stakeholders in each region, and efforts made to balance negative economic impacts with enhanced equity and efficiency of the fishery along the coast.

Appendix B. TMGC Approach

Proposed New Allocation Alternative For Black Sea Bass: Dynamic Transboundary Approach

Black Sea Bass PDT

22 April 2019

Introduction

This proposal offers a new alternative for modifying the allocation of the commercial black sea bass quota. It involves a dynamic approach for gradually adjusting state-specific allocations using a combination of resource utilization (historical allocations) and current levels of resource distribution. The alternative is modeled after the Transboundary Management Guidance Committee (TMGC) approach, which was developed and used for the management of shared Georges Bank resources between the United States and Canada.

As noted by Gulland (1980), the designation of units for management entails a compromise between the biological realities of stock structure and the practical convenience of analysis and policy making. For black sea bass, the Atlantic Coast states from North Carolina to Maine - acting through and by the MAFMC, ASMFC, and GARFO – use a single management unit encompassing the entire region occupied by the stock, from the southern border of North Carolina northward to the U.S.- Canadian border. While there is a general scientific consensus that the black sea bass population has shifted its center of biomass to the northen portion of its range (Bell et al. 2014 and NEFSC 2017), the current management structure, as reflected by current state-by-state allocations, does not recognize this new population dynamic.

This new alternative sets forth an approach that balances stability within the fishery, based on historical allocations, with gradual adjustments to the fishery, based on regional shifts in resource distribution emanating from updated stock assessments or surveys. The approach affords considerable flexibility, both with regard to initial configurization and application over time. A key feature involves the use of control rules to guard against abrupt shifts in allocations.

This new alternative draws upon established principles of resource sharing, which include consideration of access to resources occurring or produced in close spatial proximity to the states in the management unit and historical participation in the exploitation of the resources (Gavaris and Murawski 2004). The former has emerged from the changing distribution of the black sea bass resource and the effects this creates within the fishery. The latter recognizes traditional involvement and investment in the development of the fishery since the the beginning of black sea bass joint management in 1996. Both principles were incorporated in the TMGC approach; historical participation was initially afforded primary emphasis, then gradually down-weighted so that, after a nine-year phase-in period, the annual allocation was based primarily on resource distribution (Murawski and Gavaris 2004). The approach proposed here for black sea bass is similar; the proposal envisions a gradual transition, giving more weight to historical participation at first, then slowly phasing in the distributional aspects over time, and then implements changes to state specific allocations through a two-step process.

Details for the calculations used for the TMGC approach were described by Murawski and Gavaris (2004). Modifications to that approach are necessary, given key differences between the shared Georges Bank resources and the shared black sea bass resource. Those differences include the state-by-state allocation system currently in place for black sea bass, the need to translate from regional to state-specific allocations, and the need to accomodate multiple jurisdictional differences in the fishery.

This new alternative proposes use of existing state-by-state allocations to reflect initial values for historical participation (aka resource utilization) and proposes use of the 2016 benchmark stock assessment results(NEFSC 2017) to determine the values for resource distribution; the two values are then integrated in the form of regional shares. An alternative to using the stock assessment would be to use synoptic trawl survey information. This potential alternative is described in more detail below. The two regions as defined in the

assessment are proposed: (1) ME - NY, (2) NJ - NC. They emanate from the spatial stratification of the stock in to units that generally align with those used for the assessment, which used the Hudson Canyon as the dividing line based on several pieces of evidence that stock dynamics had an important break in this area. These regional shares are then sub-divided into state-specific allocations.

The overall approach can be modified by the Board and Council in various ways. For example, sub-alternatives can be developed for:

- the regional configuration (e.g., other regions beyond those proposed here);
- the values for historical participation/resource utilization (e.g., current, status quo allocations, or some variant thereof);
- the percentage weighting values for Resource Utilization and Resource Distribution (90:10, or some variant thereof);
- the increment of change in these values from one year to the next (10%/year, or some variant thereof;
- the periodicity of adjustments (e.g., annually vs. biannually); and
- the overall time horizon for the transition (e.g., 9 years vs. 18 years).

The control rule can also be evaluated via two or more sub-alternatives (e.g., a cap that's higher or lower than 10%).

Data and Methods

Formula

Adapted from the TMGC application (TMGC 2002), the approach for calculating the respective regional shares, which takes historical utilization in to account and adapts to shifts in resource distribution, is as follows:

$$\%RegionalShare = (\alpha_y * \sum_r StateSpecAlloc) + (\beta_y * \%ResDistr_{r,y}) \quad (1)$$

Where α_y = percentage weighting for utilization by year; β_y = percentage weighting for resource distribution by year; $\alpha_y + \beta_y = 100\%$; $StateSpecAlloc$ = state specific allocation; $ResDistr$ = resource distribution; r = region; y = year

Proposed regions:
Two regions are proposed: (1) ME - NY, (2) NJ - NC.

Proposed values for historical participation/resource utilization:
See Resource Utilization section below.

Proposed values for resource distribution:
The current proposal is to use the distribution in the two regions based on the stock assessment biomass calculations. This could be altered to use synotpic trawl survey information, therefore resource distribution would be based on most recent trawl survey information in that case.

Proposed percentage weighting values for resource utilization and resource distribution:
The initial sharing formula is proposed to be based on the weighting of resource utilization (from historical allocations) by 90% and the weighting of resource distribution by 10%. Additional alternatives are prtesented below.

Proposed increments of change in the weighting values from one adjustment period to the next: Initially proposed at 10% per period. Thus, 90:10 to begin, then: 80:20, 70:30, 60:40, 50:50; 40:60; 30:70; 20:80, concluding at 10:90. Other alternatives are tested below.

Proposed periodicity of the adjustments:
Bi-annually based on stock assessment updates. If the survey alternative were used, this could be increased to annually.

Overall time horizon for the transition:
The initial proposal would conclude in 9 years. If commenced in 2020, it would conclude in 2028

With these - or alternative - parameters assigned, the region-specific shares then need to be prorated into the existing state-specific allocation structure. This can be accomplished by:

$$NewStateAllocation = \frac{Allocation_s}{\sum_r StateSpecAlloc} * \%RegionalShare \quad (2)$$

Where $Allocation_s$ = the specific state being calculated

Resource Utilization

Historical state-specific commercial allocations for black sea bass are codified in Amendment 13 to the Fishery Management Plan for Black Sea Bass (FMP) (MAFMC 2003) (Table 2). These allocations can serve as the basis for the resource utilization values in the allocation formula. These values, as used in the formula, would remain consistent throughout the reallocation process, even as the final state allocations change over time, based on equations 1 and 2. This is philosophically consistent with the FMP, as this portion of the allocation formula is meant to represent the historical fishing aspects of the black sea bass fishery.

However, alternative strategies (set forth in the form of sub-alternatives) could be used to set the initial allocation design. That is, the initial resource utilization portion of the allocation design could be adjusted, via revised state allocations, before transitioning into the formulaic approach to be used as the process moves forward.

One way to implement this type of approach would be the following, working from equation 2 above:

$$NewStateAllocation = \frac{Allocation_s + \lambda_s}{\sum_r StateSpecAlloc} * \%RegionalShare \quad (3)$$

Where λ = a state specific allocation additive or reduction factor and s = the state being calculated.

This formula allows for a shift in initial (status quo) allocations to account for potential discrepencies believed to be represented in the existing allocations.

Resource Distribution

This proposal offers two options for calculating the resource distribution. The first option would be to use the spatial stock assessment to determine the amount of resource in each region (north = NY, CT, RI, MA, NH, ME; south = NJ, DE, MD, VA, NC). The spatial stock assessment calculates a north and south biomass value, which can then be turned in to a proportion. The benefit of this approach is this number is calculated through a synthesis of many biological parameters and represents the best available science for the population. The drawback is that the assessment is updated periodically (not every year), therefore the information will not be evaluated every year, but would depend on the assessment cycle. Additionally, if the spatial stock assessment were to fail at some point in the future, this would impact the ability to do the dynamic allocation calculations. The current estimated allocation from the benchmark assessment would be 6,800 MT (January 1 biomass) in the south, 17,000 MT (January 1 biomass) in the north, equating to 29% of the biomass in the south and 71% of the biomass in the north (NEFSC 2017). It is important to note that these are the unadjusted biomass amounts from the assessment. Since data are readily available for this option, an example calculation and projection has been developed below. The process set forth below addresses total biomass, but it could be modified (and presented as a sub-alternative) to address exploitable biomass.

