Mid-Atlantic Fishery Management Council
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Michael P. Luisi, Chairman | P. Weston Townsend, Vice Chairman
Christopher M. Moore, Ph.D., Executive Director

MEMORANDUM

Date: December 1, 2022

To: Council

From: Jason Didden, staff

Subject: Monkfish Specifications

The following materials support potential action regarding 2023-2025 monkfish specifications and related measures via Monkfish Plan Framework 13 (FW13) for this jointly-managed fishery. Dr. Rachel Feeney of New England Fishery Management Council (NEFMC) staff is the overall lead for monkfish (NEFMC is the lead Council) and will be presenting.

- December 2022 NEFMC meeting outcomes (pending – will be posted as supplemental)
- 11/29/2022 Draft Committee Meeting Summary
- 11/28/2022 Draft Advisory Panel (AP) Meeting Summary
- FW 13 Decision Document
- FW 13 Draft Environmental Assessment (online link only)
- Fall 2022 PDT Meetings Summary
- NEFMC Scientific and Statistical Committee (SSC) Acceptable Biological Catch (ABC) Recommendation; link to supporting documents: https://www.nefmc.org/calendar/oct-26-27-2022-ssc-meeting.
- Monkfish Plan Development Team (PDT) Memo to SSC regarding ABCs
- 2022 Monkfish Fishery Performance Report
- 2022 Management Track Assessment Peer Review Report (monkfish related excerpts)
- 2022 Management Track Assessment Report; link to associated documents: https://apps-nefsc.fisheries.noaa.gov/saw/sasi/sasi_report_options.php (select 2022 and monkfish)

Committee motions are included in the Draft Committee Summary. Of note, the Committee recommended rejecting all alternatives regarding new specifications and related restrictions. It is not clear what would happen if the Councils adopted such an approach, but NMFS staff should have additional input for the Council meetings. The Committee also recommended increasing the minimum mesh to 12" from the current 10" in 2026 (many already use 12" and implementing in 2026 will minimize impacts for those who would need to switch). The Committee also requested that the NEFMC's SSC re-evaluate the recommended ABC reduction based on a variety of concerns, which will be described in the pending Committee summary and discussed at the NEFMC meeting (occurring the week before the Mid-Atlantic Fishery Management Council meeting). NEFMC meeting outcomes will be posted as supplemental as soon as possible.

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Eric Reid, *Chair* | Thomas A. Nies, *Executive Director*

MEETING SUMMARY - DRAFT

Monkfish Committee

Warwick, RI and via webinar

November 29, 2022

The Monkfish Committee (Committee) met on November 29, 2022, in person and via webinar at 10:00 AM to 1) receive the *Monkfish Advisory Panel (AP) report* on their November 28 meeting, 2) receive an update on and recommend final preferred alternatives for *Framework Adjustment 13 to the Monkfish Fishery Management Plan* (FW13) specifications and management measures, 3) make any final recommendations on the *2023 Council Priorities regarding Monkfish*, and 4) discuss other business.

MEETING ATTENDANCE: Ms. Elizabeth Etrie (Chair), Mr. Peter Hughes (Vice Chair), Mr. Pete Christopher (GARFO), Mr. Dan Farnham, Mr. Matt Gates, Mr. Eric Hansen, Mr. Dewey Hemilright, Mr. Scott Olszewski, Mr. John Pappalardo, Mr. Paul Risi, Mr. Alan Tracy, and Ms. Kelly Whitmore. Monkfish Advisory Panel (AP): Mr. Greg DiDomenico (Chair); Council staff: Dr. Rachel Feeney (Plan Development Team (PDT) Chair), Ms. Jenny Couture, Mr. Chris Kellogg, Ms. Janice Plante, Mr. Tom Nies; MAFMC staff: Mr. Jason Didden. Council Chair Mr. Eric Reid. GARFO staff: Mr. Mitch McDonald, Mr. Spencer Talmage. Two other AP members, and about 15 other people attended.

KEY OUTCOMES:

- On Framework Adjustment 13
  - The Committee recommended rejected all alternatives in Action 1 (specifications) and Action 2 (effort controls), then recommended remanding the recommendations of the Scientific and Statistical Committee (SSC) for acceptable biological catches (ABCs) back to the SSC.
  - For Action 3 (monkfish gillnet mesh size), the Committee recommended Alternative 2 Option B (12" minimum mesh size) with a delayed implementation to Fishing Year (FY) 2026.

AGENDA ITEM #1: INTRODUCTIONS, APPROVAL OF AGENDA, AND OTHER UPDATES

The Chair introduced the Committee, welcomed attendees, and sought approval of the agenda. There were no agenda changes. Staff reviewed the timeline for 2022 monkfish work and FY 2022 fishery performance based on monthly in-season quota monitoring.

AGENDA ITEM #2: ADVISORY PANEL REPORT

The AP Chair briefed the Committee on the outcomes of the November 28 AP meeting. On Framework Adjustment 13, the AP recommended status quo specifications, no action for effort controls, and to increase the monkfish minimum mesh to 12", requesting that implementation be delayed to FY 2026. The AP also recommended remanding the 2022 monkfish management track assessment. On 2023 Council management priorities regarding monkfish, the AP recommended prioritizing formation of a working group to ensure the RSA and other research is being used in the assessment process; addressing the sturgeon bycatch reduction recommendations; evaluating whether the current management system provides enough flexibility for the fishery; and exploring managing winter skate and monkfish in one

Fishery Management Plan. The AP also recommended not developing fishery models for predicting how the fishery may respond to effort control. Rather, the AP recommends relying on AP input rather than on models of the fishery. The AP wanted a future Monkfish RSA program priority to be to develop research to address science shortfalls in current assessments and provide funding needed for alternative model development and exploration. Finally, the AP recommended that the monkfish research track assessment be earlier than the current schedule (2027). The AP did not have a quorum through its entire meeting (see AP meeting summary).

The AP Chair noted that much of the AP meeting was focused on AP member concerns about reliance on the Ismooth approach to develop monkfish catch advice, an approach that uses results of the NMFS bottom trawl survey and fishery catch. The Chair reported that advisors feel that monkfish are abundant, but in the fall, have moved away from areas where the trawl survey is conducted. Particularly in the south, monkfish fishing has been occurring after Thanksgiving, later than the survey. Advisory Panel members also noted that the directed fishery primarily uses gillnets and was concerned that the survey uses trawl gear, so may not be catching monkfish as well. AP members were concerned about how long it has been since there was a reliable assessment. See AP meeting summary for other concerns and questions.

AGENDA ITEM #3: FRAMEWORK ADJUSTMENT 13

2022 Management Track Assessment and SSC recommendations

Staff provided an overview of the 2022 monkfish management track assessment, as updated from the preliminary reports at the August 30 Committee meeting (survey trends were reported) and the September NEFMC and MAFMC meetings (preliminary assessment and peer review were reported). Staff then presented an overview of the recommendations of the Scientific and Statistical Committee (SSC) on setting the overfishing limits, acceptable biological catches, and discard deductions.

Committee members asked several questions and shared concerns about the scope of data used to set catch advice, the choice of the Ismooth approach for developing catch advice and related uncertainties, and the reductions in catch that would be needed under the ABCs recommended by the SSC. In the North, a 34% reduction from the current ABC and a 21% reduction from FY 2021 catch. In the South, a 69% reduction from current ABC and a 29% reduction from FY 2021 catch. Staff addressed many questions regarding the assessment and SSC recommendations, reiterating that use of the Ismooth approach was first used in 2016 when the analytical assessment failed. Staff reviewed the history of how ABCs have been set since that time (see staff presentations since March 2022, particularly September NEFMC meeting) Committee. A Committee member asked when recruitment could be used to predict discards. Staff indicated that would potentially come after recruitment is used in the assessment. The Committee reiterated several questions asked by the Advisory Panel such as how recent catch impacts ABC determination. Staff clarified that a basic theory of Ismooth is that biomass is impacted by removals (catch); if the survey is trending downwards, then removals should be lowered from what they have recently been. It was clarified that the spring 2022 survey data were used and the SSC operates by consensus (potentially with minority positions articulated) rather than by motions. The NEFMC Chair asked if fishery catch-per-unit-effort (CPUE) had been calculated and analyzed as an abundance trend. It may fill in some of the information gaps. Staff noted that this is not in the assessment report, but the NEFSC could be asked if this has been calculated.

Public Comment:

- **Ted Platz (AP member, monkfish gillnet fisherman, RI)**: Assessments used the SCALE model until it was rejected. He recalled the fishery being in decline in 1990s but was rebuilt in 2010. Landings and effort were increasing from 2005 to 2015. He feels there is not a biomass issue, but economic issues. There is no early fall fishery because there is no fish then. He feels the survey index contradicts what fishermen know about fishery from 2005 to 2015. He is concerned about a pending fishery collapse. There were no problems until it was decided to use Ismooth. The index

implies that the trawl survey catches one monkfish one out of every three tows, which does not reflect how many monkfish are in the ocean.

- **Greg DiDominico (AP Chair, NJ):** Asked if the SSC and PDT specifically considered the Legault, et al paper as it applied to monkfish when the ABC was developed.

Staff noted that a co-author of the paper is on the PDT, the SSC was provided a link to the paper (which was an assessment document), and three co-authors were present during the SSC meeting (one sits on the SSC).

- **Drew Minkiewicz (Fisheries Survival Fund):** Asked if data in the assessment report from the "NMFS scallop survey" is the Federal survey, noting that it has limited coverage (e.g., not on the Mid-Atlantic Bight), or if the RSA-funded survey data are also used. He also asked if the fishery achieved the catch target year after year and the survey stays the same, would ABC decrease.

Staff confirmed that the data in the report are just from the NMFS scallop survey. Staff reiterated that the SSC set the Ismooth catch advice to be the annual catch target (survey multiplier * recent catch = new ACT), so under that example, no, the ACT and ABC would be the same.

- **Dr. Emerson Hasbrouck (Cornell Cooperative Extension Program)**: Like at the AP meeting, shared the results of his monkfish Research-Set-Aside (RSA) projects that showed there is a single genetic stock across the coast. He asked why this result is not being incorporated into management and why the Councils are still managing monkfish as two separate stocks).

Staff reiterated that that the Councils manage stocks as defined by assessments and that research such as this could be incorporated into the next research track assessment in 2027.

- **James Dopkin (AP member, monkfish gillnet fisherman, NJ)**: Asked if the Ismooth approach includes fishery effort.

Staff clarified that it does not. The following questions were developed throughout the meeting, which would be better addressed by the NEFSC or SSC rather than Council staff.

Questions more related to the assessment

- How do the other data presented in the assessment (e.g., ASMFC shrimp survey, NMFS scallop) compare with the results of the Ismooth approach that relies on the NMFS bottom trawl survey index and fishery catch? Are they consistent? Contradictory? Inconclusive?
- When the Ismooth approach was originally adopted during the 2016 assessment, what was the rationale for determining it is appropriate? The Legault et al manuscript states "Therefore, care is needed when trying to generalize these results across stocks that may have different life histories, exploitation histories, and without unreported catches or increases in *M*." What specific traits about monkfish make it an appropriate candidate for using the Ismooth approach?
- In the Ismooth approach, the index is scaled to the time series mean. Does that time series begin with the beginning of the trawl survey (1963 fall, 1968 spring) or is there a set window of time that shifts forward each assessment? What is the impact of this scaling on the survey multipliers? Can a figure be provided that provides the entire time series of the trawl survey index with the LOESS-smooth line?
- Fishermen are indicating (hearing more from gillnetters in the south) that their fall fishing is starting later in the season, after Thanksgiving because the monkfish are not present earlier. Because the trawl survey is earlier, could it be missing monkfish? Fishermen are concerned that the sonar activity from wind development and/or climate change are moving monkfish away from their traditional fishing areas.
- What information is there on the catchability of monkfish in the survey?
- What is the potential for other assessment approaches and data to be considered?
    - Has a fishery CPUE been calculated and/or can that be provided in assessments?

- Is it possible to create a monkfish index using the industry-funded scallop survey?
- Has there been consideration of CPUE assessment approaches, like is done for tilefish?

Questions more related to the SSC recommendations

- Would the status quo specifications prevent overfishing? Did the SSC decide on this?
- Does the SSC have the latitude to consider other data not provided in the assessment (e.g., scallop industry dredge survey, fishery CPUE)?

Action 1 specifications

Staff then presented the range of Framework 13 alternatives and the preliminary impacts analysis. There were no preliminary questions from the Committee.

Public Comment:

- **Maggie Raymond (industry member, ME):** Asked for the rationale for the range of alternatives for reducing the incidental possession limits by 20% and 40%. Asked if there were alternatives regarding reducing discards in the southern area. Asked if a combination of DAS and possession limit reduction options were selected, could less restrictive options be selected that are in the document.

Staff clarified that this range bounds the 30% reduction in Total Allowable Landings under the SSC's recommended ABCs. Staff noted that the NEFMC decided in June 2022 to not have alternatives regarding reducing southern discards in this action. Staff clarified that, yes, a combination of less restrictive options could be selected.

The Committee discussed the Council's policy on when a remand of an ABC back to the SSC is appropriate and the decision process for joint action. GARFO clarified that NMFS cannot approve the status quo specifications, as they are higher than the SSC-recommended values. GARFO also clarified that without specifications, the ACL would be 0 mt and any catch would be deducted as an accountability measure from a future ACT. GARFO also clarified scenarios where the Regional Administrator could use its authority to implement specifications without Council action. GARFO expects to clarify the process further at the NEFMC meeting. Committee members discussed ideas for how to remand to the ABC. It was noted that the SSC is not an assessment body but uses assessment results to develop catch recommendations. Committee members wondered if a remand would allow enough time to have specifications in place for an on-time start of the fishing year.

Public Comment:

- **Greg DiDomenico:** Asked for clarification on if the MAFMC needs to review the Terms of Reference (TOR) that the NEFMC SSC is provided when developing ABCs.

The NEFMC Executive Director and NOAA General Counsel clarified that the Council with the administrative lead (New England for monkfish, Mid-Atlantic for spiny dogfish) sets the TOR, and that the TORs used in this case were standard. General Council spoke to the decision process and will offer more clarifications at the NEFMC meeting. Several Committee members were hesitant to make final recommendations, with the number of outstanding questions.

- **Maggie Raymond:** Urged the Committee to recommend the SSC-recommended ABCs for one-year and ask the SSC to reconsider the ABC for years 2 and 3. This would ensure that some amount of catch would be allowed come May and not completely disrupt the fishery.

GARFO staff confirmed that setting specifications for one year for monkfish is possible.

Motion #1 (Tracy/Hemilright): For Action 1 (FY 2023-2025 Specifications), the Committee recommends that the Council select Alternative 2 (Status Quo) as preferred.

Rationale: Based on discussions during SSC, AP, and today's Committee meeting, the SSC recommendation would create drastic reductions. There are unanswered questions about the assessment and procedures that need to be answered.

Motion to substitute (Hughes/Risi): For Action 1 (FY 2023-2025 Specifications), the Committee recommends that all Action 1 alternatives be moved to Considered but Rejected.

Rationale: Originally thought there would be an increase in specifications, not a decline. Ismooth does not allow for estimation of reference points. Alternative 2 (status quo) is not an approvable option by GARFO (above the SSC recommendation), and Alternative 3 would suppress the fishery substantially. There is no statement or analysis that says Alternative 2 would lead to overfishing.

Elizabeth "Libby" Etrie, Chair	No vote	Dewey Hemilright	No
Peter Hughes, Vice Chair	Yes	Scott Olszewski	No
Pete Christopher	No	John Pappalardo	Yes
Dan Farnham	Yes	Paul Risi	Yes
Matt Gates	Yes	Alan Tracy	No
Eric Hansen	Yes	Kelly Whitmore	Yes

The motion to substitute carried 7/4/0.

Main motion (Hughes/Risi): For Action 1 (FY 2023-2025 Specifications), the Committee recommends that the Council that all Action 1 alternatives be moved to Considered but Rejected.

Elizabeth "Libby" Etrie, Chair	No vote	Dewey Hemilright	Yes
Peter Hughes, Vice Chair	Yes	Scott Olszewski	No
Pete Christopher	No	John Pappalardo	Yes
Dan Farnham	Yes	Paul Risi	Yes
Matt Gates	Yes	Alan Tracy	No
Eric Hansen	Yes	Kelly Whitmore	Yes

The main motion carried 8/3/0.

Discussion of the motion: Many of the previously stated questions and concerns were reiterated.

Public Comment (throughout above Motion 1 discussion):

- **Maggie Raymond:** Reminded that the Council remanded the witch flounder ABC. It took a lot of time and effort and only resulted in a 100 mt increase of quota. She urged the Committee to identify specific criteria for a remand. She did not support either the original motion or motion to substitute as it would likely disrupt the fishery more if regulations were not in place.
- **James Dopkin:** Noted that Ismooth was acceptable in prior years but now it is a bad predictor. He felt that the SSC did their job, but the inputs are off. He recommended status quo specifications.
- **Liam Sullivan (monkfish fisherman, RI):** Felt that fishermen will suffer under the SSC's recommendation. He is concerned about flaws being carried throughout the whole process.
- **Ted Platz:** Felt that this is a lose-lose scenario. There is a healthy fishery now but a bad assessment. He supported the motion to substitute. He did not want to cave to what he felt was bad science.
- **Kevin Sullivan (monkfish fisherman, RI):** Agree with Liam. He is seeing a lot of monkfish. There are fewer boats and costs are way up. He feels the fishery cannot take these hits.
- **Greg DiDomenico:** Supports the motion to substitute.

Action 2 Effort Controls

The Chair called for comments and motions for selecting alternatives for effort controls. There were none.

Action 3 Monkfish Gillnet Mesh

The Chair then called for comments and motions for selecting alternatives for gillnet mesh.

Motion #2 (Farnham/Gates): For Action 3 (Gillnet Mesh), the Committee recommends that the Council select Alternative 2, Option B (12" minimum) as preferred. The Committee recommends revising Alternative 2 to have the implementation of this measure delayed until FY 2026 (i.e., not FY 2025 as stated in the Framework).

Rationale: Most fishermen use the larger mesh already and the delayed implementation would lessen the impact of the cost to replace gear.

Public Comment:

- **Ted Platz**: Most fishermen replace their gillnets every five to six years.

Elizabeth "Libby" Etrie, Chair	No vote	Dewey Hemilright	No vote
Peter Hughes, Vice Chair	Yes	Scott Olszewski	Yes
Pete Christopher	Yes	John Pappalardo	Yes
Dan Farnham	Yes	Paul Risi	Yes
Matt Gates	Yes	Alan Tracy	Yes
Eric Hansen	Yes	Kelly Whitmore	Yes

The motion carried 10/0/0.

Action 2 Effort Controls

The Chair again called for comments and motions for selecting alternatives for effort controls. A Committee member was concerned that if effort control alternatives remained in the document, then GARFO could have the latitude to choose one if the Councils did not take action.

Motion #3 (Hughes/Farnham): For Action 2 (Effort Controls), the Committee recommends that all Action 2 alternatives be moved to Considered but Rejected.

Rationale: Originally thought there would be an increase in specifications, not a decline. Ismooth does not allow for estimation of reference points. Alternative 2 (status quo) is not an approvable option by GARFO (above the SSC recommendation), and Alternative 3 would suppress the fishery substantially. There is no statement or analysis that says Alternative 2 would lead to overfishing.

Public Comment:

- **Maggie Raymond:** Did not support rejecting all the alternatives in Actions 1 and 2. Doing so only removes the Council from having input in management.
- **Greg DiDomenico:** supported the motion.
- **Ted Platz:** supported the motion.

Elizabeth "Libby" Etrie, Chair	No vote	Dewey Hemilright	Yes
Peter Hughes, Vice Chair	Yes	Scott Olszewski	No
Pete Christopher	No	John Pappalardo	Yes
Dan Farnham	Yes	Paul Risi	Yes
Matt Gates	Yes	Alan Tracy	Abstain
Eric Hansen	Yes	Kelly Whitmore	Abstain

The motion carried 7/2/2.

