Summer Flounder Minimum Mesh Size Requirements
Discussion Document for November 2023 Monitoring Committee Meeting

Introduction

The Mid-Atlantic Fishery Management Council (Council) and Atlantic States Marine Fisheries Commission's Summer Flounder, Scup, and Black Sea Bass Board (Board) are considering several summer flounder mesh regulation issues at their December 2023 joint meeting. This document provides background information and preliminary analysis for the Monitoring Committee's consideration of the **summer flounder commercial minimum mesh size requirements** (5.5-inch diamond or 6.0-inch square minimum mesh).

The minimum mesh size regulations can be modified through specifications and would not require a separate action. The Council and Board may choose to 1) make no changes to these measures, 2) recommend specific changes with the option of specifying a phase-in period, or 3) identify additional analysis or research needs to support future consideration of this issue.

The Monitoring Committee should review the information below as well as public feedback provided thus far, and provide feedback and recommendations to the Council and Board on whether changes in the minimum mesh sizes are needed. The Monitoring Committee could also identify additional analysis/research needs as appropriate.

Problem Summary

Since 1993, the Fishery Management Plan (FMP) has specified two options for minimum mesh sizes for summer flounder trawl vessels: **5.5-inch diamond or 6.0-inch square**. At the time of Amendment 2 development, there was limited information about square mesh selectivity for summer flounder beyond a recognition that the square mesh equivalent should be larger than the adopted diamond mesh. A recent (2018) study indicated that the 6.0-inch square mesh does not appear to be equivalent to the 5.5-inch diamond mesh in terms of selectivity and may be retaining too many undersized summer flounder. Observer data analysis and industry feedback should be considered to inform discussion of whether a square mesh option is still needed, or whether modifications to the regulations may be needed.

Regulatory Background

Trawl vessels must use nets with a minimum mesh size of **5.5-inch diamond or 6.0-inch square** in the entire net when possessing more than 200 pounds of summer flounder in the winter (November 1-April 30) and more than 100 pounds in the summer (May 1-October 31). These mesh regulations were evaluated through Amendment 2 (1993). At the time this measure applied only to the net's codend. The minimum mesh requirements were modified in 1998 (Amendment 10) to apply throughout the whole net, to reduce mortality and discards of immature summer flounder, as well as to simplify enforcement.

At the time of the original implementation of the minimum mesh size under Amendment 2, data were limited on the selectivity of a square mesh for summer flounder on which to base an equivalent to the 5.5-inch diamond mesh. Mesh selectivity information for cod, haddock, and pollock demonstrated that for round fish, 5.5-inch diamond mesh has roughly the same selectivity characteristics as a 5.0-inch square mesh. However, little information was available on selectivity behavior for flatfishes like summer flounder. The equivalency of 6.0-inch square mesh to 5.5-inch diamond, as documented in Amendment 2, was based on three sources:

1. Amendment 4 to the Northeast Multispecies FMP (1990)[1] stated: "The use of square mesh codends is known to significantly increase the retention of small flounders. Preliminary information indicates that a 5. 5-inch square mesh codend may have roughly the same flatfish selectivity characteristics as a 5-inch diamond mesh codend."
2. A selectivity study for winter flounder in Connecticut (Simpson 1989)[2] found diamond mesh to have a length at 50% retention about 1 cm longer (L60 = 22.6 cm), and a selection range (3.4 cm) about 1 cm narrower, than square mesh in a comparison of diamond vs. square mesh 102 mm (4-inch) codends.
3. Researchers in Nova Scotia Cooper and Hickey (1989)[3] primarily explored selectivity behavior for cod and haddock but for flounder observed that the diamond mesh cod ends always had higher 50% retention lengths and selection factors.

2018 Mesh Size Study

In 2016-2017, a new mesh size selectivity study for summer flounder, scup, and black sea bass was funded by the Mid-Atlantic Fishery Management Council to address a Council research priority related to determining mesh selectivity for a range of mesh sizes and configurations. The Hasbrouck et al. study report was presented to the Council in April 2018.[4]

Results of this study indicated that the current minimum mesh sizes for summer flounder of 5.5-inch diamond or 6.0-inch square do not appear to be equivalent to each other in terms of selectivity. The 6.0-inch square mesh releases less than 50% of fish at or below the minimum size, and its selectivity appears more similar to a 5.0-inch diamond mesh (Figure 1; Table 1).