As an alternative, values for resource distribution can be obtained and calculated using scientific surveys, with results apportioned into regions. Since surveys are undertaken annually, the values for resource distribution, by region, can be recalculated and updated annually, biannually, or upon whatever timeframe is deemed most appropriate, affording an opportunity to regularly adjust allocations in sync with shifts in resource distribution. Such shifts may, or may not, follow consistent trends. Accordingly, the technique affords a dynamic approach, consistent with actual changes in resource distribution. Drawing upon the TMGC approach, a swept area

biomass, considered a relative index of abundance, can be computed in each stratum, then summed to derive the biomass index for each region. The biomass index estimate derived from each survey would represent a synoptic snapshot of resource distribution at a specific time during a year. Combining the results of multiple surveys requires an understanding of seasonal movement patterns and how much of the biological year each survey represents. For this reason, it is proposed to use the National Marine Fisheries Service (NMFS) Trawl Survey in combination with the North East Area Monitoring and Assessment Program (NEAMAP) Survey. These are both well-established surveys, currently used in the stock assessment, and are synoptic, covering both offshore and inshore strata. As proposed in this alternative, the existing survey strata could be used to partition the survey information into two stock regions: (1) ME - NY, and (2) NJ - NC. The strata do not align perfectly with these two spatial configurations, but they are relatively close (Figures 1 and 2). Table 1 provides an example of how the strata could be applied for each region.

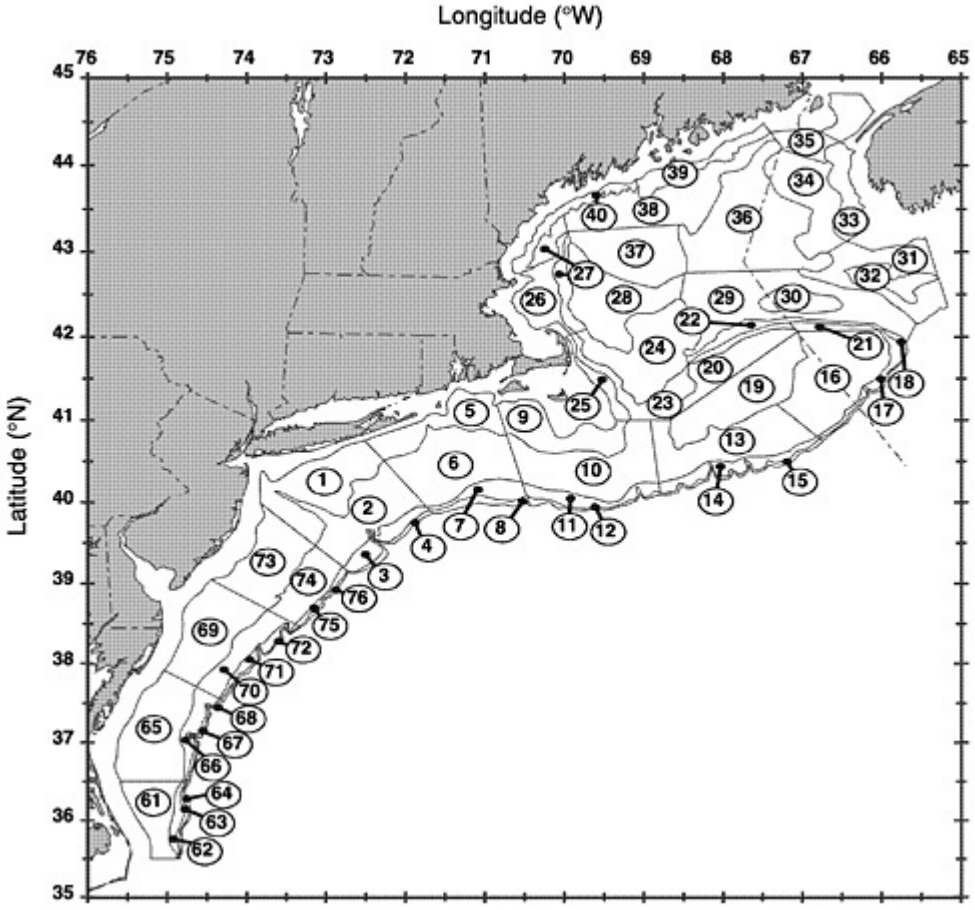

Figure 1: Map of National Marine Fisheries Service trawl survey strata.

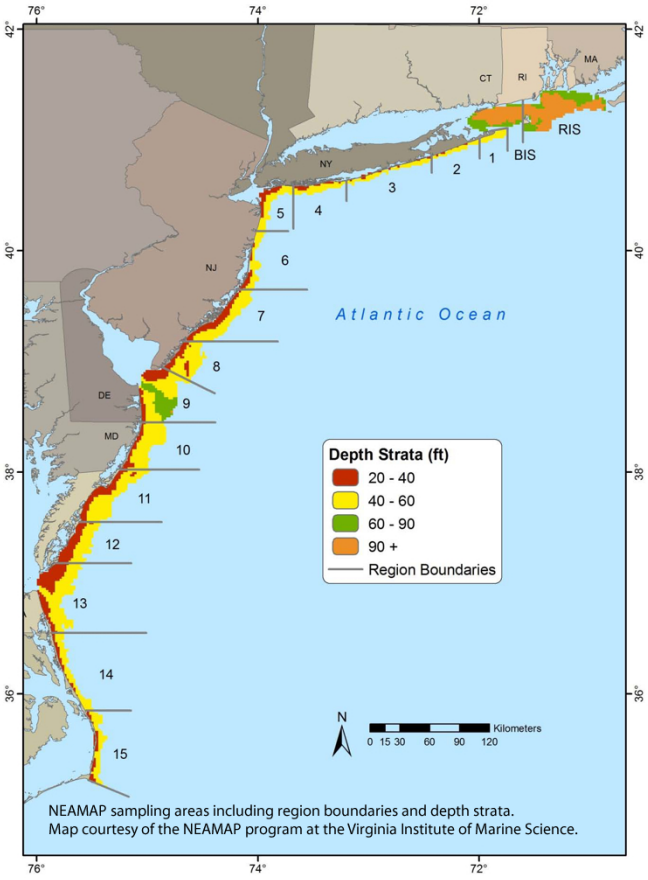

Figure 2: Map of North East Area Monitoring and Assessment Program trawl survey strata.

Table 1 - Strata or Region assigned to each region for resource distribution calculations.

Regions	NMFS Strata	NEAMAP Regions
Region 1: ME - NY	1 - 40	1 - 5, BIS, RIS
Region 2: NJ - NC	3, 61 - 76	6 - 15

*Note: This is a first cut, these should be finalized through discussions between the TC and survey staff.

This approach could be refined over time by developing area polygons that better align with the boards desired regional configuration. Then, using the spatial information from the surveys, the survey information could be partitioned into the polygons.

Additionally, there may be ways to use state survey information within the analysis – either directly by averaging those surveys into the swept area biomass calculations, or indirectly such as using them to verify or corroborate the information from the surveys used in the calculations. Such use of state survey information could be developed and integrated into the process over time via analysis and recommendations from the monitoring and technical committees.

A robust, locally weighted regression algorithm (Cleveland 1979), referred to as LOESS, could then be used to mitigate excessive variations in sampling results. Per the TMGC approach, a 30% smoothing parameter could be used. That level of smoothing was chosen because it reflected current trends, was responsive to changes, and provided the most appropriate results for contemporary resource sharing. The recommended

default of two robustness iterations also was adopted (Cleveland 1979) in the TMGC approach and could also be adopted here. Resource distributions could then be updated annually by incorporating data from the latest survey year available and dropping data from the earliest survey used in the previous year so that a consistent window of data is maintained. After the surveys are combined, the LOESS smoother would be applied to the survey data. The fixed resource utilization (90% weighting in year 1) and the most recent resource distributions as calculated by the surveys (10% weighting in year 1) can then be applied to the sharing formula to determine regional allocation shares for the upcoming fishing year.