Action 1 Specifications

Motion #4 (Hughes/Gates): The Committee believes the Ismooth model has deficiencies and may be unsuitable to the monkfish fishery and we would ask that the SSC reevaluate the FY 2023-2025 ABC recommendation.

Rationale: The index-based methods paper (Legault, et al.) and the paper's peer reviews cautioned against over-generalizing the results without considering the specific life history and catch history of monkfish and maybe that is an error or omission.

Discussion on the Motion: NEFMC Chair Reid cautioned that the SSC does not have much latitude to reevaluate the assessment and urged that specific criteria be developed that meets the Council's policy. Some of the above concerns and questions were reiterated about the original decision to use Ismooth in 2016 and if the SSC considered the work of the Index-Based Methods Working Group report and peer review reports.

Public Comment:

- **Greg DiDomenico**: Concerned that the MAFMC was not consulted on the TOR for the SSC.

The Committee Chair noted that General Counsel indicated earlier in the meeting that this was not an issue.

Elizabeth "Libby" Etrie, Chair	No vote	Dewey Hemilright	Yes
Peter Hughes, Vice Chair	Yes	Scott Olszewski	Yes
Pete Christopher	Abstain	John Pappalardo	Yes
Dan Farnham	Yes	Paul Risi	Yes
Matt Gates	Yes	Alan Tracy	Yes
Eric Hansen	Yes	Kelly Whitmore	Yes

The motion carried 10/0/1.

Staff indicated that the questions raised by the Committee would be raised prior to the NEFMC Meeting.

AGENDA ITEM #3: 2023 COUNCIL MANAGEMENT PRIORITIES

Staff reviewed the draft 2023 priorities and recent PDT and AP recommendations to consider in making final recommendations on what the Council should work on next year regarding monkfish, including any ranking of priorities.

A Committee member asked if FW13 should be on the priority list. Staff noted that if the Council agrees to remand the ABC, then work on this action will certainly continue into 2023 and need to be on the priority list. A Committee member suggested that monkfish have a CPUE-based assessment. Staff clarified that this idea would not be a Council task. A Committee member asked what happens to the research recommendations of assessment peer reviews. Staff clarified that they can be listed on the Council's priority list, but such lists help the NEFSC to design work to improve research track assessments. There were no motions or consensus statements.

AGENDA ITEM #4: OTHER BUSINESS

No other business.

The meeting adjourned at 5:15 pm.

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Eric Reid, *Chair* | Thomas A. Nies, *Executive Director*

MEETING SUMMARY - DRAFT

Monkfish Advisory Panel

Webinar

November 28, 2022

The Monkfish Advisory Panel (AP) met on November 28, 2022, via webinar at 10:00 AM to give input on 1) the *Framework Adjustment 13 to the Monkfish Fishery Management Plan* (FW13) specifications and management measures, 2) the *2023 Council Priorities regarding Monkfish*, and 3) other business.

MEETING ATTENDANCE: Mr. Greg DiDomenico (AP Chair), Mr. James Dopkin, Mr. Greg Mataronas, Mr. Ted Platz, Mr. Chris Rainone, and Mr. Tim Froelich. NEFMC Council staff: Dr. Rachel Feeney (Plan Development Team (PDT) Chair), Ms. Jenny Couture, Chris Kellogg, and Janice Plante. GARFO staff: Danielle Palmer and Spencer Talmage. NEFMC Monkfish Committee Chair (Ms. Elizabeth Etrie), five other Committee members, and Council Chair Eric Reid. MAFMC staff: Mr. Jason Didden. About eleven other people attended.

KEY OUTCOMES:

- On Framework Adjustment 13
  - Specification alternatives (Action 1): recommended Alternative 2 (Status Quo).
  - Effort control alternatives (Action 2): recommended Alternative 1 (No Action).
  - Gillnet mesh size (Action 3): recommended Alternative 2 Option B (12" minimum mesh size) with a delayed implementation to Fishing Year (FY) 2026.
  - Recommended remanding the 2022 monkfish management track assessment.
- On 2023 Council management priorities regarding monkfish, recommended prioritizing formation of a working group to ensure the RSA and other research is being used in the assessment process; addressing the sturgeon bycatch reduction recommendations; evaluating whether the current management system provides enough flexibility for the fishery; and exploring managing winter skate and monkfish in one Fishery Management Plan. The AP made three other recommendations.
- Under other business, the AP Chair requested clarification on what happens if FW13 is not completed on time and if federal regulations require both NEFMC and MAFMC to review the Terms of Reference for the NEFMC SSC when it recommends a monkfish ABC.

AGENDA ITEM #1: INTRODUCTIONS, APPROVAL OF AGENDA, AND OTHER UPDATES

The AP Chair introduced the advisors, welcomed attendees, and sought approval of the agenda. There were no agenda changes. Staff reviewed the timeline for 2022 monkfish work and FY 2022 fishery performance based on monthly in-season quota monitoring. There was a brief discussion on who on the AP is active in the monkfish fishery. Staff noted that the new AP term starts in January and that the applicants are under review by the Executive Committee, taking into account prior participation in AP meetings. The results of the review are not yet available.

AGENDA ITEM #2: FRAMEWORK ADJUSTMENT 13

Specifications

Staff provided an update on the development of 2023-2025 specifications including summarizing the outcomes of the 2022 management track assessment and peer review; the Scientific and Statistical Committee (SSC) recommendations on setting the overfishing limits, acceptable biological catches, and discard deductions; the range of alternatives, and the impact analysis.

Discussion: Advisers asked several questions including the terminal year of the survey index (last year of data, 2022 for spring and 2021 for fall), data used to calculate the Ismooth catch advice (the last three years of total fishery monkfish catch and the trawl survey multiplier), if there were missing surveys and stations in the survey (no survey in 2020), and the assumed discard mortality rate being used (100% except for the newly revised rate of 64% in the scallop dredge gear). Regarding the discard mortality rate, one adviser stressed that 100% is inaccurate. He noted his participation in a winter skate tagging study that showed discard mortality of skate was 11%. Staff noted that like to revising the scallop dredge gear discard mortality rate, other research on discard mortality can be incorporated into the next assessment.

Several members expressed frustration with the assessment process and the outcome given they believe monkfish are very abundant and that the trawl survey is not sufficient for estimating monkfish abundance. Several AP members active in the southern management area pointed out that the trawl survey is done in the early fall when the fish are no longer present; fishermen begin targeting monkfish after Thanksgiving in recent years given warming waters and impacts from offshore wind development have changed fish distribution. One member stated that the last three years of fishing catch are not indicative of future fishing effort because of the pandemic, high fuel prices, low monkfish prices, etc. The AP generally thought the main issue is that the science does not match what fishermen observe on the water.

Regarding the Ismooth method and results, the AP Chair reiterated that the assessment is not an appropriate approach for monkfish given the method was generalized for a groundfish stock, and that the Legault, et al. paper includes several cautions with using the Ismooth approach. The Committee Chair stated that the Ismooth approach was first adopted in 2016 after the analytical assessment failed. She agreed that the decline in survey indices will cause disruptions in the fishery but that this is the method approved to be used for the fishery as a backup for the rejected analytical assessment. Questions about the assessment method can be discussed during the upcoming NEFMC meeting after the assessment scientist's presentation on December 6th.

Several AP members further discussed frustration with the Ismooth approach. More specifically, that the method does not account for other reasons why catch declines beyond a decline in biomass including economic factors, skate limits, high bait skate prices, lack of labor, DAS management versus quota management, labor availability, etc. The approach is self-perpetuating and causes a downward spiral in catch advice. The economic factors are preventing fishermen from achieving their total allowable landings. Advisers objected to using the Ismooth model for setting catch advice for FY2023-2025 and suggested selecting status quo given what they see as a bad assessment and high monkfish abundance. One adviser commented that the fishing is good, and if there is no crisis then there is no management. Additional questions on the Ismooth method were discussed including why the time series of the trawl survey is scaled to 1 (to help determine the slope multiplier of the last three years) and if all sources of discards are included in the discard deduction (yes).

Public Comment:

- **Josiah Dodge (new monkfish fishermen)**: Stated that he is a new monkfish fishermen and inherited his vessel from his father. He is concerned with large decreases in DAS and commented that this unexpected DAS reduction, warming waters, offshore wind development, and high diesel fuel prices will substantially impact his ability to survive fishing. There is a need for better science, use of gillnet versus trawls for surveys, and inclusion of more data such as observer data.

- **Drew Minkiewicz (Fisheries Survival Fund)**: Asked if catch stays below the ACL, then that will lead to lower catch advice in future years based on the Ismooth method.

Staff noted that if the survey trend is increasing then catch advice would increase too if the magnitude of the survey catch outweighs any decline in catch. If the survey index shows a flat trend and catch is also decreasing, then catch advice would decrease.

- **Dan Farnham (Monkfish Committee member)**: Asked if catch per unit effort (CPUE) data are available for the directed monkfish gillnet fishery and how the pandemic impacted the trawl surveys.

Staff answered that CPUE data were not in the assessment report and that the missing 2020 survey value was imputed, taking an average of 2019 and 2021 survey data.

- **Emerson Hasbrouck (Cornell Cooperative Extension Program)**: Shared the results of his monkfish Research Set Aside (RSA) projects that showed there is a single genetic stock across the coast. He asked why this result is not being incorporated into management and why the Councils are still managing monkfish as two separate stocks).

Staff answered that the Councils manage stocks as defined by assessments and that research such as this could be incorporated into the next research track assessment in 2027.

1. **Motion (Rainone/Platz):** For Action 1 FY 2023-2025 Specifications, the AP recommends to the Committee Alternative 2 (status quo).

Rationale: There is insufficient data. The fishery is not fishing in the early fall when the trawl survey is happening, so the AP feels that the survey timing is off. The last six years of status quo specifications have produced a consistently increasing biomass of monkfish. Given the recent pandemic and the resulting fish prices, the fishery has had severely reduced landings. That should not be used against the fishery.

Discussion of the motion: The Committee Chair cautioned that the Status Quo recommendation is higher than the SSC recommendation which could mean NOAA Fisheries deems this action is inconsistent with the Magnuson-Stevens Act and be thus unable to approve this action. She noted that this will be discussed further during the Committee meeting the following day (November 29th).

Greg DiDomenico	No vote	Randall Morgan	Absent
James Dopkin	Yes	Nicholas Muto	Absent
Tim Froelich	Yes	John Our	Absent
Michael Karch	Absent	Ted Platz	Yes
Greg Mataronas	Yes	Chris Rainone	Yes
Bill McCann	Absent		

Motion 1 carried 5/0/0 with a quorum.

Effort Controls

Regarding effort controls, staff presented the range of alternatives and the preliminary impact analyses for separate monkfish Day-at-Sea (DAS) allocation by area and reduction of DAS allocations (Action 2) and reduction in incidental possession limits while using a Northeast Multispecies DAS for permit category C and D vessels (Action 3).

Discussion: A couple of AP members disagreed with the idea that if fishermen are only on a Northeast (NE) Multispecies DAS that they are not targeting monkfish in the north. Several fishermen set gillnet gear on the side of fishing for groundfish and that the Council created the ability to add a monkfish DAS

while out at sea. Reducing DAS will pressure fishermen to high-grade which means there will be longer soak times to harvest the full monkfish limit and achieve the best price, so not likely to lead to substantial discards. When fishermen use all of their monkfish DAS, then they will likely fish on a NE Multispecies DAS to fish skate and discard any monkfish over the incidental limits. Fishermen will continue fishing, thus any option other than status quo for effort controls would lead to an increase in monkfish discards. Another adviser pointed out that the directed monkfish fishery has the lowest discards, so it is not sensible to reduce the monkfish DAS. The directed fishery would have a high negative economic impact. A few advisers commented that the monkfish fishery is healthy.

Public Comment:

- **Patrick Duckworth (monkfish fishermen)**: Agreed with the AP comments that fishermen would switch to using a groundfish DAS if monkfish DAS are reduced and that the northern fishermen do target monkfish even if on only a groundfish DAS.

A quorum was lost prior to when Motion #2 was made.

2. **Motion (Platz/Mataronas; no quorum):** For Action 2 Effort Controls, the AP recommends to the Committee the No Action alternative.

Rationale: The fishery is abundantly healthy, and we should be considering increases in DAS. To reduce effort controls is not rational.

Discussion of the motion: One adviser wanted clarity on what happens if both NEFMC and MAFMC reject all options in the FW13 document and if FW13 is not submitted to NOAA Fisheries by February 1. Staff clarified that the ACL would be 0 lb beginning on May 1 because the fishery does not have default specifications in place.

Greg DiDomenico	No vote	Randall Morgan	Absent
James Dopkin	Yes	Nicholas Muto	Absent
Tim Froelich	Absent	John Our	Absent
Michael Karch	Absent	Ted Platz	Yes
Greg Mataronas	Yes	Chris Rainone	Yes
Bill McCann	Absent		

Motion carried 4/0/0. The AP did not have a quorum. The majority of those present supported the motion. Prior to leaving the meeting (before this motion was on the board), Tim Froelich indicated that he supports status quo effort controls. The Chair noted his support of this motion.

A quorum was then regained.

Gillnet Mesh Size

Regarding gillnet mesh size, staff presented the alternatives and impact analyses in the FW13 document on potentially increasing gillnet mesh size from 10" to either 11" or 12".

Discussion: One adviser requested a 3-year delay (one additional year than what is included in the FW13 document) to help minimize the economic costs for the few fishermen using < 12" mesh and to help sync with the specification setting process. The larger mesh helps minimize discards in the skate and monkfish fishery, improves general custodial of the fishery, and is long overdue given most fishermen already use this larger mesh size.

3. **Motion (Platz/Dopkin):** For Action 3 Gillnet Mesh, the AP recommends to the Committee Alternative 2, Option B (12" minimum). The AP supports a delayed implementation to FY 2025 (as written) but requests a delayed implementation until FY 2026.

Rationale: Delaying implementation another year would allow more of the impacted vessels to adjust. Virtually everyone in the fishery is using 12" already. This change is overdue, and the fishery has already moved to using larger mesh to better optimize monkfish landings and reduce catch of unwanted fish.

Discussion of the motion: No other discussion on the motion.

Greg DiDomenico	No vote	Randall Morgan	Absent
James Dopkin	Yes	Nicholas Muto	Absent
Tim Froelich	Yes	John Our	Absent
Michael Karch	Absent	Ted Platz	Yes
Greg Mataronas	Yes	Chris Rainone	Yes
Bill McCann	Absent		

Motion carried 5/0/0 with a quorum.

Tim Froelich had not been present for the vote on Motion #2 on effort controls. He then indicated his support of Motion #2.

4. **Motion (Platz/Rainone):** The AP believes that the Ismooth model has known deficiencies and is unsuitable for the monkfish fishery. The AP rejects Ismooth as a model for this fishery and asks that the 2022 assessment be remanded. The AP asks that the MAFMC and its SSC be included in the science and model development for this fishery.

Rationale: The results of the Ismooth are wildly inconsistent with the biomass reality of the current fishery and suggest management actions that undermine a perfectly healthy fishery.

Discussion of the motion: One adviser asked about the ability to land an additional DAS' worth of fish on a trip. Staff clarified that was previously included in the alternatives, but the NEFMC removed this in September when it learned that catch reductions were likely needed and this could increase fishing effort. The AP Chair noted that this can be brought up in a future action.

A few other advisers expressed interest in status quo to help with business planning and to help offset high fuel prices. The advisers reiterated that the stock is healthy and there is desire to do collaborative research with the gillnet fishery to produce a better stock assessment. It is unclear why the trawl survey data is being used to inform a directed gillnet fishery's catch advice.

Greg DiDomenico	No vote	Randall Morgan	Absent
James Dopkin	Yes	Nicholas Muto	Absent
Tim Froelich	Yes	John Our	Absent
Michael Karch	Absent	Ted Platz	Yes
Greg Mataronas	Yes	Chris Rainone	Yes
Bill McCann	Absent		

Motion carried 5/0/0 with a quorum.

AGENDA ITEM #3: 2023 COUNCIL MANAGEMENT PRIORITIES

Staff reviewed the draft 2023 priorities and recent PDT recommendations for the AP to consider in making final recommendations on what the Council should work on next year regarding monkfish, including any ranking of priorities.

Discussion: One adviser commented that the stock assessments have been inaccurate in the fishery since 2001. From 2010 to 2016, assessments indicated that effort could be doubled, which one adviser noted he did not believe, and now the current assessment suggests that effort should be dramatically reduced. There was a suggestion to use the RSA program to help the science community develop a better model for the monkfish fishery and help reduce sturgeon bycatch. Another adviser did not think a model to help determine the impact of changing effort controls is needed given that is the AP's job. The stock assessment is the limiting factor; the AP and the Committee should work together to look at RSA collected data and other research that should be used in the assessment process. The Committee Chair commented that this type of approach (incorporating new data) is most likely to be used in a research track assessment (next one scheduled for 2027), not a management track assessment. The MAFMC PDT member spoke about his experience with the spiny dogfish fishery which had a similar aging issue as

monkfish and a delayed assessment process due to waiting for new data. It is unclear whether there is the necessary data to complete a research track assessment (e.g., age structure data, length data, etc.). One adviser reiterated his desire to have the research track be prioritized first before another management track assessment.

One adviser suggested forming a small working group of a scientist, an adviser, and a Committee member to look at previous RSA data and project findings. The adviser commented that one of the reasons monkfish catch is lower than expected is because of high bait price and high abundance of winter skate. He suggested including winter skate in the monkfish fishery because of the high abundance of winter skate, which is limiting the monkfish fishery given the skate limits are being harvested first. Several fishermen are harvesting both winter skate and monkfish together so joint decisions and recommendations on these species is reasonable.

The AP lost quorum part-way through developing this statement.

Consensus Statement #1 (no quorum): The AP recommends the following for 2023 Council work priorities:

1. Form a work group of Committee and AP members to ensure that RSA and other monkfish research is being used in the assessment process. We need more follow-up on if prior research was used and if not, why not, to help solve problems.
2. Address monkfish recommendations in the NOAA Fisheries Action Plan to Reduce Atlantic Sturgeon Bycatch in Federal Large Mesh Gillnet Fisheries.
3. Evaluate whether the current management system (i.e., reliance on monkfish DAS and possession limits to control catch) provides enough flexibility to adjust the directed, incidental and discard fisheries to changing quotas.
4. Explore removing winter skate from the Skate FMP and move it into the Monkfish FMP. Given the overlap, this will put the interested people in the same room and will improve management.

Other AP recommendations:

1. The AP recommends not developing fishery models for predicting how the fishery may respond to effort control. Rather, the AP recommends relying on AP input rather than on models of the fishery.
2. A future Monkfish RSA program priority should be to develop research to address science shortfalls in current assessments and provide funding needed for alternative model development and exploration.
3. That the Council recommend to the Northeast Regional Coordinating Committee that the monkfish research track assessment be earlier than the current schedule (2027).

The AP did not have quorum when the above statement was finalized, but there was no objection to this statement from AP members present.

Discussion of the consensus statement: There was no other discussion on the consensus statement.

AGENDA ITEM #4: OTHER BUSINESS

The AP Chair reiterated his uncertainty over what happens if the framework document is not complete in time and continued to ask whether federal regulations require both NEFMC and MAFMC to review the Terms of Reference for the NEFMC SSC when it recommends a monkfish ABC.

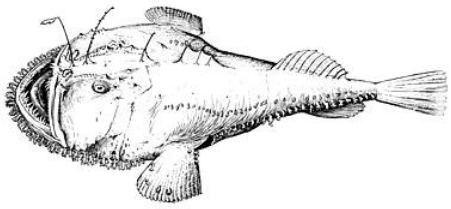
The Monkfish Committee Chair thanked the AP Chair for his service on the AP and as Chair. This is the last meeting before his term ends.

The meeting adjourned at 3:15 pm.