The Monitoring Committee first reviewed the results of this study in July 2018, and identified concerns with the amount of undersized summer flounder caught with the 6.0-inch square mesh. The Monitoring Committee recommended further evaluation of potentially phasing out the use of 6.0-inch square mesh to reduce discards of undersized fish, but emphasized that feedback from industry on the use of and need for square mesh nets should be sought before pursuing specific changes.

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[1] Amendment 4 to the Northeast Multispecies FMP: https://archive.nefmc.org/nemulti/planamen/Amend%204/amendment_4_combined.pdf

[2] Simpson, D.G. (1989). Codend selection of winter flounder *Pseudopleuronectes americanus*. NOAA Technical Report NMFS 75: https://www.st.nmfs.noaa.gov/spo/SPO/tr75opt.pdf

[3] Cooper, C.G. and W.M. Hickey. 1989. 1988 Selectivity Experiments Square Mesh Cod-Ends of 134, 140, and 155 mm. Fisheries Development and Fishermen's Services Division. Project No. 154: https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/253803.pdf

[4] Hasbrouck et al. 2018 is available at: http://www.mafmc.org/s/Tab08_SFSBSB-Mesh-Selectivity-Study-Apr2018.pdf.

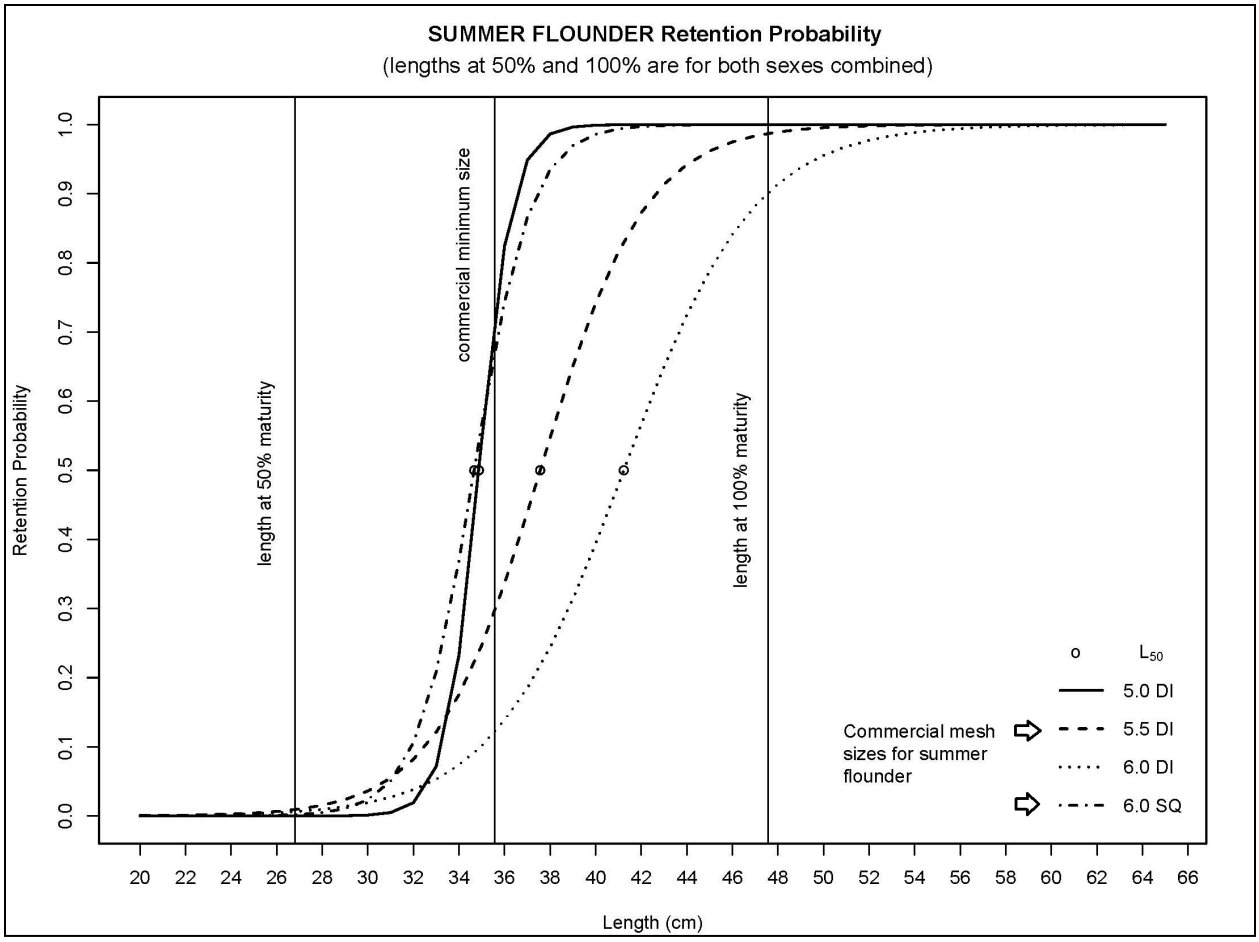

Figure 1: Logistic selective curve for summer flounder catches with 5 codends (4.5-inch diamond, 5-inch diamond, 5.5-inch diamond, 6-inch diamond, 6-inch square). Additional details can be found in the study report (Hasbrouck et al., 2018).

Table 1: From Hasbrouck et al. 2018: Maximum likelihood fit of logistic selectivity curve parameters for 5 codend mesh sizes and SELECT model goodness-of-fit measures for summer flounder. Standard error is shown in parentheses. Coefficient of variation is shown in double parentheses. 5.5" Diamond and 6" Square are the current regulation minimum mesh sizes.