The benefit of this approach is that it could be performed annually with the most contemporary data. The drawback is that survey data are prone to variability. The LOESS smoothing and the control rule set forth below are designed to account for some of this variability to keep it from causing unreasonable changes in a single year.

As a final nuance to the survey alternative, a sophisticated modeling approach could be developed to achieve the same information as above. Techniques like the use of the VAST model (Thorson 2015) have been shown to be appropriate for this type of an analysis and could be adopted, in lieu of the swept area biomass technique, as a method for calculating resource distribution by region.

For this proposal, the assessment technique will be used as there is actual data that can be used to examine an example. With additional work, a retrospective analysis using trawl survey information could be developed.

Control Rule

In addition to the formula for calculating the regional allocations and then translating into the state specific allocations, additional measures could be added by way of a control rule. Such measures would enable various checks and balances to be incorporated into the process to guard against unintended consequences.

One such control rule, proposed here, is to guard against any abrupt change occurring to any regional allocation in any given year (or other time frame), and thus minimize short-term impacts, by capping the amount of any annual or bi-annual change to the regional shares at 10%. This can be shown as:

$$\%RegionalShare = \begin{cases} 10\%, & \text{if } \Delta AnnualChange > 10\% \\ \%RegionalShare, & \text{if } \Delta AnnualChange \leq 10\% \end{cases} \quad (1)$$

The effect would be to ensure that any changes to allocations occur incrementally, even in a case of large shifts in resource distribution in any given year or period. This control rule serves as an additional layer of protection against large changes, in addition to the other factors outlined above that are also built in to contend with uncertainty and variability.

Flexibility

A key attribute of this proposed new approach for modifying the allocation system is its flexibility. All of the decision points set forth in this proposal, once agreed to, can be adjusted as the process moves forward. Such adjustments, emanating from routine reviews by the Board and Council, can address any of the range of parameters initially set by the Board and Council. The Board and Council could define how changes to the system would be considered and enacted moving forward - e.g., via Addenda and Frameworks, the specifications process, or some other mechanism. The ranges of parameters/issues that readily lend themselves to such adjustment include:

- The α and β parameters can be adjusted to change the way the utilization and distribution are weighted in the equation;
- The increment of change in the α and β parameters can be adjusted to increase or decrease the transition speed;
- The time horizon for the transition can be changed;
- The initial state allocations can be set at status quo, or shifted to accommodate various objectives; and
- The control rule can be adjusted to be more or less protective of incremental changes.

Given such flexibility, the Board and Council could decide to implement a transition program that begins in 2020, with either current, status quo allocations, or some variant thereof, and based on assessment information through 2018 (same information used for the proposed 2019 operational stock assessment update), establish resource distribution values for each of the two regions. Using those parameters, and a weighting of allocations by 90% and resource distribution by 10%, enact new, slightly revised state-specific allocations for 2020. If the Board and Council opted for a transitional program involving 10% annual increments, until the weightings reached 10% utilization from historical allocations and 90% resource distribution, this sharing formula would transition from a 90:10 resource utilization-to-resource distribution weighting in 2020 to a 10:90 weighting by 2028. During every transitional period, the trawl survey information would be updated and factored into the resource distribution values. As such, each regional and associated state-specific adjustment would not necessarily be the same, whether in magnitude or direction.

Alternatively, the Board and Council could opt for a transitional program involving 10% increments every two years, or 5% annual increments, or 5% increments every two years, etc. Those alternatives would significantly slow the transition. Some of these variants are illustrated below as examples.

Example

The following are examples of how the new approach can be applied; it incorporates various proposed or strawman parameters, all of which can be modified upon review and consideration by the Board and Council:

- The assessment information is used to calculate the Resource Distribution values.
- Step 1: Apply the state-specific allocations and resource distribution information to equation 1.
  - Summed state allocations for Region 1 (sum of ME-NY)

```
sum.reg1
```

```
## [1] 0.33
```

  - Summed state allocation for Region 2 (NJ - NC)

```
sum.reg2
```

```
## [1] 0.67
```

- Step 2: Apply the Resource Distribution information to equation 1.
  - Strawman values:

```
dist.reg1 = 0.71
dist.reg2 = 0.29
```

- Step 3: Select α and β parameters for equation 1 for year 1:
  - The initial sharing formula is proposed to be based on the weighting of resource utilization (from historical allocations) by 90% and the weighting of resource distribution by 10%. Thus:

```
alpha = 0.9
beta = 0.1
```

- Step 4: Calculate the results, in the form of proportional regional shares, from equation 1:

```
# Region 1 equation and result
Reg1.Share = (alpha*sum.reg1) + (beta*dist.reg1)
Reg1.Share
```

```
## [1] 0.368
```

```
# Region 2 equation and result
Reg2.Share = (alpha*sum.reg2) + (beta*dist.reg2)
Reg2.Share
```

```
## [1] 0.632
```

  - This does not account for any change to the original allocations, see step 6 below.

- Step 5: Determine need to apply the control rule

```
# Control Rule
if (abs(Reg1.Share-sum.reg1) > 0.1 | abs(Reg2.Share-sum.reg2) > 0.1 ) {
  if (Reg1.Share-sum.reg1 > 0) {
    Reg1.Share = (sum.reg1*(0.1))+sum.reg1
    Reg2.Share = (sum.reg2*(-0.1))+sum.reg2

  }
  if (Reg2.Share-sum.reg2 > 0) {
    Reg1.Share = (sum.reg1*(-.1))+sum.reg1
  Reg2.Share = (sum.reg2*(0.1))+sum.reg2

  }

}
```

  - As proposed, the rule would cap any change at 10%. Since none of the resulting shares change by more than 10%, the control rule would not apply in this case.

- Step 6: Establish the state-specific allocation structure to be pro-rated by the regional shares. This example **does not** apply a λ value to alter the allocations per equation 3.

  - The state-specific allocations could be the current, status quo allocations; or they could be variants, established via equation 3.

Table 2 - Current state by state allocations.

State	Current Allocation
Maine	0.005
New Hampshire	0.005
Massachusetts	0.130
Rhode Island	0.110
Connecticut	0.010
New York	0.070
New Jersey	0.200
Delaware	0.050
Maryland	0.110
Virginia	0.200
North Carolina	0.110

Four hypothetical examples of state-specific allocations under the new program were performed and are presented below (Tables 3, 4, 5, and 6; Figures 3, 4, 5, and 6).

Example 1: The first example represents a configuration resulting in more liberal change in state allocations. The parameters are set as follows: 2 regions (ME - NY; NJ - NC); resource utilization = status quo allocations ; transition from 90:10 to 10:90; 10% per year change in the transition from utilization to distribution; annual adjustments; the transition time to 90% weight on the resource distribution is 9 years; 10% control rule;

distribution assumption is based on the biomass by region from the assessment for the time period of 2004 - 2012; distribution of adjustments to states within a region are based on historic allocations.

Example 2: Any TMGC configuration could also be modified to distribute the allocation adjustments equally to the states within each region, instead of distributing those adjustments proportionally to the historic state allocations. This example represents a configuration resulting in more liberal change in state allocations as noted in example 1. The parameters are set as follows: 2 regions (ME - NY; NJ - NC); resource utilization = equal allocations to each state within the region; transition from 90:10 to 10:90; 10% per year change in the transition from utilization to distribution; annual adjustments; the transition time to 90% weight on the resource distribution is 9 years; 10% control rule; distribution assumption is based on the biomass by region from the assessment for the time period of 2004 - 2012; distribution of adjustments to states within a region are based equal distribution.

Example 3: The third example represents a more conservative configuration, with more limited changes to state allocations. The parameters are set as follows: 2 regions (ME - NY; NJ - NC); resource utilization = status quo allocations; transition from 90:10 to 30:70; 5% per year change in the transition from utilization to distribution; annual adjustments; the transition time to 70% weight on the resource distribution is 12 years; 3% control rule; distribution assumption is based on the biomass by region from the assessment for the time period of 2004 - 2015; distribution of adjustments to states within a region are based on historic allocations.