DECISION DOCUMENT

Monkfish Fishery Management Plan

Framework Adjustment 13



This document was developed to help the NEFMC select preferred alternatives for Framework Adjustment 13.

December 1, 2022

Version – NEFMC

Anticipated Council Action:

Prior to selecting final preferred alternatives, Council staff will present the measures under consideration in Framework Adjustment 13 and their draft analyzed impacts on target species, non-target species, protected resources, physical environment (EFH), and human communities (economic and social impacts). Council staff will also answer questions, as needed, about the document.

1. Select *preferred alternatives* in each of the actions in Framework Adjustment 13
    a. Action 1: Fishing Year (FY) 2023-2025 specifications
    b. Action 2: Effort controls (Days-at-Sea and incidental possession limits)
    c. Action 3: Monkfish gillnet mesh size
2. Motion to submit Framework Adjustment 13 to NOAA Fisheries.

Note: Monkfish is managed under a joint management plan with the MAFMC. The MAFMC will select preferred alternatives during its meeting December 12-15, 2022.

Per the monkfish fishery regulations:

> "Management adjustments made to the Monkfish FMP require majority approval of each Council for submission to the Secretary"
>
> "If either the NEFMC or MAFMC has rejected all options, then the Regional Administrator may select any measure that has not been rejected by both Councils and that meets the Monkfish FMP's goals and objectives."
>
> "If the Councils fail to submit a recommendation to the Regional Administrator by February 1 that meets the goals and objectives of the Monkfish FMP, the Regional Administrator may implement through rulemaking in accordance with the Administrative Procedure Act one of the options reviewed and not rejected by either Council, provided the option meets the goals and objectives of the Monkfish FMP, and is consistent with other applicable law."

Action 1 – FY 2023-2025 Specifications

Section 4.1 – Action 1 – FY 2023-2025 Specifications *Choose one alternative*		Preferred by	
		AP	**Committee**
Alternative 1 (Sec. 4.1.1)	**No action** OFL = 0 mt; ACL = 0 mt; TALs = 0 mt		REJECT
Alternative 2 (Sec. 4.1.2)	**Status Quo** North: OFL = 17,805 mt; ACL = 8,351 mt; TAL = 6,624 mt South: OFL = 23,204 mt; ACL = 12,316 mt; 5,882 mt Discard deduction = 3-year mean discard:catch	√*	REJECT
Alternative 3 (Sec. 4.1.3)	**Updated Specifications (SSC recommendation)** North: OFL = undetermined; ACL = 5,526.0 mt; TAL = 4,631.7 mt South: OFL = undetermined; ACL = 3,766.0 mt; 1,448.5 mt Discard deduction = 10-year median discards		REJECT**

Decisions/Questions/Information to Consider

* The AP recommends that the 2022 assessment be remanded and the MAFMC SSC be included in the science and model development for this fishery.

** The Committee recommends that the SSC reevaluate the FY 2023-2025 ABCs recommendations.

The 2022 management track assessment report and peer review report are provided under Tab 1.8.

The SSC memo to the NEFMC on recommendations for specifications is provided under Tab 12.

The *NEFMC Operations Handbook* includes a policy on remanding ABC recommendations back to its SSC (See page 20, also listed in staff slides). A remand needs to meet one of the four criteria listed.

Should the Council approve a remand, then the Council would not be selecting a preferred alternative for Action 1 at this meeting.

The NEFMC is the lead Council for the Monkfish FMP, and the lead Council takes final action first. If the NEFMC takes final action in January 2023, the MAFMC could take final action in February. If this is not possible, then the next regular Council meetings to take final action would be the NEFMC in April followed by the MAFMC in June. However, either Council could call a special meeting for this purpose. There could be operational issues with starting the fishing year on May 1 with delays in final action.

There are no default specifications for the monkfish fishery. Without specifications, the fishing year starts on May 1 with an ABC and Annual Catch Limit of 0 mt. The accountability measure would still be in place: a pound-for-pound deduction from the Annual Catch Target in the second year following the year that catch (landings and discards) exceeds the ACL. During the NEFMC meeting, NOAA Fisheries is being asked to clarify if and what catch would be allowed under this scenario and the conditions that allow the Secretary of Commerce to take administrative action to implement specifications.

Other important Considerations/Draft EA References

Document #2a is the draft environmental assessment (summary table of impacts on p. 6 of decision document):

- Target species impacts: Section 6.2.1 (p. 84)
- Non-target species impacts: Section 6.3.1 (p. 88)
- Protected resource impacts: Section 6.4.1 (p. 91)
- Impacts on physical environment and Essential Fish Habitat: Section 6.5.1 (p. 95)
- Human community impacts: Section 6.5.1 (p. 98)

Action 2 – Effort Controls

Section 4.2 – Action 2 – Effort Controls *The Council may choose Alternative 2 and 3. Within Alternative 2, choose one option for North and one option for South. Within Alternative 3, choose one option.*		**Preferred by**	
		AP	**Committee**
Alternative 1 (Sec. 4.2.1)	**No action** 46 (45.2 after RSA deduction) DAS for each limited access monkfish permit, 37 of which may be used in the South	√	REJECT
Alternative 2 (Sec. 4.2.2)	**Separate monkfish DAS allocation by area, reduce DAS allocation** North DAS options: • Option A = 20 DAS • Option B = 10 DAS • Option C = 0 DAS South DAS options: • Option A = 20 DAS • Option B = 10 DAS • Option C = 0 DAS		REJECT
Alternative 3 (Sec. 4.2.3)	**Reduce NFMA permit category C and D incidental possession limits** • Option A = 20% reduction • Option B = 40% reduction		REJECT
Decisions/Questions/Information to Consider			
Document #2a is the draft environmental assessment. Section 6.1.1 includes analyses for how these effort control options would have reduced recent fishery landings and compares these reductions to the landings reduction that would be necessary to keep landings within the FY 2023-2025 TALs proposed under Action 1, Alternative 3.			
Other important Considerations/Draft EA References			
Document #2a is the draft environmental assessment (summary table of impacts on p. 6 of decision document): • Target species impacts: Section 6.2.2 (p. 85) • Nontarget species impacts: Section 6.3.2 (p. 89) • Protected resource impacts: Section 6.4.2 (p. 93) • Impacts on physical environment and Essential Fish Habitat: Section 6.5.2 (p. 96) • Human community impacts: Section 6.6.2 (p. 100)			

Action 3 – Monkfish Gillnet Mesh Size

Section 4.3 – Action 3 – Gillnet Measures *If the Council chooses Alternative 2, choose one option.*		**Preferred by**	
		AP	**Committee**
Alternative 1 (Sec. 4.3.1)	**No action** 10" minimum mesh size when on a Monkfish-only DAS, also in the GOM/GB Dogfish and Monkfish Gillnet Fishery Exemption Area.		
Alternative 2 (Sec. 4.3.2)	**Increase gillnet mesh size** Increase minimum mesh size when on a Monkfish-only DAS, also in the GOM/GB Dogfish and Monkfish Gillnet Fishery Exemption Area. Two-year implementation delay (FY 2025). • Option A = Increase to 11" • Option B = Increase to 12"	√* **(Option B)**	√** **(Option B)**
Decisions/Questions/Information to Consider			
This would not impact vessels fishing only for dogfish in the GOM/GB exemption area (Document #4a, p. 17). * The AP requests delayed implementation until FY 2026 to allow more impacted vessels to adjust. ** The Committee recommends delayed implementation until FY 2026.			
Other important Considerations/Draft EA References			
Document #2a is the draft environmental assessment (summary table of impacts on p. 6 of decision document): • Target species impacts: Section 6.2.3 (p. 87) • Nontarget species impacts: Section 6.3.3 (p. 90) • Protected resource impacts: Section 6.4.3 (p. 94) • Impacts on physical environment and Essential Fish Habitat: Section 6.5.3 (p. 97) • Human community impacts: Section 6.6.3 (p. 105)			

Table 1 – Summary of potential impacts of the alternatives under consideration in Framework 13 across the valued ecosystem components.

Actions & Alternatives			Direct and Indirect Impacts				
			Target Species	**Non-target Species**	**Protected Resources**	**Physical Env. (EFH)**	**Human Communities**
Action 1: ABC, ACL, TAL	**Alt. 1: No Action**		Uncertain or moderate +	Positive	Slight + to moderate +	Slight +	Economic: High - Social: High -
	Alt. 2: Status Quo		Uncertain or slight -	Slight +	Slight – to slight +	Slight -	Economic: Moderate + Social: Moderate +
	Alt. 3: Update (SSC Rec.)		Uncertain or moderate +	Moderate +	Slight – to moderate +	Slight -	Economic: Negative Social: Moderate -
Action 2: Effort Controls	**Alt. 1: No Action**		Slight -	Negligible	Slight – to slight +	Slight -	Economic: Negligible Social: Slight -
	Alt. 2: Separate DAS Alloc. by area, Reduce DAS	**Option 2A: 20 DAS**	Slight +	Slight +	Slight -	Slight -	Economic: Negative Social: Slight -
		Option 2B: 10 DAS	Slight + to moderate +	Slight + to moderate +	Slight – to moderate +	Slight -	Economic: Negative Social: Slight -
		Option 2C: 0 DAS	Moderate +	Moderate +	Moderate +	Slight -	Economic: Negative Social: Slight -
	Alt. 3: Reduce NFMA Incidental Limits	**Option 3A: 20% reduction**	Negligible to slight +	Negligible to slight +	Slight – to slight +	Slight -	Economic: Negative Social: Slight -
		Option 3B: 40% reduction	Negligible to slight +	Negligible to slight +	Slight – to slight +	Slight -	Economic: Negative Social: Slight -
Action 3: Monkfish Gillnet Mesh Size	**Alt. 1: No Action**		Slight -	Slight -	Slight – to slight +	No impact	Economic: Negligible Social: Slight +
	Alt. 2: Increase Mesh Size	**Option A: Increase to 11”**	Slight +	Slight +	Slight – to slight +	No impact	Economic: Slight - Social: Slight +
		Option B: Increase to 12”	Slight +	Slight +	Slight – to slight +	No impact	Economic: Slight - Social: Slight +

The Draft Environmental Assessment for Monkfish FW 13 is available at:

https://www.nefmc.org/library/december-2022-monkfish-committee

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Eric Reid, *Chair* | Thomas A. Nies, *Executive Director*

MEETING SUMMARY

Monkfish Plan Development Team

webinars

September 27, October 18, November 2, 2022

The Monkfish Plan Development Team (PDT) met on September 27, October 18, and November 2, 2022, via webinar to continue work on Framework Adjustment 13 to the Monkfish Fishery Management Plan and develop recommendations for 2023 monkfish work priorities. This document summarizes these three meetings and the related PDT correspondence.

MEETING ATTENDANCE

Dr. Rachel Feeney (PDT Chair), Jenny Couture (NEFMC); Sharon Benjamin, Danielle Palmer, Spencer Talmage, and Kris Winiarski (NMFS/GARFO); Dr. Jon Deroba and John Walden (NMFS/NEFSC); Jason Didden (MAFMC); Renee St. Amand (CTDEEP), Eric Schneider (RIDEM) and Dr. Tara Dolan (MADMF). Monkfish Committee Chair Libby Etrie, Committee member Kelly Whitmore, and a few members of the public attended.

FRAMEWORK ADJUSTMENT 13

September 27

On September 27, the PDT was presented with the results of the 2022 monkfish management track assessment and the preliminary findings of its peer review, which happened the week prior, and developed potential overfishing limits (OFL) and acceptable biological catches (ABC) for the Scientific and Statistical Committee to consider in late October. The PDT discussed how the catch time series was updated with the new (lowered) dredge discard mortality rate, how missing trawl survey data in 2020 was treated (used the mean of the surrounding years as a proxy), and how the 2015-year class seems to have been short lived (was either not as big as was thought or may have been largely caught as juveniles). The peer review report was not available, but the PDT discussed how the reviewers seemed to agree that the Ismooth method for developing catch advice is appropriate but did not reach consensus on how that catch advice should be applied in management. The PDT discussed how the Ismooth approach uses the latest trend in the trawl survey; essentially, if the survey index is trending up for example, then allowable catch can increase. However, both the northern and southern monkfish survey indices are trending downward.

The PDT then reviewed the history of prior assessments, the NEFMC's Risk Policy, and how assessment outcomes have been used to develop specifications. Because the last three monkfish assessments (2016, 2019, 2022) have determined that the stock status is unknown, the PDT determined that it is impossible to calculate OFLs. The PDT agreed that use of OFLs based on the 2013 assessment is not appropriate, as the method used for that assessment was later determined to have failed. The PDT thus agreed that the OFL should be undetermined. It was noted that the modeling work led by the Northeast Fisheries Science Center determined that the Ismooth method for developing catch advice, in the face of multiple

uncertainties, was good at promoting long-term stability of biomass and catch and likely to provide catch advice that prevents overfishing.

The PDT then calculated ABCs per the Ismooth method (trawl survey multiplier * recent catch = ABC). Several PDT members were concerned about basing the next ABCs off the current ABCs. Like the above rationale for OFL, the premise for the current ABCs was the 2013 assessment that was rejected in 2016. Also, the current ABC in the south is higher than in the north, and some indicators are suggesting (e.g., chainsweep study) that biomass is lower in the south relative to the north. The PDT discussed much of the data in the assessment, and while there are some uncertainties that the PDT was optimistic about, the only indicator that has been accepted through the last three assessment peer reviews is use of the trawl survey index using the Ismooth method. The PDT discussed the potential ABCs using the Ismooth method and other potential approaches (e.g., phasing in ABCs over time, varying approaches by area). Staff will update the NEFMC and MAFMC on assessment outcomes and likely ABCs.

The PDT sub-group on developing methods for setting the discard deduction from the annual catch target reported progress on completing an analysis of the current and four alternate discard deduction methods. PDT members provided input on refining the analysis and developed a preliminary recommendation to change the method to using the most recent 10 years of discards for setting the deduction. The PDT discussed the importance of setting the deduction accurately, so there is neither substantial catch overages or allowable catch left unharvested.

The PDT then discussed the Committee's tasking to develop effort control alternatives that would help keep the fishery within updated catch limits. The PDT recommended removing certain alternatives that are focused on increasing effort. The PDT was concerned about the potential of just turning potential landings into discards; focusing on measures that reduce the number of trips taken may have more impact on reducing catch than measures that decrease landing limits. Staff will bring this input to the Councils. The PDT also discussed the challenges with querying data and developed solutions.

October 18

With the draft assessment peer review report available, the PDT finalized its memo to the SSC regarding 2023-2025 OFLs and ABCs. Having already agreed to recommend that OFL be undetermined, the PDT focused on the ABCs. The PDT discussed how it is the general practice of PDTs to present ABCs to the SSC that are consistent with the assessment and/or control rule methods. Due to the lack of an analytical assessment, the parameters needed to apply the monkfish ABC control rule are not available, so use of the ABC control rule is impossible. The PDT forwarded the ABC values calculated from the Ismooth approach as it has been presented in the past three assessments and accepted via peer review except in the latest, in which the reviewers did not reach consensus on how catch advice should be applied. For SSC discussion, the PDT prepared ABCs based on both recent catch and ABCs, because a minority of reviewers supported consideration of applying the multiplier to recent ABC. The PDT agreed to recommend against basing FY 2023-2025 ABCs off recent ABCs but did not reach explicit consensus on recommending the Ismooth approach because of several concerns about relying in the Ismooth approach (reasons detailed in the October 18 PDT summary). Reasons for not basing future ABCs off current ABCs included that current ABCs stem from an analytical assessment method that was invalidated in 2016 and that used a previous timeseries of discard data with errors and assumptions that were updated in the 2022 assessment.

The PDT also finalized its memo to the SSC on discard deduction approaches, including an analysis of how use of the Ismooth approach for setting ABCs would impact the discard deduction and total allowable landings..

November 2

With the SSC's recommendations for the OFLs and ABCs, the PDT worked to finalize alternatives and impacts analysis for review by the AP, Committee and Councils, aiming to finish documents by

November 21. The PDT focused on developing effort control alternatives, noting the Committee task to develop alternatives that would keep catch within the ACLs and that most of the recent landings in the northern area are coming from groundfish trips that are not using monkfish DAS, landing incidental amounts of monkfish. The PDT is concerned that the effort controls in the Monkfish FMP (monkfish DAS and possession limits) have limited impact on controlling monkfish landings or discards, especially in the Northern area. A member of the public was concerned about the lack of a good assessment model and suggested developing seasonal closures to control catch. The PDT noted that the assessment has many uncertainties. While the PDT believes that seasonal closures could impact catch, the PDT decided there is insufficient time to develop such an idea in Framework 13, noting this idea has not been discussed by the Committee. The PDT agreed to develop alternatives that would make DAS allocations distinct between the north and south, and options for reducing DAS in each area. The PDT discussed the incidental monkfish trips in the north and decided to develop alternatives that would adjust them. With each of these options, there was concern about the possibility of just turning landings into discards rather than reducing overall catch.

DRAFT 2023 COUNCIL MANAGEMENT PRIORITIES REGARDING MONKFISH

On November 2, the PDT reviewed the recommendations made thus far by the PDT, Advisory Panel, and Committee about 2023 work priorities and developed final comments for the Committee to consider. The PDT commented on the following potential priorities from the August 30 Committee meeting:

1. "Review recommendations from the Research-Set-Aside (RSA) program review and develop improvements to the Monkfish RSA program. Consider use of RSA DAS and whether additional flexibility is warranted (e.g., flip to a directed RSA DAS while at sea)."

The PDT supports having a functional RSA program. Given concerns about future reductions in catch limits, this is not the time to implement revisions to the RSA program that would increase participation. The PDT supports having a discussion to help prepare for future program revisions, but this is a lower priority now relative to others on this list. This could be combined with priority #3, as a workgroup could be convened to have these discussions.

2. Address monkfish recommendations in the NOAA Fisheries *Action Plan to Reduce Atlantic Sturgeon Bycatch in Federal Large Mesh Gillnet Fisheries*.

This is a required action, but the PDT suggests developing this action as an omnibus in collaboration with other FMPs and perhaps the MAFMC.

3. Form a work group of fishermen, NOAA and Council staff, Monkfish Committee members, etc. to discuss the Monkfish RSA program and identify potential improvements.

The PDT suggests combining this with priority #1.

4. Address latent effort in the fishery; consider 1) developing a DAS leasing program that would allow markets to drive DAS availability and cost, or 2) moving to a quota management program to increase profitability, flexibility, and efficiency (eliminate the DAS program). Consider updating the control date that was established in May 2012 during development of Amendment 6.

The PDT notes that the number of active permits in the monkfish fishery has been on a consistent, downward trend for some time (see performance report). The PDT generally supports considering other management approaches to increase the options for how management can respond to changes in catch limits.

5. Develop a model that would help predict how changing effort controls would impact the monkfish fishery.

In developing Framework Adjustment 13 analysis, the PDT was limited in accurately estimating how the fishery may respond to changing effort controls. There is likely enough fishery data to support developing a model to better predict fishery responses to various management measures, but insufficient time to create and evaluate such a model within either the specification timeline (or workload limitations of PDT members). Such a model could help the Councils evaluate whether the current management system (i.e., reliance on monkfish DAS and possession limits) provides sufficient flexibility to adjust the directed, incidental, and discard fisheries to changing quotas.

6. Develop an economic analysis of the monkfish fishery to help understand the fishery and the outcomes of potential management actions, include further defining the distinctions between the northern and southern fisheries.

The PDT recommends combining this with priority #5.

7. Update AP-PDT monkfish fishery performance report.

The PDT indicated that having an annual update of fishery data and a check-in with the AP on fishery performance would help the PDT fulfill the regulatory requirement of the NEFMC and MAFMC to annually monitor the status of the monkfish fishery and resource (50 CFR 648.96(a)). The PDT expects that future reports would take less time to prepare, as much of the time spent this year was on determining the content and organization of the report. There is now a template to base future reports on.