	4.5" Diamond	5" Diamond	5.5" Diamond	6" Diamond	6" Square
N tows (paired)	24	24	24	24	22
N length classes	55	50	51	47	57
Length class range (cm)	21-75	27-76	28-78	32-78	25-81
a	N/A	-47.78	-16.30	-14.42	-27.72
b	N/A	1.37	0.43	0.35	0.80
p - relative fishing efficiency	N/A	0.49 (0.02)	0.55 (0.02)	0.55 (0.03)	0.50 (0.02)
L_{25} (cm)	N/A	34.07 (0.72) ((0.021))	35.03 (1.19) ((0.034))	38.09 (1.05) ((0.028))	33.29 (1.51) ((0.045))
L_{50} (cm)	N/A	34.87 (0.67) ((0.019))	37.56 (0.87) ((0.023))	41.23 (1.22) ((0.030))	34.67 (1.16) ((0.034))
L_{75} (cm)	N/A	35.67 (1.04) ((0.029))	40.1 (1.39) ((0.035))	44.37 (2.00) ((0.045))	36.04 (1.66) ((0.046))
Selection range	N/A	1.6 (1.17)	5.06 (1.92)	6.28 (2.07)	2.75 (2.18)
Selection factor	N/A	6.94	6.83	6.87	5.78
Model deviance	N/A	144.45	230.77	133.48	92.49
df	N/A	113	178	93	73
p-value	N/A	0.0245	0.0047	.0038	0.0615

Observer Data Analysis

Staff used the Northeast Fisheries Observer Program (NEFOP) data to investigate the usage of diamond and square mesh for summer flounder. Specifically, staff looked at observed trawl data from 2007 – 2022 where summer flounder was identified as the primary target species. Based on these observed trips, use of diamond mesh was more commonly observed on hauls targeting summer flounder (68% of hauls), while square mesh made up about 31% of total observed hauls (Table 2).

The observed square mesh hauls were then further broken down into 0.5-inch bins to get a better understanding of what size square mesh was most commonly used among industry participants (Figure 2).[5] As shown in Figure 2, most observed hauls on trips that reported summer flounder as the primary target species used square mesh measuring 5.5 – 6.49 inches, and the greatest number of observed hauls used 6-6.49 inches.