Example 4: The final example is intended to showcase a number of additional modifications that could be made to the approach to achieve certain objectives. In discussions amongst the PDT (and previously the Board regarding recreational black sea bass) it has been noted that it may be appropriate to treat New Jersey as an individual region due to its geographic position straddling the division of the Northern and Southern regions adjacent to Hudson Canyon. Additionally, some Board members have suggested modifying the "resource utilization" part of the equation to increase the allocations for Connecticut and New York due to their allocations being disproportionate to their current resource availability. Lastly, the PDT discussed the option of holding Maine and New Hampshire's current allocations static throughout the transaction. To demonstrate these modifications, the parameters are set as follows: 4 regions (ME and NH remaining as a non-dynamic region with static allocations; MA - NY; NJ as a stand-alone region; and DE - NC); resource utilization = CT and NY base allocations increased by 1% in each of the first three years; transition from 90:10 to 10:90; 10% per year change in the transition from utilization to distribution; annual adjustments; the transition time to 90% weight on the resource distribution is 9 years; 10% control rule; distribution assumption is based on the biomass by region from the assessment for the time period of 2004 - 2012, and assumes NJ is consistently 60% of the southern region distribution; distribution of adjustments to states within a region are based on historic allocations plus the incremental change as noted above.

The allocations presented in these tables would be different if any of the parameters were changed. Additionally, note that these examples are based on a scenario where the approach was implemented in 2004. The example shows how the system would work and the effects to the states over the initial period of adjustment from Resource Utilization having the highest weight in the equation to Resource Distribution having the highest weight during a period of time where the biomass was rapidly changing.

Table 3 - Allocation trajectory for all states under the parameters outlined in example 1 above. The control rule is not triggered in any year in this example. This is a retrospective analysis as if this method were in place beginning in 2004.

State	2004	2005	2006	2007	2008	2009	2010	2011	2012
Maine	0.005	0.005	0.006	0.006	0.007	0.008	0.009	0.009	0.010
New Hampshire	0.005	0.005	0.006	0.006	0.007	0.008	0.009	0.009	0.010
Massachusetts	0.134	0.139	0.149	0.168	0.187	0.206	0.224	0.240	0.268
Rhode Island	0.113	0.117	0.126	0.142	0.158	0.174	0.189	0.203	0.227
Connecticut	0.010	0.011	0.011	0.013	0.014	0.016	0.017	0.018	0.021
New York	0.072	0.075	0.080	0.090	0.101	0.111	0.120	0.129	0.144
New Jersey	0.197	0.193	0.186	0.171	0.157	0.143	0.129	0.116	0.095
Delaware	0.049	0.048	0.046	0.043	0.039	0.036	0.032	0.029	0.024
Maryland	0.109	0.106	0.102	0.094	0.086	0.078	0.071	0.064	0.052
Virginia	0.197	0.193	0.186	0.171	0.157	0.143	0.129	0.116	0.095
North Carolina	0.109	0.106	0.102	0.094	0.086	0.078	0.071	0.064	0.052

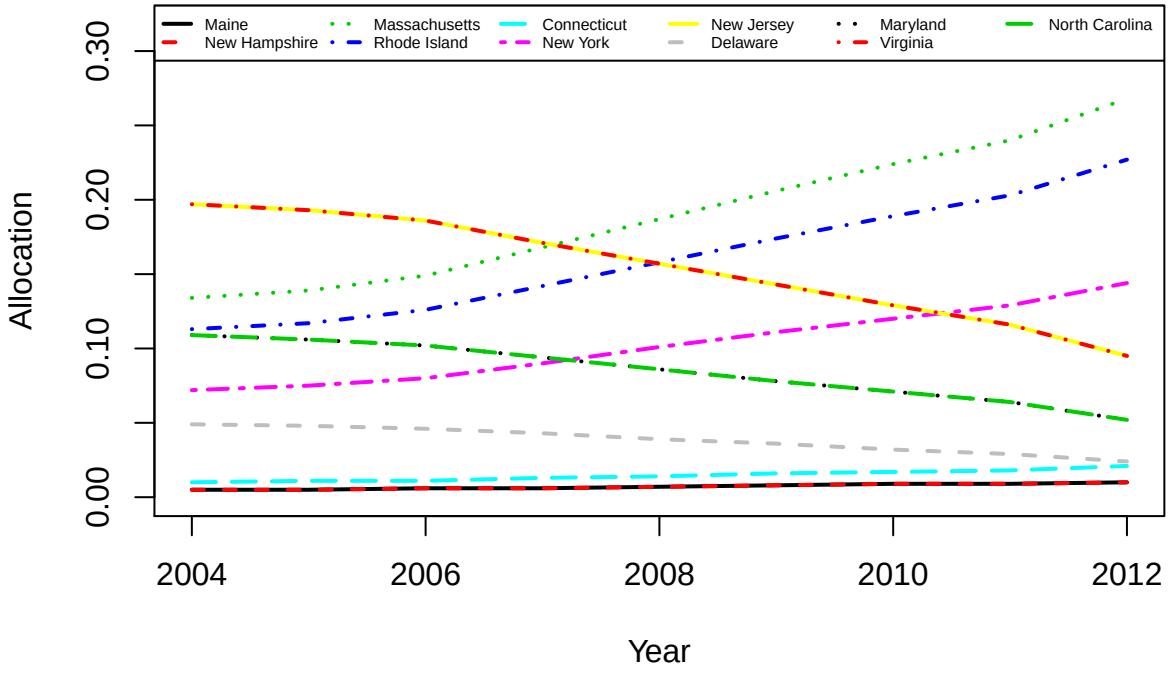

Figure 3: Allocation trajectory for all states under the parameters outlined in example 1 above. The control rule is not triggered in any year in this example. This is a retrospective analysis as if this method were in place beginning in 2004.

Table 4 - Allocation trajectory for all states under the parameters outlined in example 2 above. The control rule is not triggered in any year in this example. This is a retrospective analysis as if this method were in place beginning in 2004.

State	2004	2005	2006	2007	2008	2009	2010	2011	2012
Maine	0.070	0.071	0.074	0.082	0.093	0.102	0.109	0.112	0.119
New Hampshire	0.016	0.027	0.044	0.064	0.084	0.099	0.108	0.112	0.119
Massachusetts	0.106	0.099	0.094	0.094	0.099	0.105	0.110	0.113	0.119
Rhode Island	0.124	0.114	0.104	0.101	0.102	0.106	0.110	0.113	0.119
Connecticut	0.012	0.024	0.041	0.063	0.083	0.098	0.108	0.112	0.119
New York	0.012	0.024	0.041	0.063	0.083	0.098	0.108	0.112	0.119
New Jersey	0.111	0.111	0.108	0.099	0.088	0.077	0.069	0.065	0.057
Delaware	0.192	0.176	0.154	0.127	0.101	0.083	0.071	0.065	0.057
Maryland	0.111	0.111	0.108	0.099	0.088	0.077	0.069	0.065	0.057
Virginia	0.057	0.068	0.078	0.081	0.079	0.073	0.068	0.065	0.057
North Carolina	0.192	0.176	0.154	0.127	0.101	0.083	0.071	0.065	0.057