Additionally, the PDT recommends adding a priority:

8. Evaluate whether the current management system (i.e., reliance on monkfish DAS and possession limits to control catch) provides sufficient flexibility to adjust the directed, incidental, and discard fisheries to changing quotas.

#3

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Eric Reid, *Chair* | Thomas A. Nies, *Executive Director*

DATE: November 21, 2022

TO: Tom Nies, Executive Director

FROM: Scientific and Statistical Committee (SSC)

SUBJECT: **Terms of Reference – Overfishing levels (OFLs), acceptable biological catches (ABC), and discard deduction approach for monkfish, 2023 through 2025**

The SSC met on October 26, 2022, in Boston, MA to address the following Terms of Reference (TORs):

Overfishing Limits and Acceptable Biological Catches TORs

1. Review information from the September 2022 management track assessment for monkfish and provided by the Monkfish Plan Development Team (PDT).
2. Comment on the conclusion of the assessment and peer review that the stock status of monkfish is unknown and the applicability of the NOAA Fisheries *Procedural Guidance for Changing Assessed Stock Status from Known to Unknown*.
3. Recommend overfishing limits (OFLs) and acceptable biological catches (ABCs) for monkfish in both the northern and southern management areas for fishing years (FY) 2023-2025 that will prevent overfishing, meet the objectives of the fishery management plan, and consider the Council's Risk Policy Statement.

Discard Deduction Approach TORs

1. Review analyses provided by the Monkfish PDT of alternate approaches for setting the discard deduction from the annual catch target when setting specifications.
2. Recommend an approach for setting the discard deduction, commenting on the PDT's recommendations.

To address these TORs, the SSC considered the following information:

Information

1. 2022 Management Track Assessment of Monkfish
    a. NEFSC staff presentation
    b. Stock assessment report
    c. Peer review report
2. Presentation: Monkfish PDT report (NEFMC staff)
3. Memo from Monkfish PDT to SSC re OFLs and ABCs FY 2023-2025, October 19, 2022
4. NEFMC Risk Policy
    a. Risk Policy Matrix for Monkfish
    b. NEFMC Risk Policy Road Map
5. NOAA Fisheries Procedural Guidance for Changing Assessed Stock Status from Known to Unknown
6. Memo from SSC to Council re OFLs and ABCs for FY 2020-2022

7. Discard deduction approaches
    a. Memo from Monkfish PDT to SCC re discard deduction approaches, October 19, 2022
    b. O'Keefe C. (2020). Evaluation of Methods to Estimate Monkfish Discards for Calculating Total Allowable Landings. Fishery Applications Consulting Team LLC with support from the New England Fishery Management Council. 32 p.
    c. O'Keefe C. (2021). 2021 Evaluation of Monkfish Discard Estimation for Calculating Total Allowable Landings. Fishery Applications Consulting Team LLC with support from the New England Fishery Management Council. 19 p.
8. Background Information
    a. 2022 Monkfish Fishery Performance Report
    b. NOAA/NEFSC. 2022 State of the Ecosystem Reports. Available at: https://www.fisheries.noaa

SSC members in attendance
Mike Carroll, Jeremy Collie, Yong Chen, Kevin Friedland, Adrian Jordaan, Lisa Kerr, Conor McManus, Jason McNamee, Richard Merrick, Cate O'Keefe, Terry Stockwell, Sam Truesdell, John Wiedenmann, Lindsey Williams

TERMS OF REFERENCE – Overfishing Limits and Acceptable Biological Catches

1. *Review information from the September 2022 management track assessment for monkfish and provided by the Monkfish Plan Development Team (PDT).*

Presentations from Northeast Fisheries Science Center (NEFSC) staff and the Monkfish Plan Development Team (PDT) were provided to the SSC regarding the recent management track assessment for monkfish. The management track assessment changed the method for calculating discards, reinserted discard records that had been manually deleted, and reduced the discard mortality rate in the scallop fishery from 100% to 64% based on recently published literature[1]. The assessment applies the ISmooth approach (formerly referred to as PlanBSmooth) to estimate a direction and rate of change in NEFSC survey indices that forms the basis for catch advice.

The SSC recommends continued use of the Ismooth index-based assessment as the basis for catch advice for monkfish in both the Northern and Southern Management Areas.

2. *Comment on the conclusion of the assessment and peer review that the stock status of monkfish is unknown and the applicability of the NOAA Fisheries Procedural Guidance for Changing Assessed Stock Status from Known to Unknown.*

The Ismooth index-based approach precludes formal estimation of reference points and stock status for monkfish in both Management Areas. The 2022 Management Track peer review panel recommended listing stock status as unknown. The SSC reviewed the NOAA Fisheries Procedural Guidance for changing status from known to unknown and commented that monkfish stock status be switched to unknown based on the time since the index-based method was introduced (Criterion B, Aging Stock Assessment) and because of short-comings of the previous analytic assessment (Criterion C3, Reject New Assessment, Flawed Previous Model).

[1] Weissman, A., Knotek, R., Mandelman, J., Rudders, D., Roman, S., and Sulikowski, J. 2021. Determining discard mortality of monkfish in a sea scallop dredge fishery. North American Journal of Fisheries Management 41: 856-870.

The SSC concurs with the conclusion that monkfish stock status is presently unknown given problems identified with the previously rejected length-based assessment and the time elapsed since the last analytical assessment in 2016.

3. *Recommend overfishing limits (OFLs) and acceptable biological catches (ABCs) for monkfish in both the northern and southern management areas for fishing years (FY) 2023-2025 that will prevent overfishing, meet the objectives of the fishery management plan, and consider the Council's Risk Policy Statement.*

The SSC recommends OFL be unknown for the Northern and Southern Management Areas for FY 2023-2025, and ABCs of 5,526 mt for the Northern Management Area and 3,766 mt for the Southern Management Area to be held constant for FY 2023-2025.

The unknown OFL advice is based on the absence of analytical assessments and biological reference points for monkfish, which preclude determination of OFL for either the Northern or Southern Fishery Management Areas. The ABC advice is based on applying the ISmooth multipliers to the most recent 3-year average catch to calculate the Annual Catch Targets (ACT) for the Northern and Southern management areas, the ACT is increased by the management uncertainty buffer (3% for monkfish) to calculate ABCs. The SSC noted that simulations conducted by the Index-Based Methods Working Group indicated that the ISmooth approach is expected to prevent overfishing.

RATIONALE INCLUDING SIGNIFICANT SOURCES OF UNCERTAINTY

The SSC concurred with suggestions and recommendations from the 2022 Management Track assessment and Peer Review Panel that OFL for Northern and Southern monkfish is unknown. The 2022 Management Track Peer Review Panel did not provide consensus advice on whether the ISmooth multipliers should be applied to the existing ABC or to recent realized catch. The PDT highlighted that recent ABCs (since 2014) were propagated from the previous analytical assessment, which was rejected as the basis for catch advice in 2016 due to flawed ageing methods and recommended that ABCs for FY 2023-2025 should be based on applying the ISmooth multipliers to realized average catch in FY 2020-2022. The SSC noted that recent catches, managed under Total Allowable Landings (TAL), have been substantially less than the ABCs due to several factors, including discard deductions, shifts in scallop fishing effort distribution, and low prices causing uncertainty about relative stock status. They highlighted that setting ABC based on applying the ISmooth multipliers to recent realized catch can create a ratchet effect, whereby, for any given survey trend, catching less than the ABC (e.g., by reducing discards, lack of targeting due to market conditions, etc.) results in a lower ABC in subsequent years that would have resulted if the entire ABC was caught. Since discards are not allocated or controlled in the monkfish fishery, but instead deducted from the ACT, the SSC recommends that catch advice derived from the ISmooth approach corresponds more closely to the ACT than the ABC.

The SSC recommends setting Northern and Southern Management Area monkfish ABCs based on:

- ACT = ISmooth multipliers applied to most recent 3-year average catch
- ABC = ACT increased by 3% management uncertainty buffer
    - For the Northern Management Area:
        - ACT = 0.829 * 6,465 = 5,360 mt
        - ABC = 5,360 * 103% = 5,526 mt
    - For the Southern Management Area:
        - ACT = 0.646 * 5,655 = 3,653 mt
        - ABC = 3,653 * 103% = 3,766 mt

The SSC discussed how this recommended approach for monkfish, to apply the ISmooth multipliers to the ACT, differs from other SSC recommended approaches for catch advice based on PlanBSmooth assessment methods. The SSC noted that the Monkfish Fishery Management Plan (FMP) includes an ACT, which is not applied in other FMPs where the PlanBSmooth approach has been used as the basis for catch advice. The ACT is intended to account for management uncertainty in the monkfish fishery and can be adjusted by the Council. Additionally, the SSC noted that discards in the monkfish fishery are not allocated or managed under sub-Annual Catch Limits (sub-ACLs) as is done in other FMPs. The SSC's recommended reductions in ABC compared with previous levels reflect the PDT's concern about declining survey indices, particularly in the Southern Management Area. The SSC highlighted high utilization of monkfish in the Northern Management Area relative to TALs with historically lower discard rates. The SSC noted that the recommended deviation in the application of the ISmooth approach may not be warranted for other stocks.

ADDITIONAL COMMENTS

The SSC discussed future needs and technical recommendations for the monkfish populations in the two management areas. The SSC recognizes that improved age and growth information for conducting analytical assessments are unlikely to be available in the foreseeable future. The SSC concurs with the 2022 Management Track Peer Review Panel that alternative assessment methods, including cohort tracking, tagging studies, delay-difference models, and catch-survey analysis, could be pursued. If successful, such methods could provide a basis for estimating reference points and stock status.

The SSC recommends consideration of additional survey indices in the assessment (i.e., shrimp and scallop survey indices), as well as further analysis of the different patterns among surveys (e.g., integration of multiple indices), including length-frequency distributions. Since the Ismooth multiplier is based on the most recent data, the Bigelow surveys could be considered as separate abundance indices. Additionally, swept-area biomass estimates for monkfish, as reported in the Management Track assessment, could be used to estimate exploitation ratios, though this approach has not been peer-reviewed.

SUMMARY OF RECOMMENDATIONS

1. **The SSC recommends that OFL be unknown for FY 2023-2025, and ABCs of 5,526 mt for the Northern Management Area and 3,766 mt for the Southern Management Area to be held constant for FY 2023-2025.**
2. **The SSC concurs with the conclusion that monkfish stock status is presently unknown given problems identified with the previously rejected length-based assessment and the time elapsed since the last analytical assessment in 2016.**
3. **The SSC recommends that alternative assessment methods for monkfish should be investigated in the next assessment iteration.**
4. **The SSC recommends consideration of additional survey indices, analyses of differences in survey indices, and swept-area biomass estimates derived from survey indices be analyzed.**

Fishing Year	Management Area	OFL (mt)	ABC (mt)
2023-2025	Northern	Unknown	5,526
2023-2025	Southern	Unknown	3,766

TERMS OF REFERENCE – Discard Deduction Approach

1. *Review analyses provided by the Monkfish PDT of alternate approaches for setting the discard deduction from the annual catch target when setting specifications.*

The SSC received a presentation from the Monkfish PDT describing analyses conducted to support consideration of an alternative discard deduction approach to set TALs. The current approach for deducting discards in the Monkfish FMP is based on the most recent 3-year discard-to-catch ratio applied to the ACT for the subsequent 3-year TAL advice. There have been variable discard rates by monkfish management area over time, and the current approach uses lagged information applied to future years. The PDT presented a range of alternative approaches to calculate discard deductions including:

- 3-year and 10-year time series
- Mean and median discard estimates
- Direct discard amounts and discards-to-catch ratios

2. *Recommend an approach for setting the discard deduction, commenting on the PDT's recommendations.*

The SSC considered the Council's goals for adjusting the discard deduction method, which included stability to the directed fishery, minimizing changes between management cycles, and accuracy of discard predictions. The PDT highlighted that overestimating discards results in lowered TALs, whereas underestimating discards risks exceeding the ACL. The SSC noted that applying a discard ratio may be more appropriate in the Northern Management Area where discards occur in the directed fishery, whereas applying a direct discard amount may be more appropriate in the Southern Management Area where discards primarily occur in other target species fisheries (e.g., scallop fishery). The PDT explained that scallop biomass has recently been shifting northward. While most of the scallop biomass on Georges Bank is still in the Southern Management Area, scallop biomass could shift further northward into areas that overlap with the monkfish Northern Management Area, which may result in increased monkfish discards from non-targeted fisheries in the future.

The SSC recommends the following approach for setting the discard deduction, which supports the PDT's recommendations:

- **Use of 10-year moving time series**
- **Use of median discards**
- **Use of direct discard amount**
- **Updates to occur every 3 years**

SUMMARY OF RECOMMENDATIONS

1. **The SSC recommends that Alternative 5 from the Monkfish PDT Memo be used for setting the discard deduction for both the Northern and Southern Management Areas:**
    a. **Latest 10-year median of discards**
2. **The SSC recommends analysis of a recruitment index as a predictor for future discards.**
3. **The SSC recommends further evaluation of the accuracy of discard information from fisheries that catch monkfish, including both targeted and bycatch fisheries.**

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Eric Reid, *Chair* | Thomas A. Nies, *Executive Director*

MEMORANDUM – TYPO CORRECTED

(Revised December 1, 2022, with a minor typo correction on page 5.)

DATE: October 19, 2022

TO: Scientific and Statistical Committee

FROM: Monkfish Plan Development Team

SUBJECT: **Monkfish specifications for FY 2023 - 2025**

This memorandum forwards information to support recommendations by the Scientific and Statistical Committee for setting the Overfishing Limit and Acceptable Biological Catch (ABC) for the Monkfish Northern Fishery Management Area (NFMA) and Southern Fishery Management Area (SFMA) for Fishing Years (FY) 2023 - 2025. The Monkfish Plan Development Team (PDT) met by webinar on September 27 and October 18, 2022, to develop this memo.

1. OVERVIEW

Monkfish has been assessed and managed in two areas, northern and southern. This memorandum provides information to support OFL and ABC recommendations for FY 2023 – 2025 by the Scientific and Statistical Committee (SSC). To develop recommendations, the PDT reviewed 2016, 2019, and 2022 stock assessments and peer review reports, SSC reports, PDT reports, and survey information. The 2022 management track assessment for monkfish was peer reviewed on September 20 and 22, 2022.

The monkfish regulations state: "The Councils or the PDT shall calculate ABC values for each monkfish stock based on the ABC control rule established in the FMP. These calculations shall be reviewed by the SSC, guided by terms of reference developed by the Councils. The SSC shall either concur with these ABC calculations, or provide alternative recommendations for each stock and describe the elements of scientific uncertainty used to develop its recommendations." Failure of the monkfish analytical assessment in 2016 has precluded use of the existing control rule, and index-based assessments have been used to provide catch advice on an interim basis. However, ABC setting has not followed a clear and consistent method. Two ABC approaches are included in this memo; one is consistent with the catch-setting method identified in the 2016, 2019 and 2022 assessments and an alternate approach that was discussed during the 2022 peer review.

Section 2 of this memo provides a history of prior assessments and catch setting. Section 3 summarizes the 2022 assessment. Section 4 provides potential OFLs and ABCs for SSC consideration. Responses to the SSC recommendations made in 2019 during FY 2020-2022 specifications setting are in Section 5. Refer to the 2022 assessment report (Deroba 2022), the fishery performance report (NEFMC 2022), and the PDT memo on setting the discard deduction for other supporting information.

Key Points:

- The PDT recommends that the OFLs for the northern and southern monkfish management areas be undetermined.
- The PDT provides ABCs calculated using the Ismooth approach and using recent ABCs, but recommends against the latter approach.

2. PRIOR STOCK ASSESSMENTS AND SPECIFICATION SETTING

The term "PlanBsmooth" (now called "Ismooth") has been used to describe the index-based assessment method and it has been equated with the method used for Georges Bank cod since 2015. However, the terms "PlanBsmooth" and the "GB cod method" have been used to describe multiple specific methods for catch setting over the years between assessment teams, the PDT, and the SSC. This section attempts to clarify some of that history.

FY 2011-2013

PDT, SSC, Council: Amendment 5 to the Monkfish FMP, implemented in 2011, revised methods to derive the monkfish OFLs and ABCs and set specifications for FY 2011-2013 using these methods and the SARC 50 assessment (in 2011). Amendment 5 also described the following control rules:

$$OFL = \text{exploitable biomass } (B_{current}) * \text{the fishing mortality threshold } (F_{max})$$

$$ABC = \text{exploitable biomass } (B_{current}) * \text{average exploitation rate}$$

The average exploitation rate were periods of increasing biomass, 1999-2006 in the North and 2002-2009 in the South. Since 2010, the SSC has considered these control rules interim proxies until more precise aging methods can be incorporated into the assessment. *"…considerable uncertainties in the assessment model preclude its use to determine probability of exceeding the projected Overfishing Level of catch"* (SSC report to Council, 2010).

Through Amendment 5, the Council recommend OFLs be set for FY2011-2013 at 22,729 mt in the north and 28,263 mt in south and ABCs at 17,485 mt in north and 13,326 mt in south. These ABCs were set consistent with the control rule. This was informed by the Data-Poor Working Group assessment. After the Council taking final action, the 2010 monkfish assessment (SARC 50) was finalized.

Assessment: The monkfish stock assessment in 2010 (SARC 50) was an analytical assessment that used the SCALE model (had been in use since 2007), concluding that monkfish was not overfished and overfishing was not occurring but recognized significant uncertainty in this determination.

PDT: SARC 50 resulted in needing to recalculate the FY 2011-2013 ABC specifications (using the control rule) to ABCs of 7,592 mt in the NFMA and 12,316 mt in the SFMA.

Council and NMFS: NMFS approved the recalculated ABC for the south based on the SARC, lowering the ABC from 13,326 mt to 12,316 mt, given this recalculated ABC remains higher than the previously approved ACT from A5. However, NMFS disapproved the proposed specifications for the north in Amendment 5 because the recalculated ABC from the SARC was lower than the ACT from A5, leaving status quo specifications in place. Part-way through FY 2011 via Framework 7, the Council recommended a reduction in the ACT for the north so that the recalculated ABC from the SARC was higher than the ACT and thus consistent with A5. The Council also reconfirmed the SFMA ABC from the SARC (12,316 mt). NMFS reduced northern ACT and the revised effort controls while being consistent with recent scientific advice using the SARC recalculated ABC in the north (Framework 7 Final Rule).

FY 2014-2016

Assessment: The 2013 operational assessment, that informed FY 2014-2016 specifications, also used the SCALE model and concluded that monkfish was not overfished and overfishing was not occurring.

PDT: The years in which the average exploitation rate was calculated for the ABC was updated to 2006-2011 in the North and 2002-2009 in the South.

SSC: The SSC recommended OFLs for FY 2014-2016 be lowered to 17,805 mt and 23,204 mt for the northern and southern areas, respectively, but maintain status quo ABCs (7,592 mt for north, 12,316 mt for south). These recommendations were based on seemingly conflicting considerations in stock status (e.g., monkfish was above biomass targets and stable or increasing survey trends, but continuing retrospective patterns in the stock assessment and below average recruitment) that suggest that neither drastic increases, nor decreases to existing catch levels were warranted at this time

Council: The SSC recommendations for OFL and ABC were accepted through Framework 8 (NEFMC 2014).

FY 2017-2019

Assessment: The 2016 operational assessment, that informed FY 2017-2019 specifications, did not update the SCALE model because its use was invalidated by age validation research (Richards 2016). This assessment concluded that many of the biological reference points were no longer relevant due to invalidation of the growth model (e.g., no estimation of absolute biomass, F_{max} could not be recalculated), and thus were not updated. Stock status was determined to be unknown. A strong 2015-year class was identified in both the survey and the discard data The review panel for the assessment concluded that using a survey index-based method for developing catch advice was appropriate. For providing catch advice, a method called "PlanBsmooth" or the "Georges Bank cod method" was used that set catch advice based on the recent trend in NEFSC trawl survey index. This method calculates the proportional rate of change in smoothed survey indices (average of fall and spring NEFSC surveys) over the most recent three years. This rate is the slope of the regression which is then multiplied by the most recent three years average of fishery catch to determine catch advice (Equation 1):

*Equation 1: Trawl survey multiplier * latest 3-year average catch = catch advice*

Peer Review: This method was accepted during the assessment peer review. The multipliers were 102% in the NFMA and 87% in the SFMA.