[5] Observer mesh size data is reported as an average of 10 individual mesh measurements, in millimeters. For this analysis, mesh size was converted to inches and rounded to the nearest tenth of an inch, so conversion and rounding error may be present for some observations.

Table 2: Mesh type used on observed trawl hauls from 2007 – 2022 on trips that identified summer flounder as the primary target species.

Mesh Type	Proportion of Total Hauls	Total Number of Hauls
Diamond	68.07%	17,423
Square	31.10%	7,961
Unknown	0.65%	167
Combination	0.10%	25
Square/ Wrapped	0.07%	18
Grand Total	100.00%	25,594

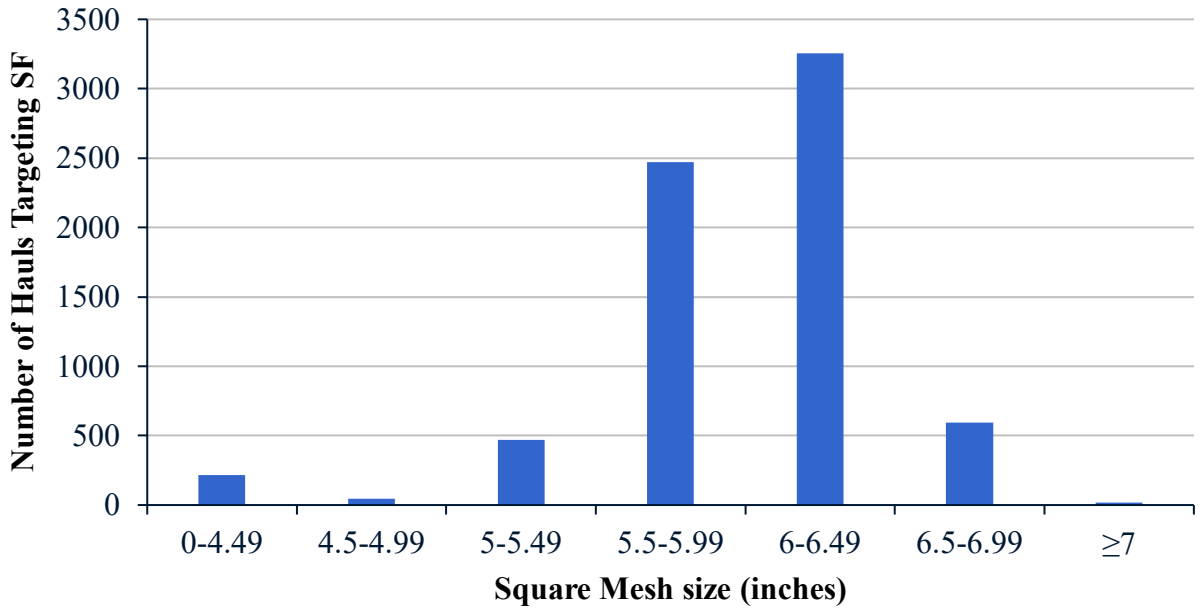

Figure 2: Total number of hauls targeting summer flounder by square mesh size from 2007 – 2022. Data source: NMFS observer data.

Observer data was also used to investigate summer flounder landings and discards by mesh type and mesh size to better characterize summer flounder catch between the two mesh regulations. Based on observed trawl data that reported summer flounder as the primary target species from 2007 – 2022, it appears that diamond mesh measuring 5 – 5.99 inches accounts for the greatest amount of summer flounder landings followed by square mesh measuring 5.5 – 6.49 inches. The quantity of observed summer flounder discards was low across all mesh categories, but the patterns generally matched that of the landings (i.e.; diamond mesh discards occurred mostly in the 5-5.99 inch range and square mesh discards mostly in the 5.5-6.49 inch range; Figure 3).

Observed discards were then compared to total observed catch (landings and discards) by mesh type and size category (Figure 4). Based on this information, discard rates ranged from 3-14.9% depending on the mesh type and size used. Diamond and square mesh measuring less than 4.49 inches resulted in the greatest portion of discards, however, they equate to a relatively small amount of observed discards in pounds (Figure 3).