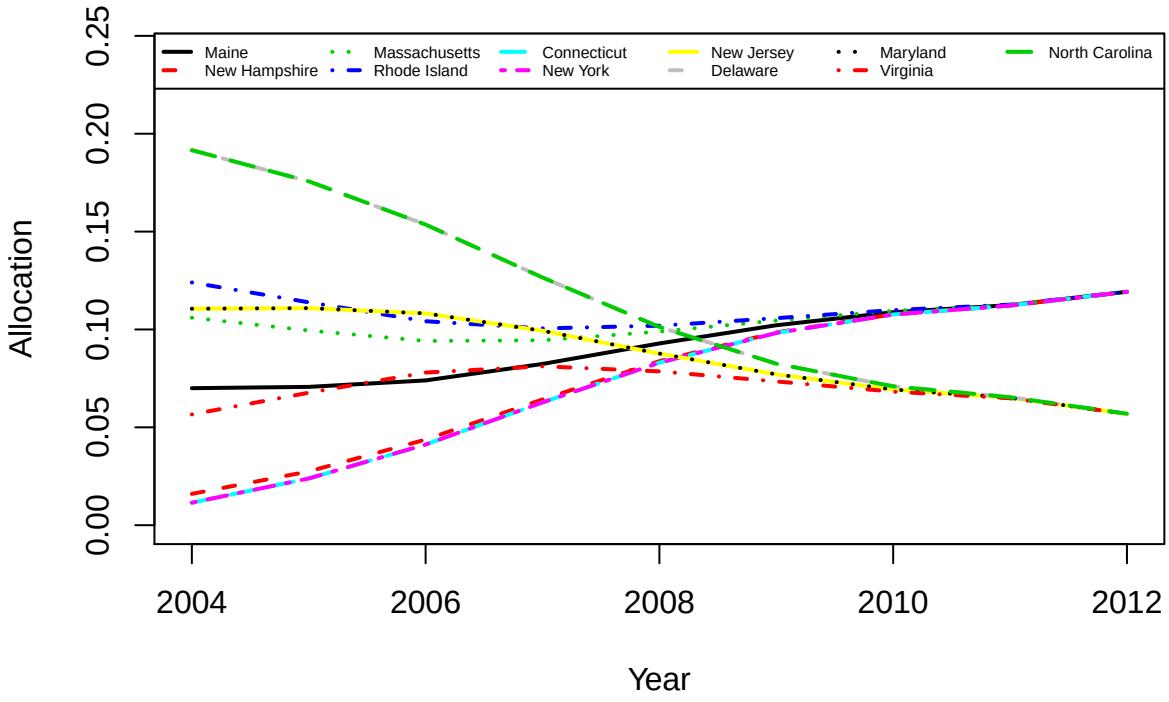

Figure 4: Allocation trajectory for all states under the parameters outlined in example 2 above. The control rule is not triggered in any year in this example. This is a retrospective analysis as if this method were in place beginning in 2004.

Table 5 - Allocation trajectory for all states under the parameters outlined in example 3 above. The control rule is triggered in each year from 2012 through 2015 in this example. This is a retrospective analysis as if this method were in place beginning in 2004. The control rule is triggered in 2012 - 2015 in this example.

State	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Maine	0.005	0.005	0.005	0.006	0.006	0.006	0.007	0.007	0.007	0.008	0.008	0.008
New Hampshire	0.005	0.005	0.005	0.006	0.006	0.006	0.007	0.007	0.007	0.008	0.008	0.008
Massachusetts	0.132	0.134	0.139	0.149	0.159	0.168	0.177	0.185	0.191	0.196	0.202	0.209
Rhode Island	0.112	0.114	0.118	0.126	0.134	0.142	0.150	0.157	0.161	0.166	0.171	0.176
Connecticut	0.010	0.010	0.011	0.011	0.012	0.013	0.014	0.014	0.015	0.015	0.016	0.016
New York	0.071	0.072	0.075	0.080	0.085	0.090	0.095	0.100	0.103	0.106	0.109	0.112
New Jersey	0.199	0.197	0.193	0.186	0.178	0.171	0.164	0.158	0.153	0.148	0.144	0.140
Delaware	0.050	0.049	0.048	0.046	0.045	0.043	0.041	0.040	0.038	0.037	0.036	0.035
Maryland	0.109	0.108	0.106	0.102	0.098	0.094	0.090	0.087	0.084	0.082	0.079	0.077
Virginia	0.199	0.197	0.193	0.186	0.178	0.171	0.164	0.158	0.153	0.148	0.144	0.140
North Carolina	0.109	0.108	0.106	0.102	0.098	0.094	0.090	0.087	0.084	0.082	0.079	0.077

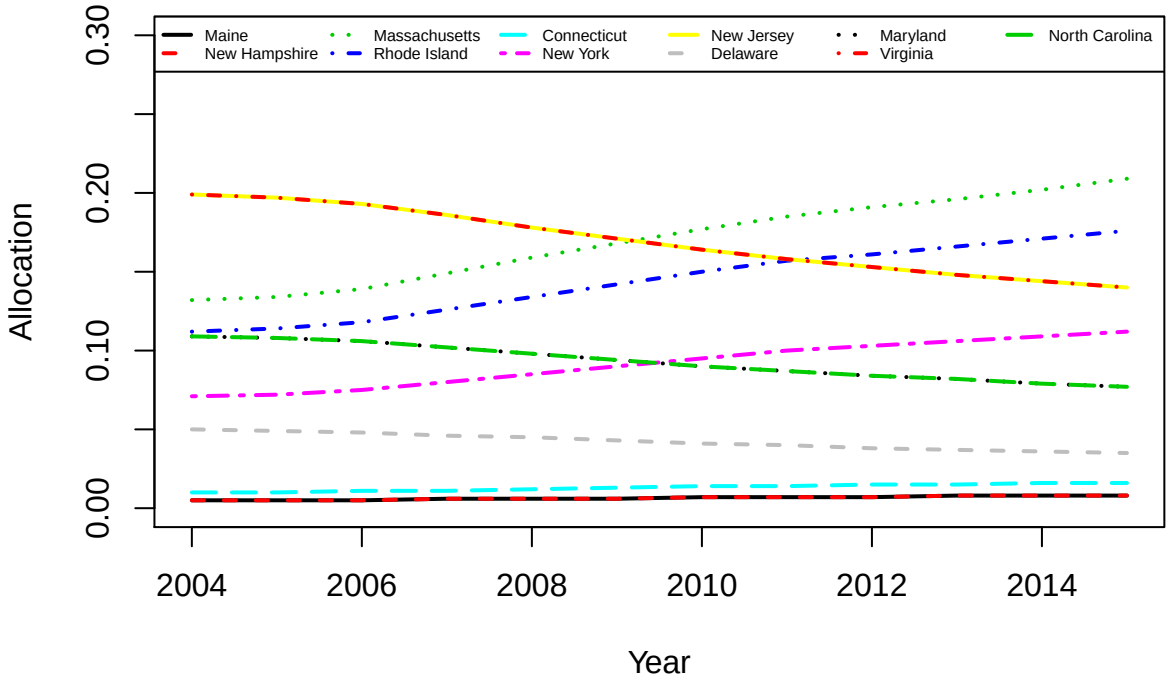

Figure 5: Allocation trajectory for all states under the parameters outlined in example 3 above. The control rule is triggered in each year from 2012 through 2015 in this example. This is a retrospective analysis as if this method were in place beginning in 2004. The control rule is triggered in 2012 - 2015 in this example.

Table 6 - Allocation trajectory for all states under the parameters outlined in example 4 above. The control rule is not triggered in any year in this example. This is a retrospective analysis as if this method were in place beginning in 2004.

State	2004	2005	2006	2007	2008	2009	2010	2011	2012	NA
Maine	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
New Hampshire	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Massachusetts	0.129	0.129	0.127	0.127	0.147	0.166	0.188	0.206	0.219	0.236
Rhode Island	0.109	0.109	0.106	0.106	0.123	0.139	0.157	0.172	0.183	0.197
Connecticut	0.020	0.020	0.031	0.042	0.048	0.055	0.062	0.068	0.072	0.078
New York	0.081	0.081	0.092	0.105	0.121	0.137	0.155	0.169	0.180	0.195
New Jersey	0.209	0.209	0.230	0.236	0.239	0.230	0.218	0.206	0.192	0.170
Delaware	0.044	0.044	0.038	0.034	0.028	0.024	0.019	0.016	0.013	0.011
Maryland	0.101	0.101	0.090	0.084	0.069	0.059	0.046	0.038	0.033	0.026
Virginia	0.186	0.186	0.168	0.158	0.130	0.111	0.087	0.072	0.062	0.049
North Carolina	0.101	0.101	0.090	0.084	0.069	0.059	0.046	0.038	0.033	0.026

