MEMORANDUM

TO: **Summer Flounder, Scup, and Black Sea Bass Technical Committee and Monitoring Committee**

FROM: **Commission and Mid-Atlantic Fishery Management Council Staff**

DATE: **May 1, 2023**

SUBJECT: **Discussion of Recreational Demand Model Configuration and Future Recreational Measures Setting Process and Timeline**

Introduction
The Recreational Demand Model (RDM)[1] was used for the first time in 2022 and early 2023 to 1) estimate the 2023 harvest under 2022 measures for summer flounder, scup, and black sea bass, and generate confidence intervals around those estimates and 2) to determine what measures for each state/region would achieve the required 10% reductions for black sea bass and scup. Throughout the process, the Summer Flounder, Scup, and Black Sea Bass Board (Board), Mid-Atlantic Fishery Management Council (Council), Monitoring Committee (MC), and Technical Committee (TC) identified model parameters, such as the number of years used to calculate the mean catch-per-trip in the RDM, that would need to be reassessed prior to the upcoming recreational measures setting process. In addition, because 2022 was the first year the Percent Change Approach[2] and RDM were used, the overall timeline and process can now be re-examined and minor adjustments can potentially be made

This memorandum provides information to assist the TC and MC in their discussions on these topics at their May 11, 2023 meeting.

Meeting Objective
The objective of this meeting is to review and identify any changes needed to key configuration aspects of the RDM, as well as the process and timeline for using the RDM to develop recreational measures.

Discuss Recreational Demand Model Configuration and Develop Recommendations

<u>*How many years of data should be incorporated in the average catch-per-trip? And how, if at all, should current year preliminary data be used in the model?*</u>
In the RDM, catch-per-trip over a certain specified time frame is used to generate the catch-per-trip distributions from which the model draws on to project future catch-per-trip. Initial model configuration in 2022 used only one year in the catch-per-trip calculation (2021). However, it was noted that catch-per-trip estimates from MRIP for 2021 for summer flounder and black sea bass in particular appear to be outliers relative to other recent years. Prior to the December 2022 Board and Council meeting, catch-per-trip was recalculated, incorporating a 5-year average instead (2018-2022). This was in response to

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[1] RDM documentation available at: https://www.mafmc.org/s/fluke-RDM-overview-final-report.pdf.
[2] Percent Change Approach process table available at: https://www.mafmc.org/s/HCR-Percent-Change-Table.pdf.

MC/TC concerns about 2021 (or a single year more generally) not being representative of recent fishery trends; however, this specific change was not discussed by the MC/TC. The benefits to using a multiple year average over a single year of data include mitigating the impacts of year-to-year fluctuations in estimates and unusual circumstances in some years that may not be predictive of future conditions. During their May 11, 2023 meeting, the TC/MC should discuss whether the model should continue to use a 5-year average or if a different approach would be more appropriate[3].

Preliminary current year data (MRIP waves 2-4) are currently included as the final year in the 5-year range when calculating catch-per-trip. However, the TC/MC may choose to not include preliminary data when the model is used in the future. Prior to availability of the RDM, preliminary current year data were typically used to project harvest, as a way to account for recent conditions in the fishery, which could be important under changing availability, changing management measures, or for other reasons. However, preliminary current year data may be less important given the capabilities of the RDM (e.g., incorporation of data on recent year class strengths, ability to predict catch and harvest under any set of measures). If preliminary current year harvest is not included in the catch-per-trip mean (or other parts of the model), then the model can be run earlier in the year once previous year harvest MRIP estimates are finalized. This could allow for the timeline for setting measures to be moved forward as well, improving the timeliness of implementation of measures.

In addition, when deciding the range of years of MRIP data to average for the catch-per-trip information, COVID years may need to be taken into consideration because of the decreased sampling during that period and due to the use of imputed data. A 5-year average would include several non-COVID years that helps with balancing out any years impacted by COVID. Table 1 compares two potential range of years options (3-years and 5-years) of MRIP data that could be included in the calculation for average catch-per-trip, including and excluding preliminary current year data. Table 2 provides the mean catch-per-trip by year from 2018-2021 for summer flounder, scup, and black sea bass, as well as the mean catch per-trip for the most recent 3-years and 5-years.

Discussion for the TC/MC: What average of years does the TC/MC recommend using for the upcoming 2024-2025 recreational management measures process, if not beyond that? Should preliminary current year data be included in this calculation?

Table 1. Comparison of the years that would be averaged to calculate mean catch-per-trip for the next two years.