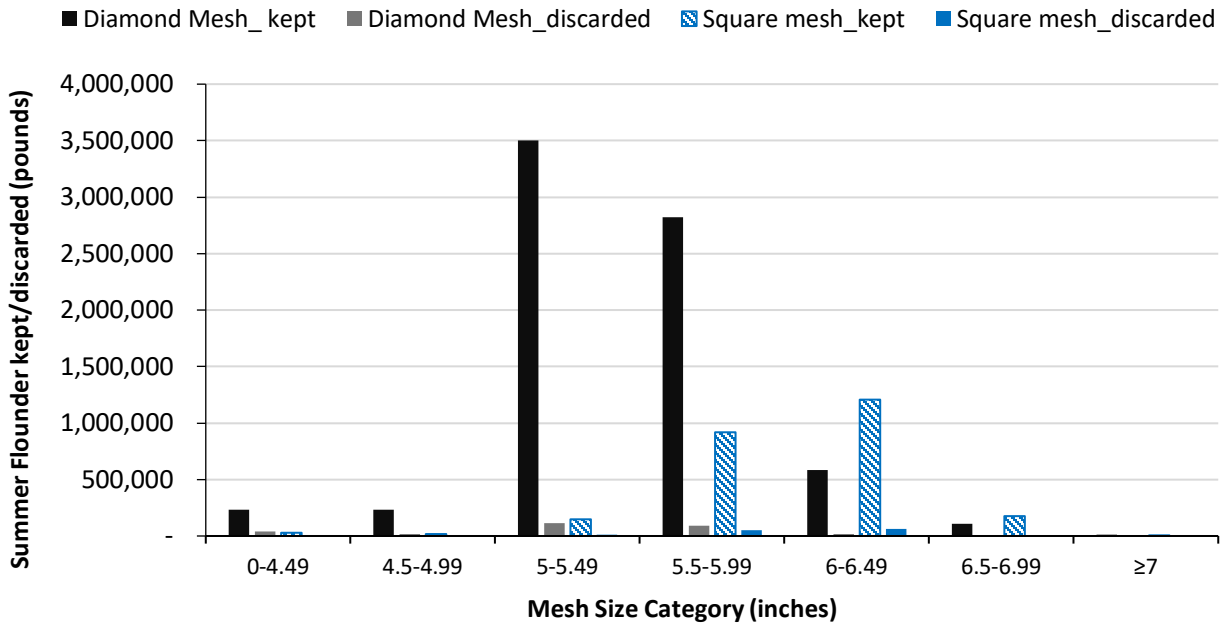

Figure 3: Observed commercial summer flounder landings and discards by mesh type and mesh size, for trawl gear hauls between 2007 – 2022 where summer flounder was identified as the primary target species. Data source: NMFS observer data.