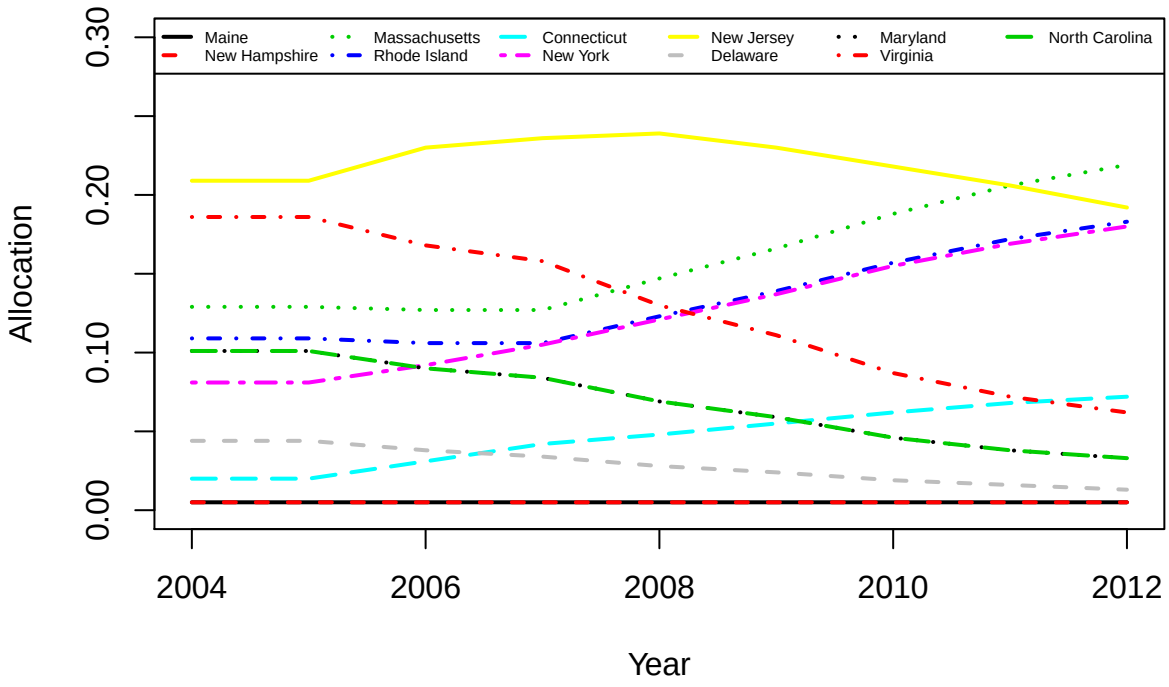

Figure 6: Allocation trajectory for all states under the parameters outlined in example 4 above. The control rule is not triggered in any year in this example. This is a retrospective analysis as if this method were in place beginning in 2004.

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Appendix C. Trigger Approach

Table 1. Reallocation of black sea bass commercial quota above a 3 million pound trigger, based on the 2017 coastwide quota of 4.12 million pounds. Quota up to and including 3 million pounds is distributed according to the status quo state allocations. Quota above the trigger is distributed equally to the states of Massachusetts through North Carolina, while Maine and New Hampshire are each allocated 1% of the quota above the trigger.

3 Million Pound Trigger					
State	**Current Allocation (%) of quotas up to and including 3 million lbs**	**Status Quo distribution of first 3 million lbs of quota**	**Allocation (%) of additional quota above 3 million lb**	**Example state allocations (lbs) under a 4.12 million lb quota**	**Example state allocations (%) under a 4.12 million lb quota**
ME	0.5%	15,000	1.00%	26,200	0.64%
NH	0.5%	15,000	1.00%	26,200	0.64%
MA	13.0%	390,000	10.89%	511,956	12.43%
RI	11.0%	330,000	10.89%	451,956	10.97%
CT	1.0%	30,000	10.89%	151,956	3.69%
NY	7.0%	210,000	10.89%	331,956	8.06%
NJ	20.0%	600,000	10.89%	721,956	17.52%
DE	5.0%	150,000	10.89%	271,956	6.60%
MD	11.0%	330,000	10.89%	451,956	10.97%
VA	20.0%	600,000	10.89%	721,956	17.52%
NC	11.0%	330,000	10.89%	451,956	10.97%
Total	100.0%	3,000,000	100%	4,120,000	100.00%

Note: Should an annual coastwide quota be equal to or less than 3 million pounds, allocation percentage defaults to current allocation percentage.

Table 2. Reallocation of black sea bass commercial quota above a 4 million pound trigger, based on the 2017 coastwide quota of 4.12 million pounds. Quota up to and including 3 million pounds is distributed according to the status quo state allocations. Quota above the trigger is distributed equally to the states of Massachusetts through North Carolina, while Maine and New Hampshire are each allocated 1% of the quota above the trigger.

4 Million Pound Trigger					
State	**Current Allocation (%) of quotas up to and including 4 million lbs**	**Status Quo distribution of first 4 million lbs of quota**	**Allocation (%) of additional quota above 4 million lb**	**Example state allocations (lbs) under a 4.12 million lb quota**	**Example state allocations (%) under a 4.12 million lb quota**
ME	0.5%	20,000	1.00%	21,200	0.51%
NH	0.5%	20,000	1.00%	21,200	0.51%
MA	13.0%	520,000	10.89%	533,067	12.94%
RI	11.0%	440,000	10.89%	453,067	11.00%
CT	1.0%	40,000	10.89%	53,067	1.29%
NY	7.0%	280,000	10.89%	293,067	7.11%
NJ	20.0%	800,000	10.89%	813,067	19.73%
DE	5.0%	200,000	10.89%	213,067	5.17%
MD	11.0%	440,000	10.89%	453,067	11.00%
VA	20.0%	800,000	10.89%	813,067	19.73%
NC	11.0%	440,000	10.89%	453,067	11.00%
Total	100.0%	4,000,000	100%	4,120,000	100.00%

Note: Should an annual coastwide quota be equal to or less than 4 million pounds, allocation percentage defaults to current allocation percentage.

Table 3. Reallocation of black sea bass commercial quota above a 3 million pound trigger according to the Rho adjusted regional biomass proportions produced by the 2015 stock assessment, applied to the 2017 coastwide quota of 4.12 million pounds. Quota up to and including 3 million pounds is distributed according to the status quo state allocations**. Quota above the trigger is distributed to the northern and southern regions according to their respective biomass proportions, and then equally to the states within each region, except Maine and New Hampshire which are each allocated 1% of the quota allocated to the northern region.**

3 Million Pound Trigger – Allocations of Additional Quota Based on Regional Biomass Proportions						
State	**Current Allocation (%) of quotas up to and including 3 million lbs**	**Status Quo distribution of first 3 million lbs of quota**	**2015 Assessment Rho Adjusted Regional Biomass Proportion**	**Allocation (%) of additional quota above 3 million lb**	**Example state allocations (lbs) under a 4.12 million lb quota**	**Example state allocations (%) under a 4.12 million lb quota**
ME	0.5%	15,000	0.86	1.0%	26,200	0.64%
NH	0.5%	15,000		1.0%	26,200	0.64%
MA	13.0%	390,000		21.0%	625,200	15.17%
RI	11.0%	330,000		21.0%	565,200	13.72%
CT	1.0%	30,000		21.0%	265,200	6.44%
NY	7.0%	210,000		21.0%	445,200	10.81%
NJ	20.0%	600,000	0.14	2.8%	631,360	15.32%
DE	5.0%	150,000		2.8%	181,360	4.40%
MD	11.0%	330,000		2.8%	361,360	8.77%
VA	20.0%	600,000		2.8%	631,360	15.32%
NC	11.0%	330,000		2.8%	361,360	8.77%
Total	100.0%	3,000,000	100.0%	100.0%	4,120,000	100.0%

Note: Should an annual coastwide quota be equal to or less than 3 million pounds, allocation percentage defaults to current allocation percentage.

Table 4. Reallocation of black sea bass commercial quota above a 3 million pound trigger according to the Rho adjusted regional biomass proportions produced by the 2015 stock assessment, applied to the 2017 coastwide quota of 4.12 million pounds. Quota up to and including 3 million pounds is distributed according to the status quo state allocations. **Quota above the trigger is distributed to the northern and southern regions according to their respective biomass proportions, and then distributed to the states within each region based on their current allocation proportions.** The highlighted state allocations for quota above the trigger are the product of multiplying each state's share of the regional biomass proportion by the regional biomass proportion.