PDT: The PDT then recommended status quo OFLs and ABCs for both management areas for a few reasons: the confidence intervals were overlapping (1.0-1.3 in north, 0.76-1.0 in south), catch had been below the TAL in recent years, the expectation that the 2015-year class would enter the fishery during the specification years, and status quo had not resulted in overfishing in prior years.

The PDT had not reached consensus on how the survey trend adjustment should be applied. In case the SSC did not agree with the PDT's status quo recommendation, the PDT prepared candidate ABCs using Equations 2-4 below, calling Equation 2 the "Georges Bank cod strategy" (GB cod method):

*Equation 2: Trawl survey multiplier * latest 3-year average catch = OFL; ABC = 0.75*OFL*

*Equation 3: Trawl survey multiplier * latest ABC = ABC*

*Equation 4: Trawl survey multiplier * latest ACT = ABC*

SSC: However, the SSC agreed with the PDT and recommended status quo OFLs and ABCs; the Council recommended and NOAA Fisheries approved status quo (ABCs were 7,592 mt in NFMA, 12,316 in SFMA).

FY 2020-2022

Assessment: The 2019 assessment, that informed FY 2020-2022 specifications, continued use of the PlanBsmooth method due to ongoing uncertainties (described above). The assessment continued to see a strong recruitment event from 2015 that led to an increase in biomass in 2016-2018, though abundance declined in 2019 as recruitment returned to average levels (NEFSC 2020). PlanBsmooth was described in the assessment report as Equation 1 (above). The assessment multipliers were 1.0 in the south and 1.2 in the north.

Peer Review: The peer review was presented with the PlanBsmooth method as Equation 1 and did not refute its use in the peer review report.

PDT: The PDT, with input by the NEFSC, recommended status quo OFLs and developed ABCs using Equation 3 (above) and called it the PlanBsmooth method and the GB cod method. The PDT recommended status quo ABC in the south (12,316 mt) and a 10% increase in the north (8,351 mt), which was more cautionary than the result of using Equation 3 (20% increase).

SSC: The SSC then recommended that the OFLs could not be determined because "analytical assessments are not available from which to estimate stock status criteria and biological reference points." The SSC

further concluded that the "current ABC control rule" (likely referring to the rule approved through Amendment 5, p. 2 of this memo) could not be used as a basis for making an ABC recommendation. The SSC approved the PDT recommendations for ABCs (Equation 3) and called it the GB cod strategy.

The Council recommended, and NMFS adopted, the ABCs as recommended by the PDT and SSC. However, the Council recommended, and NMFS adopted, status quo OFLs (17,805 mt for NFMA and 23,204 mt for SFMA). At the time, the advice from the NEFSC was to not officially change stock status to unknown or OFLs to undetermined after a failed analytical assessment. At the time, there was a national-level NOAA Fisheries working group that was developing a policy to ensure more consistency for determining when stock status should change from known to unknown. The *Procedural Guidance for Changing Assessed Stock Status from Known to Unknown* stemming from that work became effective in November 2020.

3. 2022 MANAGEMENT TRACK ASSESSMENT

Assessment: The 2022 management track assessment did not include an analytical assessment that could determine absolute biomass or fishing mortality. The PlanBsmooth method was again used to develop catch advice, though the name has been changed to "Ismooth" to distinguish from other "Plan B" approaches. Like the 2016 and 2019 assessments, this assessment concluded that the status of monkfish remains unknown. The Ismooth method for setting catch advice was again described as Equation 1 (above), the survey multiplier applied to recent catch. The multipliers were 0.829 for NFMA; 0.646 for SFMA. The fishery catch time series was updated, including a new discard mortality rate for scallop dredges (reduced to 64% from 100%) and data corrections were made.

Peer Review: The 2022 assessment was peer reviewed on September 20, 2022, and the final peer review report was available to the PDT on October 7. The peer review agreed with the unknown status determination and the updates to the catch time series. The peer review did not reach consensus on whether catch advice should by applying the multiplier to recent catch or to recent ABC (Equation 1 vs. 3), though most of the peer reviewers supported applying it to recent catch.

The PDT notes a factual error in the peer review report. The report states:

> *"The Panel spent considerable time discussing the appropriate term which the multiplier should be applied against – ABC or catch. The former has been the practice since the Ismooth approach was first applied to monkfish and moving to catch would result in a major shift in catch advice. Applying the multiplier against the catch would result in a significant decrease in ABC advice."*

The Ismooth approach was first applied to monkfish during the 2016 assessment, but the PDT and SSC then recommended status quo OFLs and ABCs for both management areas for FY 2017-2019 (Section 2). The use of Equation 3 (multiplier * ABC) was not used at that time. In 2019, the PDT used a revised version of Equation 3, recommending a lower multiplier in the north than the assessment called for (1.1 vs 1.2), and that revised version of Equation 3 was recommended by the SSC. Thus, use of ABC (Equation 3) has not been the practice Ismooth was first used in the assessment. The PDT notes that either approach would result in a "significant decrease in catch advice" from FY 2020-2022 levels, though more so with using recent catch.

4. FY 2023-2025 OFL AND ABC

Overfishing Limit

The PDT recommends that the OFLs for the northern and southern monkfish management areas be undetermined (Table 1). The lack of an analytical assessment in 2022 precluded the estimation of absolute biomass and a fishing mortality rate. An OFL cannot be calculated without these parameters. This differs from the status quo OFLs. The PDT feels that having undetermined OFLs is more consistent with the unknown stock status conclusion and that the status quo OFLs are based on an analytical assessment that was invalidated in 2016.

Table 1. Potential monkfish FY 2023-2025 OFLs for SSC consideration.

Management Area	Status Quo OFL	PDT recommended OFL
Northern	17,805 mt	undetermined
Southern	23,204 mt	undetermined

Acceptable Biological Catch

It is the general practice of PDTs to focus on forwarding ABCs to the SSC that are consistent with the assessment and/or control rule methods. Due to the lack of an analytical assessment, the parameters needed to apply the monkfish ABC control rule are not available, so use of the ABC control rule is not possible. The PDT forwards the Ismooth approach (Equation 1) as it has been presented in the past three assessments and accepted via peer review except in the latest, in which the reviewers did not reach consensus. For SSC discussion, the PDT also prepared ABCs based on recent ABCs (Equation 3), because a minority of reviewers supported consideration of applying the multiplier to recent ABC.

Ismooth approach: As presented in the assessment, the Ismooth approach (Equation 1) applies the multiplier to recent catch. Fishery catch data was used as updated in the 2022 assessment (e.g., corrections to the discard timeseries, use of 64% discard mortality for scallop dredges). The average catch over CY 2019-2021 was 6,465 mt in the NFMA and 5,655 mt in the SFMA. Use of Equation 1 results in the following ABCs for FY 2023-2025:

North: 0.829 * 6,465[1] mt = 5,360 mt

South: 0.646 * 5,655 mt = 3,653 mt

Recent ABC approach: The 2022 assessment peer review did not reach consensus on the use of the Ismooth approach for these specifications; a minority of reviewers supported consideration of applying the multiplier to recent ABC (Equation 3). The most recent ABCs are for FY 2020-2022: 8,098 mt in the NFMA and 12,316 mt in the SFMA (Table 2, p. 10). Use of Equation 3 results in the following ABCs for FY 2023-2025:

North: 0.829 * 8,098 mt = 6,713 mt

South: 0.646 * 12,316 mt = 7,956 mt

PDT consensus statement: The PDT recommends against basing FY 2023-2025 ABCs off recent ABCs. (use of Equation 3). The ABCs set for the last two specification cycles stem from an analytical assessment that was invalidated in 2016. Also, these ABCs were set using a previous timeseries of discard data with errors and assumptions that were updated in the 2022 assessment.

[1] The memo presented to the SSC on October 26 had a typo in the Northern catch. The correct catch is 6,465 mt, not 6,425. The product of this equation (5,360 mt) was correct in the memo when it was presented.

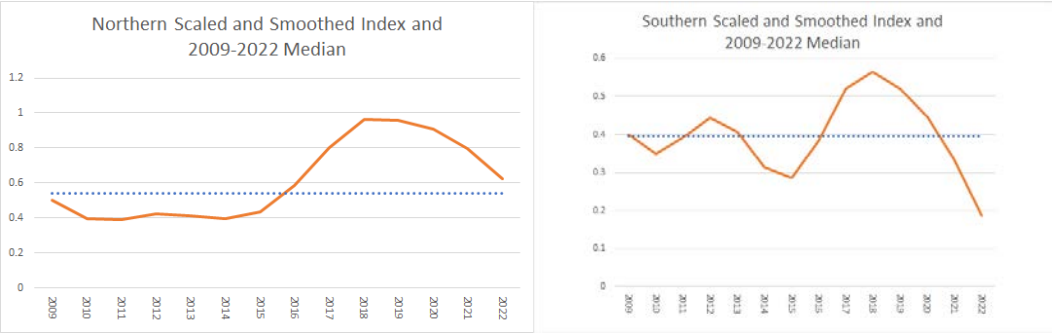
Additional discussion: In compliance with the Magnuson-Stevens Act, ABCs need to be set at levels that prevent overfishing and prevent a stock from becoming overfished, and the PDT concluded that use of the Ismooth approach would likely accomplish that outcome. This is particularly important in cases where the OFL is undetermined. The Index-based Methods Working Group and Legault et al. (in press) found that the Ismooth approach, in the face of multiple uncertainties, was likely to provide catch advice that prevents overfishing promotes long-term stability of catch and biomass. These peer-reviewed findings support the PDT's conclusion.

The PDT is concerned with the continued lack of an analytical assessment and, while the past three assessments provided catch advice using the Ismooth approach, some PDT members have concerns about relying on the Ismooth approach for monkfish at the current time for several reasons.

There is concern that the uncertainty conveyed in the LOESS smooth confidence intervals (Deroba 2022, Figures 25 and 26) only include the uncertainty introduced by the smoothing function and not the uncertainties in the underlying indices. These uncertainties arise primarily from tow-by-tow catch variability, survey design, and changes in gear/vessels over time - including the switch from the *RV Albatross* to the *RV Bigelow* in 2009. The *RV Bigelow* is known to catch significantly more monkfish than the *RV Albatross* (Miller *et al.* 2010).

There is also concern when considering recent trends and what the Ismooth approach would have advised at several time periods. Focusing on the *RV Bigelow* time series (2009-), the smoothed Northern index started below the 2009-2022 median, then increased, then decreased to slightly above the 2009-2022 index median, essentially ending where it began (Figure 1). The smoothed Southern index has been above or below the 2009-2022 index median five times since 2009. While the 2022 smoothed value is unusually low, the 2015 value would have looked similarly low as a terminal year without the benefit of the LOESS smoothing from subsequent years that we see now. Also, the 2018 smoothed value would have looked higher as a terminal year without the smoothing from subsequent years that we see now. If one had used the Ismooth approach in the south with 2015 or 2018 as the terminal year, Ismooth would have advised changing catches opposite of how subsequent southern area survey indices trended, and with even more impactful multipliers than would be apparent now due to the terminal year issue.

Figure 1. LOESS-smoothed applied to the survey indices (Figures 25 and 26 from 2022 monkfish assessment) for 2009-2022 with median line added



Considering the full time series of the survey index (fall survey began in 1963, spring survey began in 1968), the biomass indices suggest that biomass in the NFMA and SFMA has been low in recent years. The Ismooth method rescales the survey indices by the time series mean, so the time series has a mean of one (Deroba 2022, Figures 25 and 26). In the NFMA, the Ismooth indices themselves (not the LOESS-smooth) have been below one since 2004. In the SFMA, the indices have been below one since at least 1990.

Use of the Ismooth approach would result in an ABC that is lower in the SFMA relative to the NFMA, an outcome consistent with results of the chainsweep study. The estimates of monkfish biomass resulting from the paired tow experiments using chainsweep and rock hopper gears (hereafter chainsweep study) were provided to address TOR 2 of the assessment. The chainsweep study has not been peer reviewed for its application specifically to monkfish, and has not been previously used in an official capacity in a monkfish assessment or for providing monkfish catch advice. Acknowledging that, the chainsweep study suggests higher biomass in the NFMA relative to the SFMA. If biomass is lower in the south relative to the north, the PDT is concerned that use of Equation 3 would result in higher ABC in the south.

Considering the chainsweep study further, if the outcomes approximate biomass, the results suggest relatively low exploitation rates in the NFMA in recent years (e.g., ~80,000 mt in 2021 compared to the catch of 5,932 mt). In the SFMA, exploitation rates may be higher (e.g., ~15,000 mt in 2021 compared to the catch of 4,346 mt). This would further support having a lower ABC for the SFMA relative to the NFMA.

The PDT recognizes that the ABCs under either approach would be substantially lower for FY 2023-2025 than the ABCs for FY 2020-2022. Recent catches have been below ABCs, a function of many factors including: biomass, world fish markets that affect price, fishing costs, effort controls in the monkfish fishery, and dynamics of other fisheries that incidentally catch monkfish (see the 2022 Monkfish Fishery Performance Report for related details). Impacts on the Total Allowable Landings will also depend on the approach used to set the discard deduction from the Annual Catch Target (see PDT memo on discard deduction approaches), but because there are no management controls on discards (e.g., no sub-ACLs for discards), reductions in future catch would likely come from reduced landings, unless drivers outside of the Monkfish Fishery Management Plan reduce monkfish discards in other fisheries.

5. RESPONSES TO 2019 SSC RECOMMENDATIONS

In August 2019, when recommending OFLs and ABCs for FY 2020-2022, the SSC made several other recommendations, which the PDT responds to here:

SSC Recommendation #1: Improve "age and growth information for conducting analytical assessments in the future" to allow for formal estimation of stock status criteria and reference points.

PDT Response: Unfortunately, a successful aging technique has not been found for monkfish. Recognizing this, the 2022 assessment peer review suggested that NOAA Fisheries instead focus on tracking cohorts via modes in length frequency data, especially when a relatively large cohort is believed to be ageing through the population. The success of such an approach has not been evaluated.

SSC Recommendation #2: Investigate "the 2015 recruitment event and its effect on discards and biomass trends. If the high discard rates in the current fishery are primarily due to the 2015 cohort, it is important to understand if discarding will decline as this year class becomes fully recruited to the fishery."

PDT Response: The 2015 year-class was first seen in the 2016 assessment and was used, in part, as rationale for the conclusion that biomass was likely to increase, and both northern and southern indices approximately doubled from 2015 to 2018. However, the length data presented in the 2022 assessment indicate that the 2015 year-class did not track into the subsequent adult population. In the SFMA, discards were particularly high in 2016-2019, averaging 3,123 mt, and lowered to 2,318 mt on average in 2020-2021. In the NFMA, discards peaked in 2018-2019, averaging 1,167 mt (Deroba 2022, Table 1). This suggests that this year-class was heavily impacted by discarding, primarily in the scallop dredge fishery. The 2022 assessment peer review noted that there was a reduction in port sampling for individual lengths and age structures since 2019 and that if port sampling does not increase, then additional catch sampling should be done by observers to offset the loss in port sampling data.

The updated recruitment indices showed that recruitment in the north was high in 2020 relative to the time series (1963-2020), but not as high as the peak in 2015 (Deroba 2022, Figures 14 and 15). In the

south, 2020 recruitment was more like the long-term average. While this may be cause for optimism in the north, the PDT notes the recent history of the large 2015 year-class. Without new management measures that would prevent the incidental catch and discarding of juveniles, the PDT cautions against assumptions about recruitment into the fishery.

SSC Recommendation #2: Investigate "various alternative approaches for assessing monkfish as recommended by the peer review panel including surplus production models that incorporate process error and other data limited approaches (such as those available in the DLM toolkit and ICES assessment tools)."

PDT Response: Examining alternate assessment approaches was outside the scope of the 2022 assessment, which was a Level 2 management track assessment. The peer reviewers suggested that a delay-difference model be explored in the next research track assessment and the PDT supports this recommendation. The PDT notes that the DLM toolkit contains hundreds of alternatives and is uncertain what "ICES assessment tools" refers to specifically. The next monkfish assessment will be a management track in 2025, but a research track assessment is scheduled for 2027 in which alternate approaches can be explored.

SSC Recommendation #4: Examine "NEFSC survey abundances for monkfish during the 2020-2022 period to evaluate whether adjustments to the specifications might be needed to account for unanticipated changes in the abundance of monkfish in either of the two Management Areas. The SSC recommended that a "rumble strip" approach be developed (such as the approach used for scup) to ensure that the monkfish ABCs during the specification period are concordant with current stock abundance. The rumble-strip approach could examine various data such as survey abundance, size compositions, and fishery catch and length-frequencies to evaluate whether any unforeseen adverse changes had occurred in the monkfish populations in either of the two Management Areas. If so, a management action might be needed to be address this situation."

PDT Response:

The NEFSC did not update monkfish survey indices between the 2019 and 2022 assessments. Annual updates for monkfish are not normally done outside of assessments. Also, there was no survey in 2020 due to the pandemic and there has been staff turnover within the NEFSC Population Dynamics Branch, the Greater Atlantic Fisheries Office, and the NEFMC staff supporting the monkfish management plan.

In 2013, the Scientific Uncertainty Subcommittee of the Mid-Atlantic Fishery Management Council SSC identified "rumble strip" approaches for setting multi-year ABCs, including a review in their subsequent performance (see report). There was some development of approaches for managing scup, but these were never approved and implemented through a Council action. At the time, scup management benefited from having an assessment completed, the results of which were used. This is not an immediately applicable case study and such an idea for management of monkfish would require substantial effort to develop and implement.

6. REFERENCES

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Table 2. Monkfish specifications and fishery performance, 2011-2022

	Year	Fishing Year Specifications (May 1 – Apr 30)					Calendar Year Assessment Data			% ABC Caught	% ACT Caught	% TAL Landed
		OFL	ABC=ACL	ACT	Expected Discards	TAL	Landings	Discards	Catch			
Northern Fishery Management Area	2011	22,729	7,592	6,567	713	5,854	3,328	370	3,698	49%	56%	57%
	2012						4,081	493	4,574	60%	70%	70%
	2013						3,355	459	3,814	50%	58%	57%
	2014	17,805					3,434	484	3,918	52%	60%	59%
	2015						4,086	572	4,658	61%	71%	70%
	2016						4,723	734	5,457	72%	83%	81%
	2017			7,364	1,026	6,338	7,105	840	7,945	105%	108%	112%
	2018						6,009	1,253	7,262	96%	99%	95%
	2019						6,084	1,080	7,163	94%	97%	96%
	2020		8,351	8,101	1,477	6,624	5,587	723	6,310	76%	78%	84%
	2021						5,121	802	5,923	71%	73%	77%
	2022											
Southern Fishery Management Area	2011	28,263	13,326	11,513	2,588	8,925	5,271	1,566	6,837	51%	59%	59%
	2012						5,674	1,962	7,636	57%	66%	64%
	2013						5,207	1,372	6,579	49%	57%	58%
	2014	23,204	12,316				5,099	1,188	6,287	51%	55%	57%
	2015						4,550	919	5,468	44%	47%	51%
	2016						4,331	2,114	6,445	52%	56%	49%
	2017			11,947	2,936	9,011	3,796	3,544	7,339	60%	61%	43%
	2018						4,388	3,476	7,864	64%	66%	49%
	2019						4,373	3,358	7,732	63%	65%	49%
	2020				6,065	5,882	2,593	2,295	4,887	40%	41%	29%
	2021						2,005	2,340	4,346	35%	36%	22%
	2022											

New England
Fishery Management Council

2022 MONKFISH FISHERY PERFORMANCE REPORT

This fishery performance report provides a brief overview of the biology, stock condition, management system, and fishery performance for monkfish, with an emphasis on the last few years. This report is intended to help the Monkfish Committee, Scientific and Statistical Committee, and Councils understand the fishery and to help interpret fishery data; it may help understand trends in and relationships between landings and abundance.