Species	Year Measures Will Go into Effect	# of Years Averaged	Years Averaged with Preliminary Data	Years Averaged without Preliminary Data
Summer Flounder/Scup	2024/2025	3	2021, 2022, and preliminary 2023	2020, 2021, and 2022

[3] The model also uses a single year of MRIP data as a baseline year to calibrate the model. The purpose of calibrating the model is to replicate the market for recreational fishing in the most recent year for which there was complete data. Replicating the market in a baseline year allows for determination of the number of choice occasions (i.e., individual angler choices to fish or not to fish) that, based on estimated angler preferences and observed catch, needed to have occurred to result in the level of harvest that we observe from MRIP. Once the number of choice occasions is determined, the model is re-run to project outcomes under alternative recreational fishing market structures holding the number of choice occasions fixed. The alternative markets differ from the baseline in terms of regulations and catch-per-trip.

Species	Year Measures Will Go into Effect	# of Years Averaged	Years Averaged with Preliminary Data	Years Averaged without Preliminary Data
		5	2019, 2020, 2021, 2022, and preliminary 2023	2018, 2019, 2020, 2021, and 2022
Black Sea Bass	2024	3	2021, 2022, and preliminary 2023	2020, 2021, and 2022
		5	2019, 2020, 2021, 2022, and preliminary 2023	2018, 2019, 2020, 2021, and 2022
	2025	3	2022, 2023, and preliminary 2024	2021, 2022, and 2023
		5	2020, 2021, 2022, 2023, and preliminary 2024	2019, 2020, 2021, 2022, and 2023

Table 2. Summer flounder, black sea bass, and scup mean catch-per-trip on trips that targeted or caught summer flounder, black sea bass or scup, along with the standard error and 95% confidence intervals, by year from 2018 to 2022. Data from 2022 are preliminary and only include Waves 2-4. The 5-year mean and 3-year mean, along with their associated error statistics, and the percent difference between the 3-year and 5-year mean catch-per-trip are also given.

Summer Flounder Catch-per-trip

year	mean	SE
2018	1.415	0.088
2019	1.635	0.135
2020	1.575	0.105
2021	1.222	0.081
2022	1.517	0.093
2018-2022 (5 year)	1.477	0.047
2020-2022 (3 year)	1.440	0.056

% difference between 3 year and 5 year
-2.482%

Black Sea Bass Catch-per-trip

year	mean	SE
2018	1.477	0.098
2019	1.784	0.109
2020	1.660	0.118
2021	2.298	0.163
2022	1.531	0.098
2018-2022 (5 year)	1.759	0.055
2020-2022 (3 year)	1.839	0.077

% difference between 3 year and 5 year
4.514%

Scup Catch-per-trip

year	mean	SE
2018	1.725	0.179
2019	1.460	0.119
2020	1.229	0.104
2021	1.640	0.151
2022	1.770	0.174
2018-2022 (5 year)	1.543	0.065
2020-2022 (3 year)	1.516	0.082

% difference between 3 year and 5 year
-1.757%

Confidence intervals
The first step in the Percent Change Approach is to compare the average RHL for the upcoming two years to a confidence interval (CI) around the average estimated harvest for the upcoming two years under status quo management measures. The Recreational Harvest Control Rule Framework/Addenda Fishery Management Action Team/Plan Development Team (FMAT/PDT) recommended 80% CIs based on an analysis of MRIP data. An 80% CI would be expected to result in reasonably tight bounds around

harvest estimates. Higher percentage CIs would result in wider CIs, which could result in less frequent management responses. Both the MC and the FMAT/PDT recognized that wide CIs would limit the ability of managers to appropriately respond to changes in the fishery. The MC supported the use of an 80% CI for 2023 measures, but wanted to revisit the topic in the future. Table 3 provides an example of the 80% and 90% CIs calculated for summer flounder, black sea bass, and scup 2023 harvest under 2022 measures, as estimated by the RDM. These values are provided as examples. Alternative CIs (e.g., 70% or a different value) could also be considered.

The current methodology that is used to calculate 80% CIs from the RDM is as follows. The point estimates that are calculated by the RDM are the median (50th percentile) of the distribution of 100 outcomes that come from 100 runs of the model. The CIs are the percentiles of that distribution. For example, the 10th and 90th percentiles represent the lower and upper bounds of the distribution for the 80% CIs. Please note that these values (median and lower and upper percentiles) were first generated at the state level, then summed together to produce coastwide values.

Discussion for the TC/MC: Does the MC/TC recommend any changes to the methodology for calculating CIs in upcoming years?

Table 3. The lower and upper bounds of the 80% and 90% confidence intervals for estimates of 2023 harvest under 2022 measures for summer flounder, black sea bass, and scup, as calculated by the RDM.