3 Million Pound Trigger – Allocations of Additional Quota Based on Regional Biomass Proportions							
State	**Current Allocation (%) of quotas up to and including 3 million lbs**	**Status Quo distribution of first 3 million lbs of quota**	**2015 Assessment Rho Adjusted Regional Biomass Proportion**	**State Share of Regional Biomass Proportion Based on current allocations**	**Allocation (%) of additional quota above 3 million lb**	**Example state allocations (lbs) under a 4.12 million lb quota**	**Example state allocations (%) under a 4.12 million lb quota**
ME	0.5%	15,000	0.86	1.52%	1.30%	29,594	0.72%
NH	0.5%	15,000		1.52%	1.30%	29,594	0.72%
MA	13.0%	390,000		39.39%	33.88%	769,442	18.68%
RI	11.0%	330,000		33.33%	28.67%	651,067	15.80%
CT	1.0%	30,000		3.03%	2.61%	59,188	1.44%
NY	7.0%	210,000		21.21%	18.24%	414,315	10.06%
NJ	20.0%	600,000	0.14	29.85%	4.18%	646,806	15.70%
DE	5.0%	150,000		7.46%	1.04%	161,701	3.92%
MD	11.0%	330,000		16.42%	2.30%	355,743	8.63%
VA	20.0%	600,000		29.85%	4.18%	646,806	15.70%
NC	11.0%	330,000		16.42%	2.30%	355,743	8.63%
Total	100.0%	3,000,000	100.0%	100.0%	100.0%	4,120,000	100%

Note: Should an annual coastwide quota be equal to or less than 3 million pounds, allocation percentage defaults to current allocation percentage.

Appendix D. Spatial Distribution of Black Sea Bass Harvest, 2010-2017

The PDT examined data on the location of commercial black sea bass harvest during 2010-2017. Commercial landings by state, year, and statistical area were provided by the ACCSP. Landings by area were estimated based on a combination of state and federal VTR and dealer data.

Black Sea Bass landings in pounds prepared by year, state, and gear were validated with the states, with the exception of CT. Reported quantity of landings from the federal VTR data and state fishermen reports was queried and proportions by gear type and statistical area by year and state were calculated. These proportions were applied to the validated landings for all states with the exception of NY and NC, as these two states provided validated landings by gear and area. The PDT was provided with the original landings, the VTR and fishermen data, the calculated proportions, final landings with proportions applied, and a comparison of pounds by year and state.

In the most recent benchmark stock assessment, the NEFSC commercial statistical areas were partitioned into northern and southern spatial subunits, as defined in Table 1. The data suggest the proportion of total coastwide (i.e., ME-NC) commercial black sea bass landings caught in northern region statistical areas increased by about 11% between 2010-2013 and 2014-2017 (Figures 1-3, Table 2). This proportional increase was greater when considering just landings in the southern region (i.e., 19.56% if the southern region is defined as NJ-NC and 13.22% if the southern region is defined as DE-NC; Tables 5-6). Although the proportion of southern region landings caught in northern region statistical areas increased from 2010-2013 to 2014-2017, the pounds of southern region landings from southern region statistical areas increased over that time period.

New Jersey commercial harvest was close to evenly distributed between northern and southern region statistical areas during 2010-2017. A greater proportion of New Jersey harvest occurred in southern region statistical areas compared to northern region statistical areas during 2010-2013. Northern region statistical areas accounted for a greater proportion of New Jersey harvest, compared to southern region statistical areas, during 2014-2017 (Table 3).

Figures

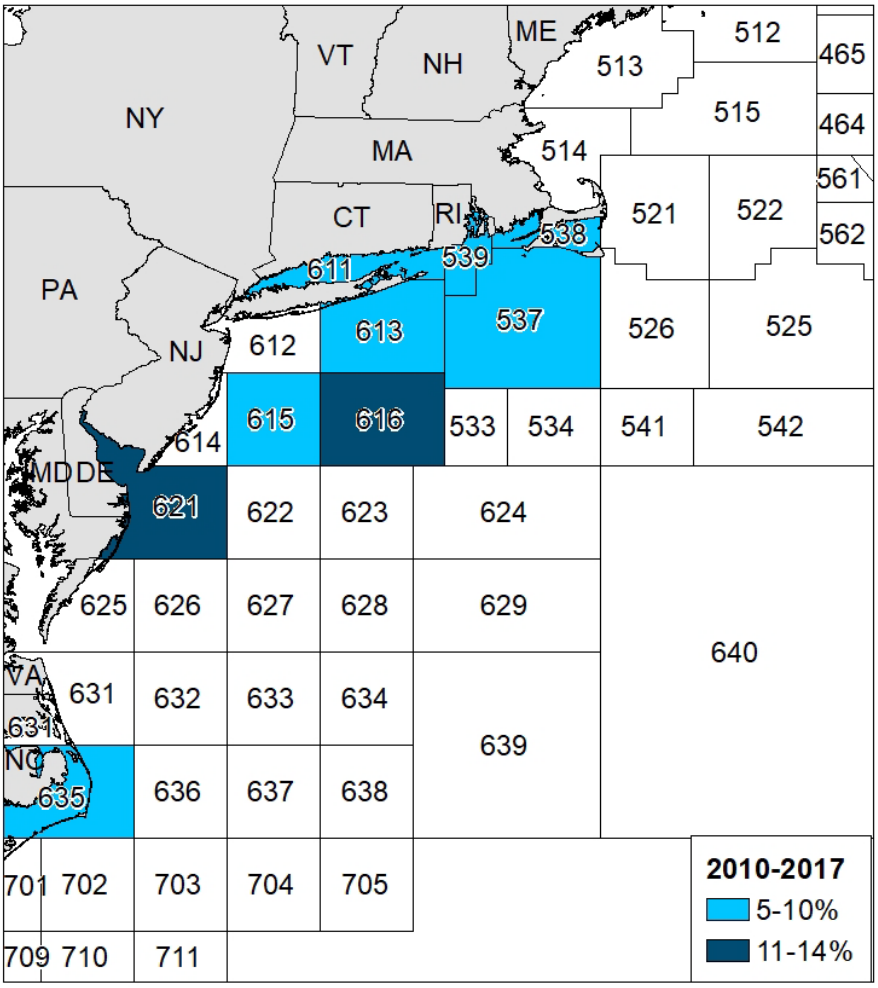

Figure 2. Proportion of commercial black sea bass landings, MA-NC, by statistical area, 2010-2017. Statistical areas accounting for less than 5% of total landings are not shown and collectively accounted for 22.79% of total landings. Only landings associated with valid northeast region statistical areas were included in the calculations. Data were provided by the ACCSP. Landings by area were estimated by applying VTR proportions of landings by area to dealer data.