The Monkfish Plan Development Team (PDT) prepared this report in collaboration with the Monkfish Advisory Panel (AP). The AP met on May 4, 2022 to review the data in this report and develop input on fishing effort, market trends, environmental changes, and other factors impacting the fishery. A few clarifications have been noted, as suggested by reviews of the PDT, Monkfish Committee, SSC, and Council staff. For more information about the monkfish fishery, visit the Monkfish Fishery Management Plan webpage of the New England Fishery Management Council (NEFMC) and the Commercial Fishing Performance Measures webpage of the Northeast Fisheries Science Center.

Key Points:

- The 2013 assessment determined that monkfish was not overfished, and overfishing was not occurring. Assessments in 2016 and 2019 could not update stock status (so considered unknown). There is substantial uncertainty regarding monkfish biomass and fishing mortality. Stock status will be reevaluated in 2022.
- The number of monkfish limited access permits has lowered over the past decade (670 to 562), about 9-20% landed ≥ 10,000 lb of monkfish each year.
- There is a substantial amount of latent effort in the fishery; the number of monkfish Days-At-Sea (DAS) used is far below the DAS allocated.
- Recent discards as percent of catch is lower in the north (9-26%) vs. the south (36-62%).
- Advisors feel low monkfish prices have been the main limiter of the fishery. Costs are increasing and wages are not competitive with shoreside employers.
- There is substantial concern about the impacts of offshore energy development and potential restrictions regarding protected species.
- Advisors would like more flexibility to fish more efficiently than current effort controls allow.

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BASIC BIOLOGY

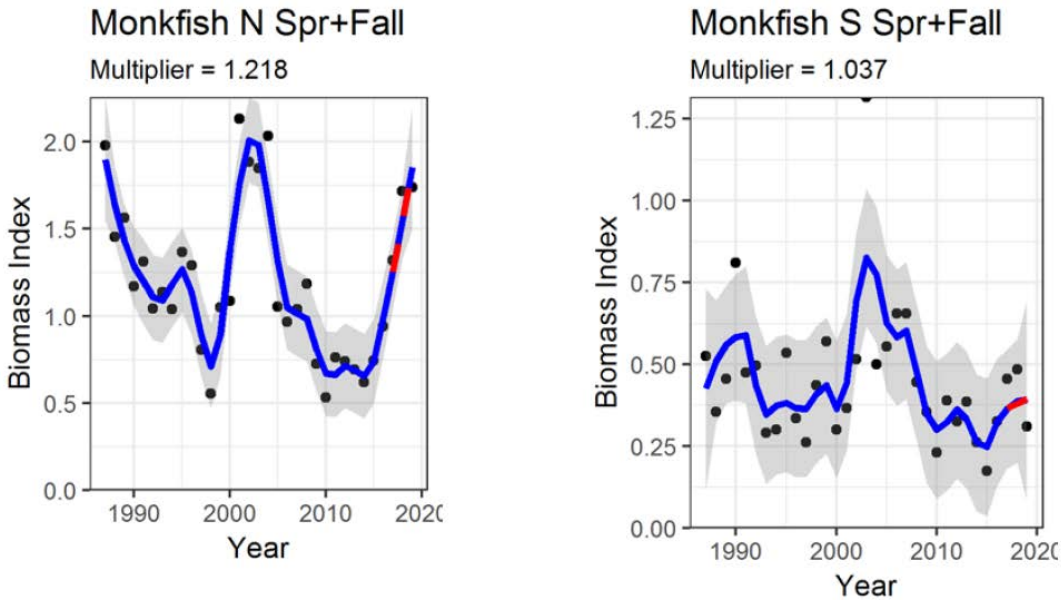
Monkfish (*Lophius americanus*), also called goosefish, occur in the Northwest Atlantic Ocean from the Grand Banks and northern Gulf of St. Lawrence south to Cape Hatteras, North Carolina (Collette & Klein-MacPhee 2002). Seasonal onshore-offshore migrations occur (from inshore areas to depths of at least 900 m) and appear to be related to spawning and possibly food availability (Richards *et al.* 2008). Stock structure is not well understood, but two assessment and management areas for monkfish, northern and southern, were defined in 1999 through the original Fishery Management Plan based on patterns of recruitment and growth and differences in how the fisheries are prosecuted (NEFSC 2020).

STATUS OF THE STOCKS

An overfishing limit (OFL) for each the northern and southern monkfish stocks has been defined as the product of the fishing mortality threshold (F_{max}) and the current estimate of exploitable biomass ($B_{current}$). The stock assessments in 2010 and 2013 concluded that the northern and southern monkfish stocks were not overfished, and overfishing was not occurring but recognized substantial uncertainty in this determination. After the 2013 assessment, the OFLs were lowered for FY 2014-2016 to 17,805 mt and 23,204 mt for the northern and southern stocks, respectively.

The stock assessments in 2016 and 2019 did not update the growth model that had been used since 2007 to assess the monkfish stocks after its use was rejected by age validation research in 2016. Instead, the stocks were assessed using the "Plan Bsmooth" method. These assessments concluded that many of the biological reference points were no longer appropriate due to invalidation of the growth model, and thus were not updated. Stock status has been unknown since 2016 and the OFLs have remained at the levels set for FY 2014. The 2019 assessment determined that a strong recruitment event in 2015 led to an increase in biomass in 2016-2018 (Figure 1), though abundance declined in 2019 as recruitment returned to average levels (NEFSC 2020; Richards 2016). Stock status was not updated in 2019 but will be revisited with updated data in the 2022 Monkfish Management Track Assessment, which will be peer reviewed in September 2022.

Figure 1. Results of "Plan Bsmooth" analysis from 2019 monkfish assessment (NEFSC 2020).



Note: Points are observed biomass indices, lines are loess-smoothed indices, "multiplier" is slope of log-linear regression through terminal three smoothed points. Results using spring and fall indices.

MANAGEMENT SYSTEM

The monkfish fishery in U.S. waters has been jointly managed since 1999 under the Monkfish Fishery Management Plan (FMP) by the NEFMC and the Mid-Atlantic Fishery Management Council (MAFMC), with the NEFMC having the administrative lead. The fishery extends from Maine to North Carolina out to the continental shelf margin. The fishery is managed as two separate stocks; the Northern Fishery Management Area (NFMA) covers the Gulf of Maine (GOM) and northern part of Georges Bank (GB), and the Southern Fishery Management Area (SFMA) extends from the southern flank of GB through the Mid-Atlantic Bight to North Carolina. The fishery is primarily managed with a yearly allocation of days-at-sea (DAS) and landing limits.

Specifications follow a hierarchy of an acceptable biological catch (ABC), and an annual catch limit (ACL) set equal to the ABC, an annual catch target (ACT) set equal to 97% of the ACL, and total allowable landings (TAL) set equal to the difference between the ACT and expected discards. These specifications are set for each management area to reduce the likelihood of the ACL being exceeded. The NFMA monkfish fishery is closely integrated with the Northeast multispecies fishery, and is primarily a trawl fishery, while the SFMA fishery is primarily a gillnet fishery targeting monkfish (with some vessels also landing skates). The differences between the two areas have resulted in some variations in management measures, such as landing limits and DAS restrictions.

Fishery specifications are set every three years. For FY 2020-2022, the ABC in the NFMA increased by 10% and was status quo in the SFMA relative to FY 2017-2019 (Table 1). The discard rate and expected discards for the NFMA increased modestly from the FY 2017-2019 specifications (13.9% to 18.2%), but the increase in the SFMA was more pronounced (24.6% to 50.8%). The large increase in SFMA discards is likely due to the large 2015-year class and predominantly the discards in dredge gear.

Table 1. Specifications for FY 2020-2022 (Framework 12).

	Northern FMA (mt)	Southern FMA (mt)
ABC = ACL	8,351	12,316
ACT (97% of ACL)	8,101	11,947
Expected Discards	(-18.2%) 1,477	(-50.8%) 6,065
Federal TAL (ACT – discards)	6,624	5,882

FISHERY PERFORMANCE

Permits and Vessels

The Monkfish FMP has seven types of federal permits: six categories of limited access permits (A-D, F, H) and one open access permit (E, Table 2). The number of fishing vessels with limited access monkfish permits has decreased over the past decade, from 670 to 562 (Table 3). Of those vessels, about 35-48% landed over 1 lb of monkfish each year and about 9-20% landed ≥ 10,000 lb of monkfish. Permit category C and D vessels consistently accounted for the greatest portion of vessels with monkfish permits and landing monkfish (Table 3, Table 4).

Fishery Effort

Effort controls such as possession limits and Days-at-Sea (DAS) are used to help ensure that the fishery landings remain within the TAL. Framework 10 established the possession limits and DAS allocations for FY 2017-2019, and these remain unchanged through FY 2022.

Table 2. Monkfish permit categories.

Permit Category		Description
Limited Access	A	DAS permit that *does not* also have a groundfish or scallop limited access permit (possession limits vary with permit type).
	B	
	C	DAS permit that *also* has a groundfish or scallop limited access permit (possession limits vary with permit type).
	D	
	F	Seasonal permit for the offshore monkfish fishery.
	H	DAS permit for use in the Southern Fishery Management Area *only*.
Open Access	E	Open access incidental permit.

Table 3. Fishing vessels with federal monkfish permits, with number of vessels landing over 1 lb and 10,000 lb, FY 2012-2021.

Permit Category	2012			2015			2018			2021		
	All	>1lb	>10K lb	All	>1lb	>10K lb	All	>1lb	>10K lb	All	>1lb	>10K lb
A	22	6	4	22	4	*	20	*	*	18	8	6
B	44	9	5	42	4	*	38	6	4	38	19	15
C	295	148	60	267	128	30	268	110	30	255	114	42
D	292	94	28	242	59	10	226	77	18	229	115	50
F	9	6	4	17	9	*	17	14	4	14	13	0
H	8	5	4	8	6	5	7	6	3	8	*	0
Total LA	**670**	**268**	**105**	**598**	**210**	**51**	**576**	**214**	**60**	**562**	**270**	**113**
E	1,743	338	19	1,578	247	8	1,525	247	20	1,485	176	7

Source: GARFO Permit database and DMIS as of April 2022.

Table 4. Proportion of monkfish landings by permit category to total monkfish landings in the year, FY 2012-2021.

Permit Category	2012	2015	2018	2021
A and B	15%	13%	16%	12%
C and D	75%	80%	77%	83%
F	2%	2%	1%	>1%
H	1%	1%	1%	0%
E	7%	5%	5%	4%
All	**100%**	**100%**	**100%**	**100%**
Source: GARFO Permit database and DMIS as of April 2022.				

Use of Days-At-Sea Allocated

DAS allocations have remained the same since FY 2017 (FW10). Limited access vessels are allocated 45.2 monkfish DAS per vessel per fishing year, 37 of which can be used in the Southern Fishery Management Area. An average of 575 permits were allocated DAS between FY 2019 – FY 2021, where permit categories C and D accounted for the greatest number of allocated DAS with about 10-11,000 DAS allocated for each (Table 5). There is a substantial amount of latent effort in the monkfish fishery; the number of DAS used is far below the DAS allocated. Further, the percentage of vessels that used at least one monkfish DAS varies by permit category. Of the Permit Category A and B vessels, 52-64% used at least one DAS in FY 2019-2020, but that decreased to 28-38% in FY 2021. The Category C and D vessels had more stable participation, but was generally lower, 4-18% these past three fishing years.

Table 5. Monkfish DAS usage, FY 2019 – 2021.

Permit Category	All Vessels			Vessels that used ≥ 1 DAS
	Total Vessels	DAS Allocated	DAS Used	
FY 2019				
A	21	909	385	11 (52%)
B	39	1,689	750	25 (64%)
C	273	11,821	583	24 (9%)
D	238	10,305	850	42 (18%)
FY 2020				
A	15	650	193	9 (60%)
B	37	1,602	444	23 (62%)
C	268	11,604	334	17 (6%)
D	229	9,916	490	32 (14%)
FY 2021				
A	18	779	130	5 (28%)
B	37	1,602	280	14 (38%)
C	255	11,042	177	11 (4%)
D	223	9,656	397	24 (11%)
Source: GARFO Vessel Permits and Allocation Management System (AMS) databases, accessed March 2022. *Notes:* Permit categories F and H account for a minor number of permits, DAS allocated, and DAS used, thus, are not included in table.				

Fishery Catch

Methods for Calculating Catch

Total Discards. Historically, monkfish discards have been calculated two ways: i) by GARFO following the close of the fishing year for end of year ACL accounting and ii) by NEFSC by calendar year during the assessment process. Methods for calculating discards are evolving towards a unified estimate from GARFO and the NEFSC using the Catch Accounting and Monitoring System (CAMS), but the discard data presented in this report were calculated as follows:

- For ACL accounting (Table 6), GARFO estimates discards using a Cochran discard ratio estimator with observed trips stratified by gear, mesh group, management area and half year. Discard ratios estimated from observed trips were then applied to stratified unobserved trips to estimate discards on unobserved trips. Total discards were calculated by using the estimates of observed discards on observed trips and using the calculated rate and trip K_{all} on unobserved trips. Monkfish discard mortality was assumed to be 100% across all gear types, although recent research suggests that monkfish discard mortality may be lower, at least in the scallop dredge fishery (Weissman *et al.* 2021).
- For the 2020 assessment (Figure 2), the NEFSC estimated discards by gear, half year and management area using observer data. For otter trawls and gillnets, the observed monkfish discard-per-kept-monkfish ratio is expanded to total monkfish discards. For scallop dredges and shrimp trawls, the observed monkfish discard-per-all-kept-catch ratio is expanded to total monkfish discards. Monkfish discard mortality was also assumed to be 100% across all gear types in NEFSC estimates of monkfish discards. These discard methods are being reevaluated in the 2022 assessment.

Total Landings. Total landings of monkfish were calculated by GARFO using the CFDERS dealer dataset after the close of the fishing year for both commercial and state permits.

Recreational Catch. Recreational catch was calculated from the MRIP database. Monkfish recreational discard mortality was assumed to be 100%.

Total Catch – Year-End ACL Accounting

From FY 2017-2021, the ACL was exceeded in the NFMA twice and never in the SFMA (Table 6). Commercial landings were 74-90% of total catch in the NFMA and 37-59% in the SFMA. State landings, defined as vessels that have never had a federal fishing permit (permit # = 000000), consistently make up under 0.5% of catch. Recreational catch is consistently under 5% of catch. In the NFMA, discards were 9% of catch in FY 2017 and have since fluctuated between 20-26% of catch. In the SFMA, discards were 51-58% of catch FY 2017-2019, lowered to 36% in FY 2020, but increased again to 62% in FY 2021.

Table 6. Year-end monkfish annual catch limit (ACL) accounting, FY 2017-2021.

Catch accounting element	Pounds	Metric tons	% of catch	% of ACL
FY 2017				
Northern Fishery Management Area (ACL = 7,592 mt)				
Commercial landings	15,003,103	6,805	90%	89.6%
State-permitted only vessel landings	60,031	27	0.4%	0.4%
Estimated discards	1,567,883	711	9%	9.4%
Recreational catch	11,725	5.3	0.1%	0.1%
Total Northern monkfish catch	**16,642,742**	**7,549**	**100%**	**99.4%**
Southern Fishery Management Area (ACL = 12,316 mt)				
Commercial landings	8,392,979	3,807	42%	30.9%
State-permitted only vessel landings	66,936	30	0.3%	0.2%
Estimated discards	11,531,614	5,231	58%	42.5%
Recreational catch	1,627	1	0.0%	0.0%
Total Southern monkfish catch	**19,993,156**	**9,068**	**100%**	**73.6%**
FY 2018				
Northern Fishery Management Area (ACL = 7,592 mt)				
Commercial landings	13,237,011	6,004	74%	79.1%
State-permitted only vessel landings	37,468	17	0.2%	0.2%
Estimated discards	4,666,815	2,117	26%	27.9%
Recreational catch	6,977	3	0.0%	0.0%
Total Northern monkfish catch	**17,948,271**	**8,141**	**100%**	**107.2%**
Southern Fishery Management Area (ACL = 12,316 mt)				
Commercial landings	10,133,407	4,596	45%	37.3%
State-permitted only vessel landings	64,841	29	0.3%	0.2%
Estimated discards	11,505,833	5,219	51%	42.4%
Recreational catch	742,988	337	3.3%	2.7%
Total Southern monkfish catch	**22,447,069**	**10,181**	**100%**	**82.7%**
FY 2019				
Northern Fishery Management Area (ACL = 7,592 mt)				
Commercial landings	13,673,898	6,202	79%	81.7%
State-permitted only vessel landings	16,474	7	0.1%	0.1%
Estimated discards	3,418,346	1,551	20%	20.4%
Recreational catch	164,771	75	1.0%	1.0%
Total Northern monkfish catch	**17,273,489**	**7,835**	**100%**	**103.2%**
Southern Fishery Management Area (ACL = 12,316 mt)				
Commercial landings	8,236,922	3,736	42%	30.3%
State-permitted only vessel landings	66,673	30	0.3%	0.2%
Estimated discards	11,174,259	5,069	57%	41.2%
Recreational catch	11,410	5	0.1%	0.0%

Total Southern monkfish catch	**19,489,264**	**8,840**	**100%**	**71.7%**
FY 2020				
Northern Fishery Management Area (ACL = 8,351 mt)				
Commercial landings	11,684,519	5,300	77%	63.5%
State-permitted only vessel landings	13,416	6	0.1%	0.1%
Estimated discards	3,503,282	1,589	23%	19.0%
Recreational catch	23,077	10	0.1%	0.1%
Total Northern monkfish catch	**15,224,294**	**6,905**	**100%**	**82.7%**
Southern Fishery Management Area (ACL = 12,316 mt)				
Commercial landings	4,944,794	2,243	59%	18.2%
State-permitted only vessel landings	20,749	9	0.2%	0.1%
Estimated discards	3,078,040	1,396	36%	11.3%
Recreational catch	359,987	163	4.3%	1.3%
Total Southern monkfish catch	**8,453,570**	**3,834**	**100%**	**31.1%**
FY 2021				
Northern Fishery Management Area (ACL = 8,351 mt)				
Commercial landings	11,496,640	5,215	75%	62.4%
State-permitted only vessel landings	18,511	8	0.1%	0.1%
Estimated discards	3,857,341	1,750	25%	21.0%
Recreational catch	7	0	0.0%	0.0%
Total Northern monkfish catch	**15,372,499**	**6,973**	**100%**	**83.5%**
Southern Fishery Management Area (ACL = 12,316 mt)				
Commercial landings	4,338,159	1,968	37%	16.0%
State-permitted only vessel landings	32,185	15	0.3%	0.1%
Estimated discards	7,278,106	3,301	62%	26.8%
Recreational catch	30,056	14	0.3%	0.1%
Total Southern monkfish catch	**11,678,506**	**5,298**	**100%**	**43.0%**

Notes:

- "Commercial landings" includes all monkfish landings by vessels with a permit number greater than zero and party/charter landings sold to a federal dealer.
- "State-permitted only vessel landings" are landings from vessels that never had a federal fishing permit (so the permit #=0).
- "Recreational catch" includes landings and discards from party charter vessels and private anglers, not sold to a federal dealer.

Source: Commercial fisheries dealer and Northeast Fishery Observer Program databases: FY 2017 data accessed 10/2018; FY 2018 accessed 3/2020; FY 2019 accessed 3/2021; FY 2020 accessed 4/22; FY 2021 accessed 7/2022; also Marine Recreational Information Program database.