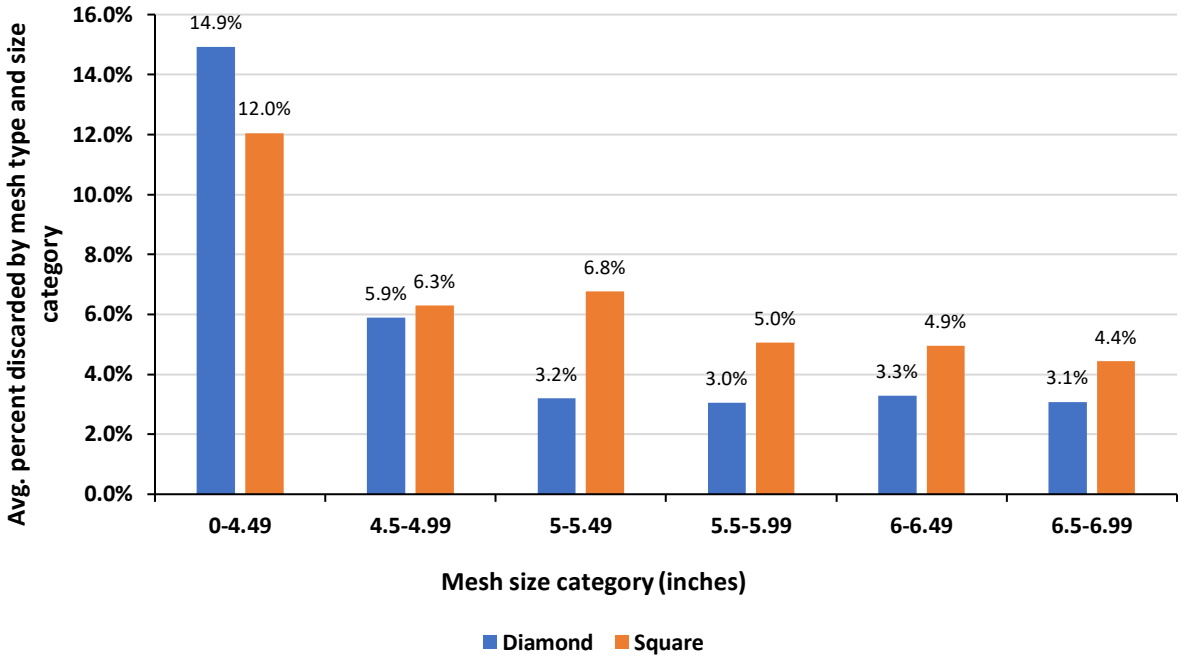

Figure 4: Average percent summer flounder discarded, by mesh type and mesh size, for observed trawl gear hauls between 2007 – 2022 where summer flounder was identified as the primary target species. Data source: NMFS observer data.

Summary of Public Feedback

Comments received to date on this issue include those made during the November 1 Summer Flounder Mesh Regulations Public Input Webinar, as well as some made via email or web form. Trigger questions provided for public comments can be found in the overview document found here. A full summary of the comments received so far is provided in the draft public input summary (comments are still being accepted and this document will be updated as needed prior to the Council and Board meeting in December).

In summary, the key take-aways on this issue include:

- Several were concerned about the cost associated with a potential change to the mesh requirements.
    - Codend mesh can cost tens of thousands of dollars and a full net replacement can cost closer to $50,000.
    - 6.0-inch square nets are still being ordered from net builders and a change to mesh size would render any recent net investments obsolete.
    - Changes would result in a significant financial burden on industry.
- The handful of stakeholders commenting on this issue supported **no changes** to the current regulations and indicated no concerns with selectivity or other issues.
    - One commenter suggested exploring a larger square mesh size.

- The author of the 2018 report recommended the MC examine Table 4 in the 2018 mesh study report (see Table 1 in this document). He noted the L50 for 6-inch square mesh was only about 1 centimeter below the legal minimum size limit, and that the p-value for model fit for 6-inch square mesh (0.06) was barely not significant.

Preliminary Staff Recommendation

As indicated above, staff were tasked with evaluating if the square mesh option was still needed, or whether modifications to the regulations may be warranted. Based on the observer data analysis above, 31% of observed summer flounder targeted hauls used square mesh, with the most common square mesh size being between 6 – 6.49 inches. This indicates that square mesh is still used in this fishery to a degree that may make removing a square mesh option difficult.

Public feedback highlighted concerns over the high costs associated with modifying mesh requirements, noting that an investment in current legal gear could be rendered obsolete. While relatively few public comments have been provided thus far on this issue, feedback generally indicates that the current minimum mesh size regulations are not an issue.

Based on the observer data and recent feedback received, staff preliminarily recommend no changes to the minimum mesh size requirements, but recommend that the Monitoring Committee consider whether further investigation on the selectivity of additional square mesh sizes should be identified as a research priority. For example, a mesh size selectivity study that builds on that of Hasbrouck et al. to investigate additional square mesh sizes to get a better understanding of a square mesh size that may be more equivalent to the 5.5-inch diamond mesh. Additional evaluation of the potential biological impacts of square mesh size options could also be beneficial. If there is a desire to change the minimum mesh sizes, staff recommend an economic analysis to provide additional insight on the estimated cost of modifying the minimum mesh requirements.