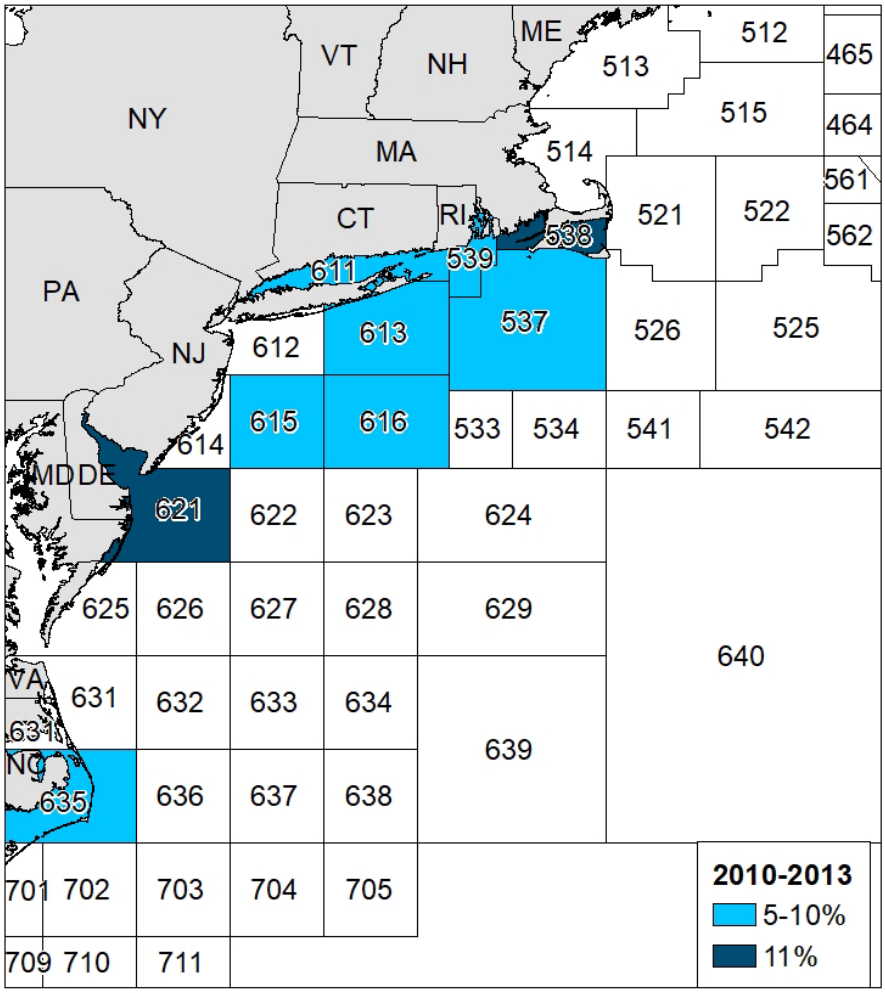

Figure 3. Proportion of commercial black sea bass landings, MA-NC, by statistical area, 2010-2013. Statistical areas accounting for less than 5% of total landings are not shown and collectively accounted for 17.20% of total landings. Only landings associated with valid northeast region statistical areas were included in the calculations. Data were provided by the ACCSP. Landings by area were estimated by applying VTR proportions of landings by area to dealer data.

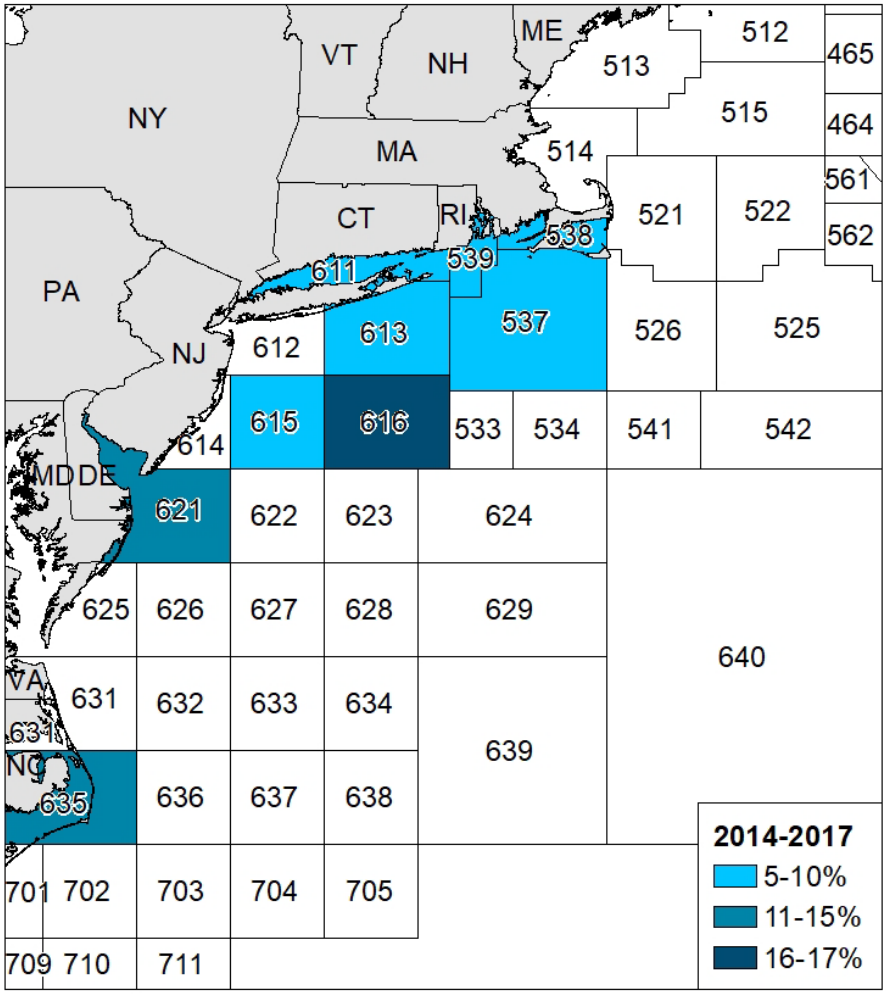

Figure 4. Proportion of commercial black sea bass landings, MA-NC, by statistical area, 2014-2017. Statistical areas accounting for less than 5% of total landings are not shown and collectively accounted for 12.87% of total landings. Only landings associated with valid northeast region statistical areas were included in the calculations. Data were provided by the ACCSP. Landings by area were estimated by applying VTR proportions of landings by area to dealer data.

Tables

Table 1. Regional partitioning of statistical areas for the black sea bass spatial stock assessment.

Statistical Areas in Northern Region	511, 513, 514, 515, 521, 522, 525, 526, 533, 534, 537, 538, 539, 541, 542, 543, 561, 562, 611, 612, 613, 616
Statistical Areas in Southern Region	614, 615, 621, 622, 623, 624, 625, 626, 627, 628, 631, 632, 633, 634, 635, 636

Table 2. Proportion of black sea bass commercial harvest, MA-NC, from northern and southern region statistical areas. Only landings associated with valid northeast region statistical areas were included in the calculations. Data were provided by the ACCSP. Landings by area were estimated by applying VTR proportions of landings by area to dealer data.

MA-NC Landings by Statistical Area						
	2010-2017		2010-2013		2014-2017	
	Proportion	Pounds	Proportion	Pounds	Proportion	Pounds
Total N areas	57.82%	9,805,213	51.54%	3,554,769	62.13%	6,250,444
Total S areas	42.18%	7,152,885	48.46%	3,342,576	37.87%	3,810,309
Total	100%	16,958,098	100%	6,897,345	100%	10,060,753

Table 3. Proportion of New Jersey black sea bass commercial harvest from northern and southern region statistical areas. Only landings associated with valid northeast region statistical areas were included in the calculations. Data were provided by the ACCSP. Landings by area were estimated by applying VTR proportions of landings by area to dealer data.

NJ Landings by Statistical Area			
	2010-2017	2010-2013	2014-2017
Total N areas	52.04%	34.40%	61.87%
Total S areas	47.96%	65.59%	38.13%
Total	100%	100%	100%

Table 4. Proportion of black sea bass commercial harvest, MA-NY, from northern and southern region statistical areas. Only landings associated with valid northeast region statistical areas were included in the calculations. Data were provided by the ACCSP. Landings by area were estimated by applying VTR proportions of landings by area to dealer data.

MA-NY Landings by Statistical Area						
	2010-2017		2010-2013		2014-2017	
	Proportion	Pounds	Proportion	Pounds	Proportion	Pounds
Total N areas	98.94%	6,270,079	98.66%	2,650,281	99.15%	3,619,799
Total S areas	1.06%	67,062	1.34%	35,970	0.85%	31,093
Total	100%	6,337,142	100%	2,686,251	100%	3,650,891

Table 5. Proportion of black sea bass commercial harvest, NJ-NC, from northern and southern region statistical areas. Only landings associated with valid northeast region statistical areas were included in the calculations. Data were provided by the ACCSP. Landings by area were estimated by applying VTR proportions of landings by area to dealer data.

NJ-NC Landings by Statistical Area						
	2010-2017		2010-2013		2014-2017	
	Proportion	Pounds	Proportion	Pounds	Proportion	Pounds
Total N areas	33.28%	3,535,133	21.48%	904,488	41.04%	2,630,645
Total S areas	66.72%	7,085,823	78.52%	3,306,606	58.96%	3,779,217
Total	100%	10,620,956	100%	4,211,094	100%	6,409,862

Table 6. Proportion of black sea bass commercial harvest, DE-NC, from northern and southern region statistical areas. Only landings associated with valid northeast region statistical areas were included in the calculations. Data were provided by the ACCSP. Landings by area were estimated by applying VTR proportions of landings by area to dealer data.

DE-NC Landings by Statistical Area						
	2010-2017		2010-2013		2014-2017	
	Proportion	Pounds	Proportion	Pounds	Proportion	Pounds
Total N areas	23.24%	1,606,816	15.53%	448,024	28.75%	1,158,791
Total S areas	76.76%	5,308,566	84.47%	2,436,253	71.25%	2,872,314
Total	100%	6,915,382	100%	2,884,277	100%	4,031,105