FY 2021 Landings

For FY 2021, 79% of the TAL was landed in the northern area and 34% in the southern area (Table 7). In the northern area, monthly landings were lower in May-November 2021 relative to December-March (312-417 lb/month vs. 501-654 lb/month). Otter trawls accounted for 63% of the FY 2021 landings to date. In the southern area, monthly landings were highest in May and June 2021 (439-535 lb/month), then dropped to a low in July-November (9-59 lb/month), then have been moderate since December (117-227 lb/month).

Table 7. FY 2021 Preliminary commercial monkfish landings by stock area and gear type: May 2021 – April 2022 (landings in live weight).

	MAY - 2021	JUN - 2021	JUL - 2021	AUG - 2021	SEP - 2021	OCT - 2021	NOV - 2021	DEC - 2021	JAN - 2022	FEB - 2022	MAR - 2022	APR - 2022	May–April, FY2021		FY 2021*		FY 2020*		Fishing Year* Landings
													Metric Tons	Percent of Area	April, 21 as a % of Target TAL	Target TAL Metric Tons	April, 20 as a % of Target TAL	Target TAL Metric Tons	Metric Tons
NORTHERN	312	417	364	348	372	338	342	539	549	501	637	509	5,228	73%	79%	6,624	80%	6,624	
OTTER TRAWL	280	294	206	167	206	234	280	493	530	482	614	464	4,250	59%	64%		70%		
GILLNET	25	103	150	178	164	96	58	45	18	14	8	45	904	13%	14%		9%		
DREDGE	0	1	3	2	1	8	3	1	1	0	0	0	20	0%	0%		0%		
OTHER GEARS	7	19	5	1	1	0	1	0	0	5	15	0	54	1%	1%		1%		
SOUTHERN	535	439	59	19	9	9	24	227	117	120	236	188	1,982	27%	34%	5,882	39%	5,882	
OTTER TRAWL	26	14	7	1	5	6	11	43	36	41	42	30	262	4%	4%		7%		
GILLNET	443	342	29	8	0	1	11	153	63	62	187	150	1,449	20%	25%		29%		
DREDGE	39	30	23	10	4	2	1	11	9	4	2	7	142	2%	2%		3%		
OTHER GEARS	27	53	0	0	0	0	1	20	9	13	5	1	129	2%	2%		1%		
ALL AREAS	847	856	423	367	381	347	366	766	666	621	873	697	7,210	100%					
OTTER TRAWL	306	308	213	168	211	240	291	536	566	523	656	494	4,512	63%					
GILLNET	468	445	179	186	164	97	69	198	81	76	195	195	2,353	33%					
DREDGE	39	31	26	12	5	10	4	12	10	4	2	7	162	2%					
OTHER GEARS	34	72	5	1	1	0	2	20	9	18	20	1	183	3%					
LANDINGS - ALL AREAS																			
Fishing Year 2021	847	856	423	367	381	347	366	766	666	621	873	697	6,513						
Fishing Year 2020	815	1,096	464	413	373	459	574	596	881	570	683	681	6,924						7,605
Fishing Year 2019	1,506	1,221	786	541	505	590	558	888	1,086	1,004	720	555	9,405						9,960
Fishing Year 2018	1,423	1,215	620	531	534	767	666	1,068	998	851	1,021	1,074	9,694						10,768
Fishing Year 2017	1,067	1,153	607	654	634	953	780	1,122	1,057	1,004	607	697	9,638						10,319
Fishing Year 2016	1,417	1,069	511	420	358	447	713	887	880	912	939	1,239	8,553						9,792
Fishing Year 2015	1,256	963	590	431	389	482	578	848	594	755	992	935	7,878						8,813
Fishing Year 2014	1,313	1,149	453	415	357	463	654	900	824	395	785	1,110	7,708						8,818
Fishing Year 2013	1,232	919	522	350	412	556	745	952	630	765	756	845	7,839						8,684
Fishing Year 2012	1,574	1,266	502	394	439	672	547	806	733	530	654	988	8,116						9,104
Fishing Year 2011	1,044	1,066	542	338	385	530	809	982	867	1,000	929	1,008	8,491						9,499
Fishing Year 2010	928	839	422	306	282	350	561	643	716	712	730	830	6,488						7,318
Fishing Year 2009	1,253	1,182	647	396	331	479	554	418	753	696	644	795	7,353						8,148
Fishing Year 2008	1,641	1,359	674	537	539	665	808	812	1,084	703	634	824	9,455						10,279
Fishing Year 2007	1,413	1,206	917	776	695	934	1,163	1,314	1,088	897	737	1,090	11,140						12,230
Fishing Year 2006	1,314	1,490	1,181	909	880	1,104	1,140	1,130	967	671	951	848	11,738						12,586
Fishing Year 2005	2,040	3,040	1,862	1,487	1,343	1,100	1,616	1,413	1,523	1,143	1,309	1,313	17,876						19,189
Fishing Year 2004	1,806	1,979	1,581	1,380	1,304	1,243	1,803	1,681	1,264	1,173	1,235	1,478	16,449						17,927
Fishing Year 2003	2,681	3,199	1,913	1,746	1,420	2,253	2,823	1,907	1,976	2,386	2,172	1,797	24,475						26,273
Fishing Year 2002	1,574	2,093	1,489	1,382	1,524	1,643	1,937	2,203	2,015	1,762	2,631	1,553	20,255						21,807

Source: GARFO quota monitoring website, accessed July 2022.

Landings Relative to TAL

The NFMA has had a higher TAL and higher possession limits relative to the SFMA. Landings relative to TAL in the NFMA have been between 79-107% since FY 2016 (Table 8), which could be a combination of revised management measures (possession limits) and the large 2015-year class. The NFMA TAL was increased by 10% for FY 2020-2022 (relative to FY 2017-2019) and the individuals from the 2015-year class have grown large enough to be retained by the fishery and are less likely to be discarded because of minimum size regulations. The landings relative to TAL in the SFMA have been lower than the NFMA, between 34-51% since FY 2016.

Table 8. Recent landings (live weight, mt) in the NFMA and SFMA compared to target TAL.

Fishing Year	Northern Area			Southern Area		
	TAL (mt)	Landings (mt)	Percent of TAL achieved	TAL (mt)	Landings (mt)	Percent of TAL achieved
2014	5,854	3,403	58%	8,925	5,415	61%
2015	5,854	4,080	70%	8,825	4,733	53%
2016	5,854	5,447	93%	8,925	4,345	49%
2017	6,338	6,807	107%	9,011	3,802	42%
2018	6,338	6,168	97%	9,011	4,600	51%
2019	6,338	6,211	98%	9,011	3,785	42%
2020	6,624	5,299	80%	5,882	2,294	39%
2021	6,624	5,228	79%	5,882	1,982	34%
Source: GARFO quota monitoring data, accessed July 2022.						

Landings and Discards by Gear Type

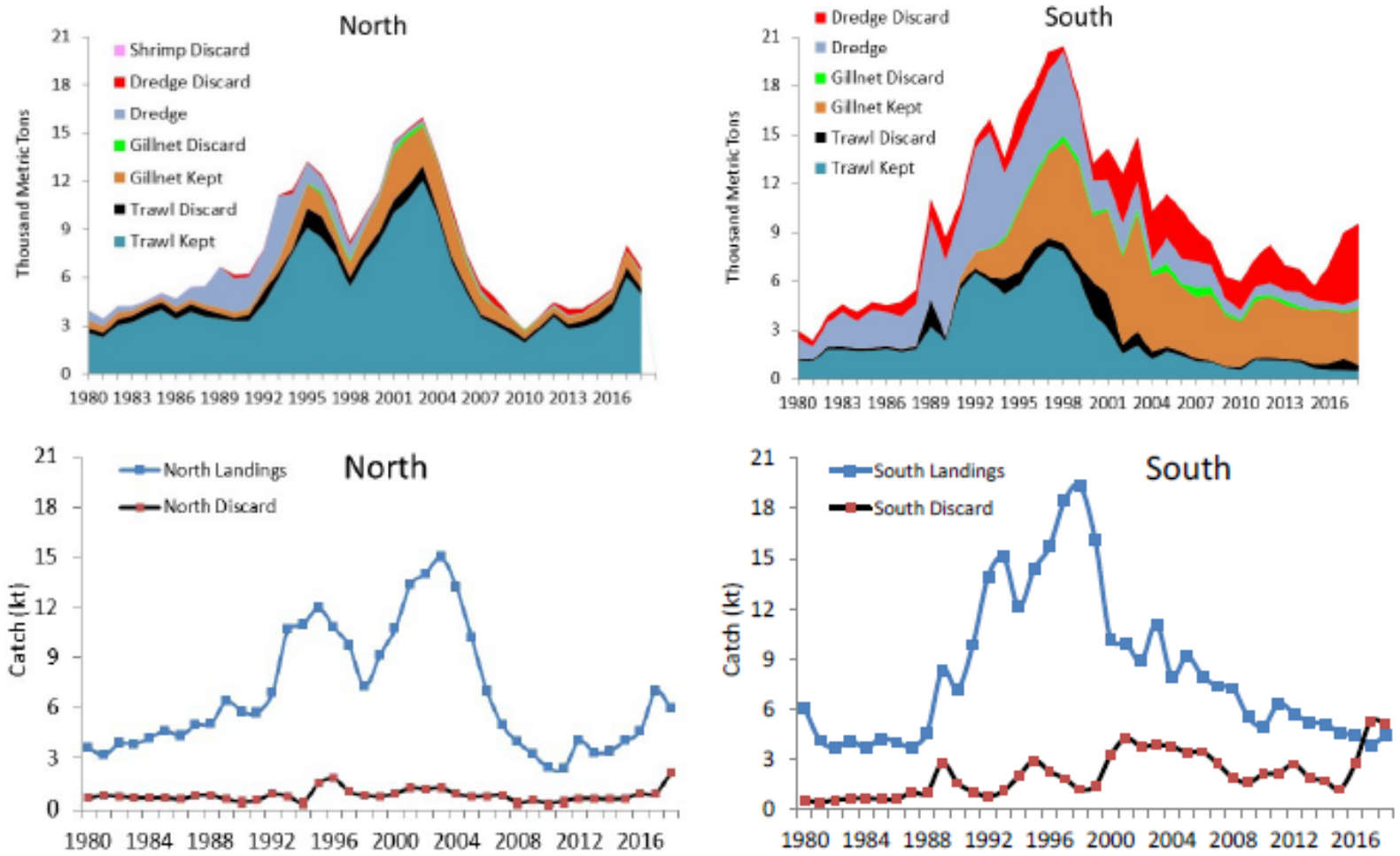
The northern and southern areas have distinctions in terms of gear type. Since at least 1980, monkfish landings in the northern area have largely been by vessels using trawls (Figure 2). In the southern area, landings were primarily by vessels using dredges and trawls from 1980 to the early 1990s.[1] Through the 1990s and to today, gillnets have been the predominant gear for vessels landing monkfish. Discards have traditionally been higher in the south relative to the north, and recently, southern discards have approximated or exceeded landings. Since FY 2018, discards in the north and south have largely been from scallop dredges, with lesser amounts by otter trawl, gillnets, and other gears (Table 9).

Table 9. Average monkfish discards by gear type, FY 2018-2021.

	Scallop Dredge	Otter Trawl	Gillnet	Other
Northern Area	52%	23%	13%	13%
Southern Area	83%	8%	3%	6%
Source: CAMS, accessed July 2022.				

[1] Monkfish Committee notes this is likely due to new monkfish possession limits intended to rebuild the southern monkfish stock that made the offshore trawl fishery less feasible.

Figure 2. Monkfish landings and discards by gear type (top panel) and total (bottom panel) for North (left) and South (right), CY 1980-2019.



Source: NEFSC (2020, Figure D5).

Revenue

Monkfish fishery revenue has generally declined in recent years, from $42.2M in CY 2005 to $10.3M in CY 2021 (Table , not adjusted for inflation). Since at least CY 2011, about half of this revenue is from trips where monkfish was over 50% of total revenue (Table 11). There is a declining number of vessels that had trips where the monkfish revenue was over 50% of total revenue, from 206 in CY 2011 to 76 in CY 2021. CY 2020 and 2021 were particularly low revenue years. Monkfish price per live pound has been on a declining trend since 2010, though prices have been increasing within the last year (Figure 3). Seasonally, prices tend to be lower in spring to summer months and higher in fall to winter.

Table 10. Total monkfish revenue, CY 2005-2021.

Calendar Year	Revenue	Calendar Year	Revenue
2005	$42.2M	2014	$18.7M
2006	$38.0M	2015	$19.1M
2007	$28.9M	2016	$20.0M
2008	$27.2M	2017	$18.4M
2009	$19.6M	2018	$14.8M
2010	$19.2M	2019	$14.5M
2011	$26.6M	2020	$9.3M
2012	$27.1M	2021	$10.3M
2013	$18.7M		

Source: ACCSP data, accessed April 2022.
Note: Revenues not adjusted for inflation.

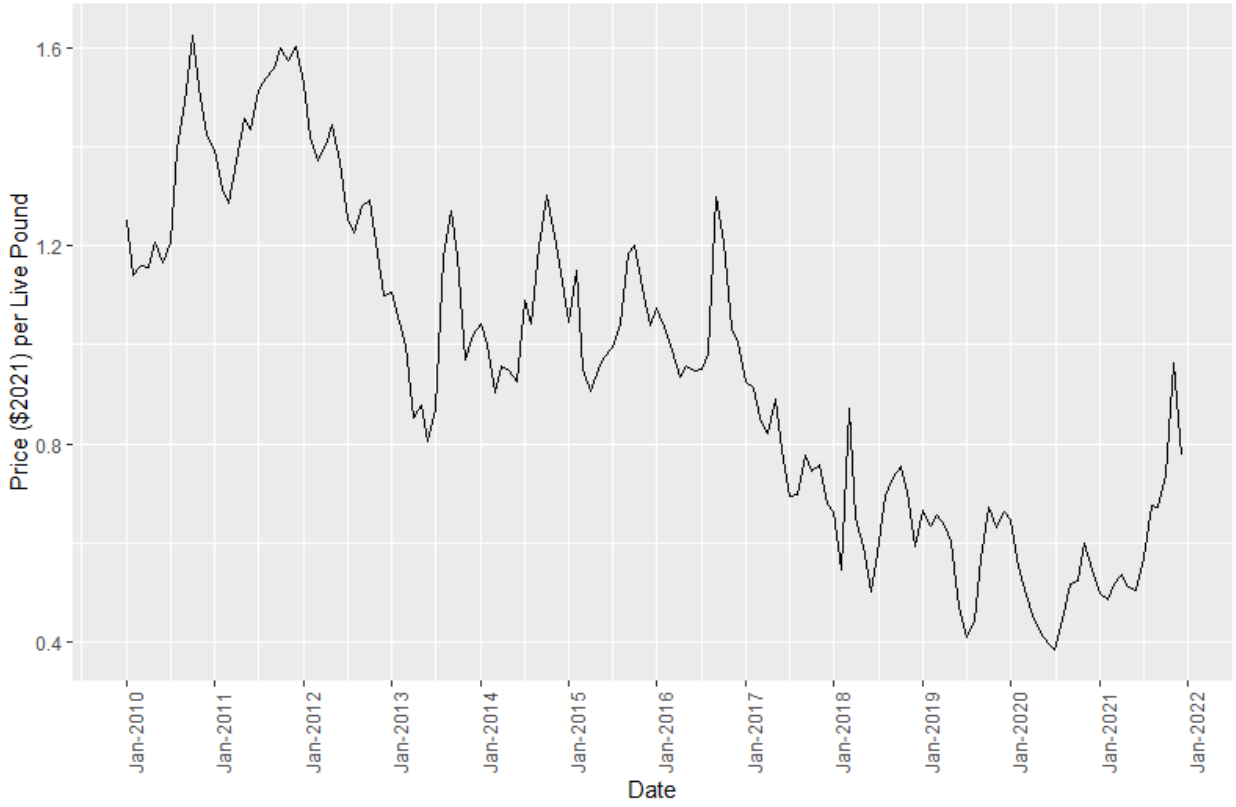
Table 11. Monkfish revenue and revenue dependence on trips where over 50% of revenue is from monkfish, CY 2011-2021.

Calendar Year	Vessels	Monkfish Revenue		Non-Monkfish Revenue		Total Revenue	% Monkfish
		Total	Per vessel	Total	Per vessel		
2011	206	$17,205,690	$83,523	$3,494,295	$16,963	$20,699,985	83%
2012	196	$15,769,087	$80,455	$3,478,988	$17,750	$19,248,075	82%
2013	164	$9,369,415	$57,131	$2,515,464	$15,338	$11,884,878	79%
2014	173	$9,695,813	$56,045	$3,169,701	$18,322	$12,865,514	75%
2015	140	$9,708,039	$69,343	$2,381,412	$17,010	$12,089,451	80%
2016	127	$10,057,253	$79,191	$2,039,105	$16,056	$12,096,359	83%
2017	135	$9,866,710	$73,087	$2,651,370	$19,640	$12,518,080	79%
2018	108	$7,293,408	$67,532	$1,730,010	$16,019	$9,023,418	81%
2019	96	$7,314,437	$76,192	$1,992,488	$20,755	$9,306,926	79%
2020	70	$2,813,271	$40,190	$1,036,824	$14,812	$3,850,094	73%
2021	76	$3,611,791	$47,524	$1,057,492	$13,914	$4,669,283	77%

Source: NEFSC SSB.
Note: Revenues adjusted to 2021 USD.

Figure 3. Monthly monkfish price per live pound ($2021), 2010-2021

Source: NEFSC SSB, July 2022.



Fishing Communities

Primary and secondary monkfish fishing ports are identified for the Monkfish FMP. Based on the criteria below, there are six primary ports in the fishery (Table 12). Of these, the highest revenue ports are New Bedford, Gloucester, and Boston, MA (Table 13). There are 14 secondary ports. The primary and secondary ports comprised 66% and 28% of total fishery revenue, respectively, during 2010-2019. There are 138 other ports that have had more minor participation (6%) in the fishery recently. More community information is available from the NEFSC Social Sciences Branch website and in Clay et al. (2007).

Primary Port Criteria. The monkfish fishery primary ports are those that are substantially engaged in the fishery. The primary ports meet at least one of the following criteria:

1. At least $1M average annual revenue of monkfish during 2010-2019, or
2. Ranking of very high (factor score ≥ 5)[2] for engagement in the monkfish fishery on average in 2016-2020, using the NOAA Fisheries Community Social Vulnerability Indicators (Table).

Secondary Port Criteria. The monkfish fishery secondary ports are involved to a lesser extent. The secondary ports meet at least one of the following criteria:

1. At least $100,000 average annual revenue of monkfish, 2010-2019, or
2. A ranking of high (factor score 1-4.99) for engagement in the monkfish fishery on average in 2016-2020, using the NOAA Fisheries Community Social Vulnerability Indicators (Table).

[2] A score of 1.0 or more places the community at 1 standard deviation above the mean.

Table 12. Primary and secondary ports in the monkfish fishery.

State	Port	Average revenue 2010-2019		Monkfish Engagement, 2016-2020		Primary/ Secondary
		>$100K	>$1M	High	Very High	
ME	Portland	√		√		Secondary
NH	Portsmouth	√		√		Secondary
MA	Gloucester		√		√	Primary
	Boston		√		√	Primary
	Scituate	√		√		Secondary
	Chatham	√		√		Secondary
	Harwichport	√		√		Secondary
	New Bedford		√		√	Primary
	Westport	√		√		Secondary
RI	Little Compton	√		√		Secondary
	Newport	√		√		Secondary
	Narragansett/Point Judith		√		√	Primary
CT	New London	√		√		Secondary
NY	Montauk	√			√	Primary
	Hampton Bays/ Shinnecock	√		√		Secondary
NJ	Point Pleasant	√		√		Secondary
	Barnegat Light/Long Beach		√	√		Primary
	Cape May			√		Secondary
VA	Chincoteague	√				Secondary
	Newport News			√		Secondary

Table 13. Fishing revenue (unadjusted for inflation) and vessels in top Monkfish ports by revenue, calendar years 2010-2019.