	Estimate for 2023 harvest	Lower bound of 80% CI	Upper Bound of 80% CI	Lower bound of 90% CI	Lower bound of 90% CI
Summer Flounder	10.92	9.23	12.94	8.80	13.63
Black Sea Bass	7.93	7.17	8.63	6.99	8.79
Scup	14.31	9.90	17.40	9.03	17.97

Discuss the appropriate level of precision in meeting the required reduction/liberalization.
During the 2023 recreational measures setting process, states/regions were directed to meet a 10% reduction for black sea bass and scup. However, members of the Board, Council, TC, and MC, as well as the modelers themselves, indicated that it may not be realistic or appropriate when using the RDM to be required to meet an exact percentage reduction or liberalization. It may be beyond the capabilities of the model to pinpoint very specific percentages.

It is worth noting that the Percent Change Approach requires consideration of a CI when determining the required liberalization or reduction percentage. It does not consider CIs when determining how to modify measures to meet the new harvest target. Depending on how the CIs are specified, a CI approach to determining which measures meet the required reduction/liberalization may not be appropriate given that the CIs may be too wide to require changes in many circumstances. Table 4 provides examples of how the width of different CIs around harvest estimates can vary by species, state, and region.

Discussion for the TC/MC: What may be an appropriate level of precision around the estimated target harvest for states/regions trying to meet a specific reduction or liberalization, based on the abilities of the RDM to predict harvest?

Table 4. The lower and upper bounds of the 80% and 95% confidence intervals (CI) for estimated harvest under measures proposed to reduce harvest for scup and black sea bass in the northern states (Massachusetts through New York). The estimated harvest under status quo conditions (no change in measures from 2022) is also given. Note: Confidence intervals are based on percentiles of the distribution of outcomes.

Scup						
State	SQ harvest estimate	Reduced harvest estimate	lower bound of 80% CI	upper bound of 80% CI	lower bound of 95% CI	upper bound of 95% CI
MA	1.582	1.418	1.293	1.543	1.241	1.589
RI	0.988	0.883	0.811	0.960	0.762	0.981
CT	1.032	0.928	0.772	1.088	0.698	1.195
NY	1.501	1.326	1.108	1.496	1.043	1.562
TOTAL	5.104	4.555	3.984	5.086	3.745	5.328

Black Sea Bass						
State	SQ harvest estimate	Reduced harvest estimate	lower bound of 80% CI	upper bound of 80% CI	lower bound of 95% CI	upper bound of 95% CI
MA	2.720	2.512	1.904	2.888	1.496	3.098
RI	2.466	2.392	1.727	2.855	1.291	2.991
CT	2.572	2.444	1.741	2.911	1.317	3.103
NY	6.093	5.179	3.938	6.030	3.150	6.255
TOTAL	13.851	12.527	9.310	14.684	7.254	15.448

How often should these decisions be reviewed?

The TC/MC should discuss how often they wish to review their recommendations, and if a set schedule should be established. Reviewing model configurations on a set schedule will allow the TC/MC to confirm model parameters continue to reflect their recommendations. The TC/MC may also want the ability to review decisions on the model configuration when conditions necessitate it. For example, the mean catch-per-trip may need to be reviewed more frequently for the next few years, to account for COVID years.

Some other things to consider when deciding how often the model configuration should be reviewed are the potential importance of keeping model configuration relatively stable and avoiding potential biases if the configuration is changed too often.

Discussion for the TC/MC: How often does the TC/MC think is appropriate to review these recommendations? Are there any decisions that should be reviewed more frequently than others?

Discuss Recreational Measures Setting Process and Timeline

Staff are currently exploring the possibility of adjusting the recreational measures setting process timeline to allow for finalization of recreational measures earlier in the year. The current timeline can be found in Table 5. As discussed above, adjusting the timeline is now a more realistic option because the

RDM does not require current year preliminary data to predict next year's harvest. The TC/MC should consider the timing of the determination of the next year's RHL, which will need to be incorporated into the Percent Change Approach to determine how measures need to be changed. The TC/MC may provide input on the available data or analyses that will need to be taken into account if the timeline were to be moved forward and if the timeline is possible given current workloads.

In addition, after this initial year of working with NEFSC staff to develop state recreational measures using the RDM, the TC has expressed interest in making suggestions to improve the process of coordination between the modelers and TC members to determine measures that meet the required reduction or liberalization in each state or region. It is also worth noting that NOAA has hired a contractor to help reduce the time needed to run the RDM and to create a graphical user interface (GUI) front-end for the model. This GUI will make it possible for TC members to input measures and generate estimates of harvest on their own. A preliminary version of the GUI may be ready prior to the joint Council and Board meeting in December.

Discussion for the TC/MC: What recommendations do you have for the recreational measures setting timeline? What data or analysis considerations should be taken into account to make the desired timelines feasible? How can the process to determine measures with the modelers be improved upon?

Table 5. Current timeline for setting the RHL and the upcoming year(s) recreational management measures.

Month(s)	Action
June	Every two years, a management track assessment is completed. In interim years, data on fishery catches and survey indices are provided.
June	The Advisory Panels (AP) meet to discuss recent performance of the commercial and recreational fisheries and develop a Fishery Performance Report.
July	The Mid-Atlantic Fishery Management Council's Scientific and Statistical Committee (SSC) reviews the management track assessment or data update, the AP Fishery Performance Report, and other information and recommends annual Acceptable Biological Catch (ABC) levels for all three species. The MC then meets to recommend annual catch limits, annual catch targets, commercial quotas, commercial measures, and RHLs for the upcoming year(s).
August	The Council and Board review recommendations from the SSC, AP, MC, and staff. They then set catch and landings limits (including the RHL) for the upcoming year(s), or review previously set catch and landings limits and revise as needed.
October/November	The MC and AP meet to review RDM estimates of harvest for the upcoming two years under current recreational management measures, as well as staff recommendations, and make their own recommendations on the required percent change in harvest and associated recreational measures for the upcoming two years.
December	The Council and Board meet to make the final determination of the required coastwide percent change in harvest, set federal waters recreational measures for the upcoming two years, and consider the use of either conservation equivalency or coastwide measures for summer flounder and black sea bass.

Month(s)	Action
January/February	If the Board approves conservation equivalency for summer flounder and/or black sea bass, or if scup recreational measures need to be modified further to achieve the required coastwide reduction or liberalization, the TC develops state measures that achieve the necessary reduction or liberalization using the RDM.
March	The Board meets to approve the proposed state recreational measures, which are implemented by the states as soon as possible.
April/May	The conservation equivalency letter with final state recreational measures is sent to GARFO staff.
May	Final federal rule implementing state waters recreational measures or use of conservation equivalency to waive federal waters measures, as appropriate.

Other Topics to Discuss if Time Allows

Considerations for setting mode-specific measures
Currently, multiple states have separate measures by mode (e.g., shore, for-hire, private) for one or more of the three species. Some concern has been expressed about the ability of the MRIP data to support such measures. The precision of MRIP percent standard error (PSE) declines with decreasing sample size, which is common when MRIP data are split into multiple groups, such as by mode. In recent years, the PSEs of MRIP data have not been considered when generating harvest estimates by mode to determine measures.

Some initial items for consideration with this issue:

- 50 CFR 648.102(d)(2) and 50 CFR 648.142(d)(2), for summer flounder and black sea bass respectively, state: "Each state or multi-state conservation equivalency region may implement measures by mode or area only if the proportional standard error of recreational landing estimates by mode or area for that state is less than 30 percent." These provisions were put into place when MRFSS was still in use.
- MRIP is in the process of implementing new Recreational Fishing Survey and Data Standards (2022) that highly discourage the use of MRIP data with PSEs of 50% or above. It is anticipated that estimates with PSEs of 50% or more will at some point no longer be available through the public data query site, though they may be available by special request. The timing for this change is currently uncertain. In addition, the MRIP query tool issues a warning if PSEs are between 30 and 50%. MRIP's Recreational Fishing Survey and Data Standards advises: "Estimates with a PSE of 30 percent or greater are not considered sufficiently reliable for most purposes, and should be treated with caution."
- In 2011-2014, under MRFSS, ASMFC's Addenda XXI-XXV required states to use a 15% PSE threshold for black sea bass: "States will not implement measures by mode or area unless the PSE of the mode or area for that region is less than 15%. Note: The MRIP data used to set state-specific conservation equivalent measures produces more variable results when used on a state-by-state basis. As the coverage area increases, the variability of the data decreases; therefore, adopting regional or coastwide approaches will give more precision to the data."

Discussion for the TC/MC: The discussion at this meeting is intended to be preliminary, and Council and Commission staff are planning to have another meeting focused on discussing this topic. Does the TC/MC have any initial thoughts on this issue?

Discuss how to adjust measures after a wave 1 fishery in the future

The Council and Commission Fishery Management Plans include special requirements for opening recreational black sea bass fisheries during wave 1 (January/February). After the total recreational harvest from a wave 1 fishery is known, the state with the fishery is required to submit a proposal of how they will adjust their measures for the rest of the year to account for harvest that occurred during that wave 1 fishery. This is usually accomplished by making adjustments to the upcoming season for that species. In recent years, Virginia, as the only state currently with a wave 1 fishery, has estimated how many days will be subtracted from their upcoming season by using MRIP harvest data to calculate the mean daily landings rate for each wave by dividing the total harvest weight in each wave by the number of days the wave was open. Virginia then is able to choose how many days to take off their upcoming black sea bass season to equal the amount of harvest that occurred during their wave 1 fishery.

Now that the RDM is available, it may be a potential alternative for states with a Wave 1 fishery to use to determine how to adjust measures to account for harvest that occurred during that year's wave 1 fishery.

Discussion for the TC/MC: Is using the RDM a viable alternative to determine how to adjust measures to account for harvest that occurred during a wave 1 fishery?