Port	Average revenue, 2010-2019			Total active monkfish vessels, 2010-2019
	All fisheries	Monkfish only	% Monkfish	
New Bedford, MA	$368,627,420	$4,240,639	1%	**479**
Gloucester, MA	$48,514,248	$2,924,748	6%	**190**
Boston, MA	$15,999,540	$1,809,192	11%	**44**
Pt. Judith, RI	$47,753,305	$1,604,760	3%	**214**
Long Beach, NJ	$26,124,402	$1,459,529	6%	**74**
Chatham, MA	$11,764,003	$817,736	7%	**57**
Little Compton, RI	$2,398,385	$802,384	33%	**31**
Montauk, NY	$17,192,554	$726,690	4%	**116**
Hampton Bay, NY	$5,746,477	$578,235	10%	**64**
Portland, ME	$24,798,943	$559,798	2%	**71**
Other (n=146)	$368,846,866	$3,750,338	1%	
Total	**$937,766,141**	**$19,274,049**	**2%**	

Source: NMFS Commercial Fisheries Database (AA data), accessed April 2022.
Note: "Active" defined as landing > 1 lb of monkfish.

The Engagement Index can be used to determine trends in a fishery over time. Those ports with very high monkfish engagement in 2016-2020, generally had very high engagement in 2006-2010 and 2011-2015, except for Boston, MA, which had increasing engagement over this time (Table 14). There are 14 ports that have had high or very high engagement during all three periods, indicating a stable presence in those communities. Annual data on port engagement is available at the Commercial Fishing Performance Measures website.

Table 14. Changes in monkfish fishery engagement over time for all ports with high engagement during at least one year, 2006-2020.

State	Community	Engagement Index			
		2006-2010	2011-2015	2016-2020	2020 only
ME	Portland	High	High	High	High
NH	Portsmouth	High	Med.-High	High	High
MA	Gloucester	Very High	Very High	Very High	Very High
	Boston	High	High	Very High	Very High
	Scituate	High	High	High	High
	Chatham	High	High	High	High
	Harwichport	Medium	Medium	High	High
	New Bedford	Very High	Very High	Very High	Very High
	Westport	Med.-High	High	High	Med.-High
RI	Tiverton	Med.-High	Medium	Medium	Medium
	Little Compton	High	High	High	High
	Newport	High	High	High	High
	Narragansett/Pt. Judith	Very High	Very High	Very High	Very High
CT	Stonington	Med.-High	Med.-High	Med.-High	High
	New London	Med.-High	High	High	High
NY	Montauk	Very High	Very High	Very High	High
	Hampton Bays/Shinnecock	High	High	High	High
NJ	Point Pleasant	High	High	High	High
	Barnegat Light/Long Beach	Very High	Very High	High	High
	Cape May	High	High	High	High
MD	Ocean City	High	High	Med.-High	Med.-High
VA	Chincoteague	High	High	Medium	Medium
	Newport News	Med.-High	High	High	High
NC	Wanchese	High	Med.-High	Med.-High	Med.-High
	Beaufort	Medium	Med.-High	Med.-High	Medium

Source: http://www.st.nmfs.noaa.gov/humandimensions/social-indicators/index.

Landings by State

During CY 2012-2021, monkfish were landed in 11 states, mostly in Massachusetts (61%), followed by Rhode Island (13%), and New Jersey (9%, Table). Massachusetts continues to account for the greatest proportion of all monkfish landings.

Table 15. Monkfish landings by state, CY 2012-2021.

STATE	Monkfish landings (mt)											
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total	
ME	488	115	257	345	243	178	219	170	411	442	**4,062**	4%
NH	57	86	74	38	50	68	123	119	175	213	**1,463**	2%
MA	5,247	3,812	4,972	4,303	4,227	4,581	5,067	5,943	6,306	6,057	**55,961**	61%
RI	1,303	1,598	2,122	1,495	1,488	1,819	1,648	1,560	1,412	2,306	**11,441**	13%
CT	347	305	457	547	724	380	464	275	246	324	**2,123**	2%
NY	841	766	1,059	1,183	773	748	827	1,193	829	1,005	**5,996**	7%
NJ	1,003	1,418	1,676	1,389	1,351	1,740	1,250	1,335	1,229	1,205	**7,946**	9%
DE	0										**0**	0%
MD	51	83	98	69	86	78	36	51	32	19	**285**	0%
VA	412	402	638	567	413	352	259	218	88	142	**1,748**	2%
NC	10	27	10	3	38	47	56	33	36	20	**244**	0%
Total	**9,758**	**8,612**	**11,365**	**9,940**	**9,394**	**9,992**	**9,949**	**10,897**	**10,765**	**11,735**	**91,271**	**100%**

Source: ACCSP database, accessed April 2022.

Research-Set-Aside Program

Monkfish regulations indicate that 500 DAS be made available for cooperative research through the Research-Set-Aside (RSA) program (this total is deducted from the 46 DAS allocated to each limited access permit; currently, each permit receives 45.2 DAS for commercial fishing). When the Experimental Fisheries Permit is approved for an RSA research project, the project has a DAS cap and poundage cap, calculated by setting each RSA DAS to be equal to double the possession limit for vessels with permit categories A and C fishing in the SFMA. For individual RSA trips, there is no possession limit, and vessels may not switch from using a monkfish DAS to an RSA DAS mid-trip.

Use of RSA DAS and landings allowed has generally declined since FY 2013 (Table 16). Of the three monkfish awards made in 2018/2019, one of the projects was successful in using almost all their DAS, while the other two less so. About half of the anticipated revenue was generated for research (~$200,000). Use of 2020 and 2021 RSA DAS has been low.

Table 16. Monkfish RSA awards compared to RSA landed catch, FY 2013-2021.

Fishing Year	DAS Awarded	DAS used	% DAS Used	Allowed (lb)	Landed (lb)	
2013	426	342	80%	1,363,200	1,207,174	89%
2014	500	354	71%	1,600,000	1,289,243	81%
2015	500	301	60%	1,600,000	1,290,238	81%
2016	500	332	66%	1,776,000	1,541,240	87%
2017	500	117	23%	1,776,000	679,180	38%
2018	500	285	57%	2,307,000	1,236,288	61%
2019	500	249	50%	2,307,000	1,024,955	50%
2020	500	Awards ongoing				
2021	500					

MONKFISH ADVISORY PANEL INFORMATION

The Advisory Panel was asked the following questions sequentially, but responses are organized below according to themes. These are the responses of individual AP members and may not reflect the experience or viewpoints of the entire AP, or the fishery at-large, and have not been independently verified. This summary captures the flavor of the comments but should not be assumed to be direct quotes. A few explanatory footnotes have been added by the PDT. There are 12 AP members; of the ten active monkfish fishermen on the AP, most are from ports south of Massachusetts and most fish in the SFMA, though a few may also fish in the NFMA.

1. *What factors have influenced recent fishing activity and how (e.g., domestic and foreign markets, costs, environment, fish distribution, regulations)?*
2. *How might these factors change in FY 2022? How do you expect the fishery to adjust?*
3. *How has the global pandemic changed the fishery? Do you see the fishery returning to a pre-pandemic state or is there a new normal emerging?*
4. *Considering the fishery data, are there specific regional or port differences in fishery performance that are important?*
5. *Are the current fishery regulations appropriate? How could they be improved and how would the improvements affect the fishery?*
6. *Have any recent regulatory changes affected the fishery and how (e.g., implemented in 2020, vessels using the Interactive Voice Response system now must submit a trip declaration within an hour of leaving port, like vessels using the Vessel Monitoring System)?*
7. *What would you recommend as research priorities?*
8. *What is hindering the use of RSA DAS to raise funds for monkfish research? How might the Monkfish RSA program improve?*
9. *What else is important for the Council to know (e.g., impacts of right whale regulations, offshore wind development)?*

Market prices and demand. Low monkfish prices have been the major factor driving the fishery in recent years. Markets have closed. The pandemic has been a factor in reducing demand, however, prices were decreasing well beforehand. For example, a New Jersey-based processor had been a significant buyer of monkfish, but demand for exports has dropped. Monkfish had been exported to Korea,[3] but the demographics of that country are changing and there is less desire among the younger generations there for monkfish. There needs to be efforts to find new markets to build prices back up. There seems to be a small increase in monkfish prices this year, which is encouraging.

Costs increasing relative to price. The costs for fuels, buoys, gillnets, and other gear have increased substantially. Sometimes necessary gear replacements have not been available. It used to be possible to buy a gillnet for $150, but it is now more like $300 per net. Other costs to consider are the shoreside/shipping costs to transport landed fish to dealers and/or processors. For example, for boats landing on Long Island (e.g., Montauk and Shinnecock), the costs to ship monkfish to New Bedford are too high. It costs $0.38 per pound to ship, and the shipper can only get $0.30 for the fish. Fishermen have done that for the last few years but will not continue doing so.

Employment and economic impacts. It is getting increasingly difficult to find reliable captains and crew. With price declines and cost increases, it is difficult for wages to be competitive with onshore industries. Unseasoned captains tend to cause more gear damage, which drives up the cost of gear with buying new nets. The possession limits constrain the fishery to a daily income limit that is crippling. Inshore gillnetters are financially struggling. The market issues are solvable but being trapped in DAS daily income trap is killing us. Fishing is a tough lifestyle, and we must be able to pay people more than what

[3] Monkfish Committee notes the Korean market for whole monkfish developed in the mid-1990s.

they would make onshore and that is not happening. We are hiring people that 10 years ago we would not have hired; you take live bodies – good enough.

Recent regulatory changes. Starting in FY 2020, the ability to "preload" DAS was removed for vessels declaring trips with the Interactive Voice Response System (IVR),[4] has reduced flexibility and efficiency. Vessels can no longer "triple load" DAS and fish farther offshore. This change caught fishermen off guard, and AP members do not recall any discussion about this by the Council or people advocating for that change. Those vessels using IVR are primarily the small Category A and B gillnet vessels fishing in the south, not part of the groundfish fishery. This change is hurting this fleet and the change happened without warning.

Protected resources. There are several area closures, particularly for protected species, that have had negative impacts on the fishery. The last round of Atlantic Large Whale Take Reduction Team regulations did not go well for the lobster fishery, and there is much concern about potential new regulations targeting other pot gear and gillnets[5] that could put many vessels out of business. If there are large-scale closures, that could trump every other concern for the fishery.

Impacts of offshore development. In Rhode Island Sound, there were recently three or four years of geotechnical and geophysical surveying for wind farm development around the clock on top of Cox's Ledge. Some of that sonar equipment can penetrate the bottom up to 1 km deep. Fishermen were told that the surveys were not impacting the ecosystem, and less impactful than the fish finders used by fishing vessels, but that is difficult to believe. There is no doubt that these surveys had an effect. Fishermen must steam farther offshore now to make a living; we used to count on fishing on Cox's Ledge in the spring and early fall. However, the fall fishery is seemingly gone out of Rhode Island and southern Massachusetts. There are so many issues with wind. Skates are impacted by electromagnetic fields; monkfish impacts are unknown. With unexperienced crew, the captain will not be able to rest during transit due to navigation concerns.

Interaction with skates. When fishing on a Monkfish DAS, vessels are constrained by possession limits for monkfish and skates. Particularly when skate possession limits are low,[6] vessels get constrained by the skate possession limit and are unable to land the full limit for monkfish (e.g., if there are 12 gillnet panels loaded with skates, there will not be monkfish). Sometimes on a Monkfish DAS trip, the value of the skate or other landings can exceed monkfish. There are boats that go out on a Monkfish DAS to target skates because they do not have to go as far offshore in January-March. They will take a bycatch of monkfish at that point. Skates are a blessing overall, but they can be constraining as well. Especially in the spring, there is less monkfish landed because of the skate limits.

Regional differences. Southern boats are more limited by DAS and trip limits than northern boats, which have more DAS and unlimited possession limits when fishing on both a monkfish and groundfish DAS. Having the preloading option taken away (for the boats using IVR), has jeopardized use of the TAL even

[4] When the FY 2020 specifications were implemented, NOAA Fisheries clarified the trip declaration requirements such that vessels using IVR had to call in a trip no later than one hour ahead of leaving port (no timeframe was specified prior). This change made the call-in timeframe for vessels using IVR match that of vessels using the Vessel Monitoring System, so that declaration requirements were consistent across the monkfish fishery (no vessels can "preload" DAS now), and vessels using IVR could no longer use three DAS. This was an administrative change not developed by the Council.

[5] Phase 2 of the Atlantic Large Whale Take Reduction Plan is under development, and it is not yet known if/what restrictions will be placed upon the gillnet fishery to reduce risk of right whale entanglements.

[6] Since FY 2020, the skate wing possession limit has been 3,000 lb (wing weight) from May 1 – August 30 and 5,000 for the rest of the year. Possession limits were lower in years prior.

more. There are fishermen in Southern New England with monkfish Category C and D permits but fish in the southern management area and use IVR rather than VMS.

The impetus for having no monkfish possession limit when fishing on both a monkfish and groundfish DAS was to better use the monkfish TAL in the northern area and provide more revenue to groundfish vessels.[7] In the southern area, fishermen are looking to target monkfish, and abundance is not the issue. The issue is the DAS and landing limits; southern boats could be more efficient with more of both. There are fewer Category A vessels over time, and that is due to economics. Vessels are selling out or keeping tied to the dock.

Fishery adjustments. Because of the low ex-vessel revenue and cost increases, vessels have shifted fishing to more inshore areas to reduce operating costs. Vessels in the south have been fishing on skates and catching fewer monkfish as a result. With all these challenges, there are multiple vessel owners that are choosing to either not fish or be more selective in the seasons and/or areas they fish. Owners of multiple vessels used to run one vessel themselves, and hire a captain and crew for the other, but there is little of that going on now with crew, price, and cost issues.

In the southern area, there has not been much of a monkfish fishery for the last four years, whether that is due to wind farms or warmer waters; it is hard to be definitive. The fishery has become nonexistent; in October and November, there is nothing. That used to be a good time of year, but there is no point in putting nets out this fall. Some vessels will not set their gillnets until the price improves.

Most other fisheries are at record high prices (e.g., lobster, scallops), or their seasonal peak is what boats are getting now year-round (e.g., black sea bass, fluke). In the monkfish and skate fisheries, they generally both go to the same dealers. The prices are low, and it all must be exported. Maybe that is the problem, but dealers need to be helping find new inroads elsewhere. FY 2005-12 were good years; FY 2016-19 were not. Hopefully, dealers will look more to domestic markets. One dealer in Rhode Island is doing that. It is necessary, because the fishery has hit the bottom on what it can take for prices. Some of the price drop is related to the pandemic, but it is unfortunately the "new normal" until new markets can be developed.

Ideas for management improvements. The skate and monkfish fisheries should be managed together. Skates should not be an open access fishery and the Skate Committee does not control access to the fishery. Skate is limiting monkfish landings in the southern management area.

Like the Monkfish RSA program, there should be a running clock, so that if monkfish is caught it can be landed rather than wasted. This would help a lot of people out, and there would be fewer concerns about whales with less gear in the water. If a vessel has the DAS, it should be able to use as many on a trip as needed to not be wasteful and have lower bycatch. However, any increases should be considered with caution. While fishermen want more DAS and higher trip limits, there is a concern about the number of latent permits in the fishery, and potential incentives for vessels to reactivate if limits are raised. With a running clock, there is potential to land all the monkfish too early in the year, and that would drive prices down. A derby fishery should be avoided.

Ideas for research priorities. It is very important to develop domestic markets, so research to develop markets is key.[8] The pingers used on gillnets to deter harbor porpoise attract seals. The sound frequency that must be used in our area is not used in other parts of the world and is thought to be less successful at deterring seals. There should be research about the number of pingers per net that are necessary (fishery must use twice as many pingers as the manufacturer's specifications call for).

[7] This measure was implemented in Monkfish Framework 9 (2016).

[8] There is a project funded by the 2022 Saltonstall-Kennedy Grant Program on monkfish market development.

Dredge discards have been high and there could be research to reduce those discards, but notably, the 2015 year-class has moved through the fishery. Scallop vessels are not landing monkfish, because it is not economical to do so. There would be fewer discards if markets improve. There was recent research on discard mortality that showed the mortality rate is much lower than the 100% assumption (Weissman *et al.* 2021). Also, scallop fishing in the Mid-Atlantic is becoming more limited, which will reduce southern discards (e.g., area around the Mud Hole is now closed[9]).

Monkfish RSA program. The RSA DAS are not getting fished now due to economics. Boats are not able to fish their own DAS, let alone RSA. Because revenue and the ability to land large quantities of monkfish are both down (e.g., skate is limiting the monkfish fishery), there is less incentive to fish the RSA DAS. Hopefully, markets will improve soon. The program has been very good and has produced many useful research projects. Some of the fishermen awarded RSA DAS have had some complaints about the number of additional reporting requirements that disincentivizes applying for use of RSA DAS.

REPORT CONTRIBUTORS

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[9] Likely referring to the New York Bight scallop closure.

Monkfish-related excerpts...

2022 Management Track Peer Review Panel Report

Richard Merrick (Chair)[1], Matt Cieri[2], Yan Jiao[3], and Cate O'Keefe[4]

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Executive Summary

Eleven fish stock assessments were reviewed by the September 2022 Management Track peer review panel. Eight of these were Level 2 Expedited Reviews: Gulf of Maine and Georges Bank winter flounder (*Pseudopleuronectes americanus*), Atlantic halibut (*Hippoglossus hippoglossus*), Georges Bank haddock (*Melanogrammus aeglefinus*), north and south monkfish (*Lophius piscatorius*), Southern New England/MidAtlantic yellowtail flounder (*Limanda ferruginea*), and American plaice (*Hippoglossoides platessoides*). The remaining three stocks received Level 3 Enhanced Review: white hake (*Urophycis tenuis*), Gulf of Maine haddock (*Melanogrammus aeglefinus*), and pollock (*Pollachius virens*). Levels of review were as recommended by the Assessment Oversight Panel (Appendix A).

The Peer Review Panel (Panel) for the September 2022 Management Track Assessments met via webinar on September 19-22, 2022. The Panel was to determine whether the completed management track assessment was technically sufficient to (a) evaluate stock status, (b) provide scientific advice and (c) successfully address the assessment Terms of Reference (Appendix B). Tables 1 and 2 present a list of the stocks, names of the lead analyst/presenters, and conclusions about stock status and the assessment.

Attendance at the meeting is provided in Appendix C with the Agenda shown in Appendix D.

We thank Russ Brown (Population Dynamics Branch Chief) and Michele Traver (Assessment Process Lead) for their support during the meeting and to the staff of the Population Dynamics Branch at NEFSC for the open and collaborative spirit with which they engaged the Panel. Dr. Brown's presentation on Data Changes was especially appreciated.

Our thanks also extend to the rapporteurs for taking extensive notes during the meeting and to staff of the New England Fishery Management Council/NOAA Fisheries Greater Atlantic Regional Fisheries Office who provided context and additional background.

The Panel has suggestions for improvements that could be made for review of Management Track assessments:

1. The SASI portal is an incredible asset for these reviews, and we support its continued maintenance. It is not unusual for documents and data to change on the drive during the period of the review, and as such, it would be useful if a version control mechanism was implemented to allow the reviewers to be notified when changes are made to documents on the site.

2. For transboundary stocks, it would be useful to have a presentation of the science and management for the Canadian fishery.
3. For species with multiple stocks, consider providing an overview of stock status, structure, etc. at the beginning of the stocks' presentations.

The Panel also has several crosscutting recommendations with respect to the individual stock assessments:

1. Assessment analysts should consider splitting the bottom trawl time series into two stanzas – Albatross versus Bigelow for those stocks where calibration between the two vessels surveys results was weak (e.g., pollock and white hake).
2. The NEFSC Bottom Longline Survey should be continued and considered for incorporation in future stock specific Management Track assessments once the time-series has grown.
3. The ASMFC shrimp survey provides valuable information on early year-classes for several species and should continue to be supported by NOAA (and perhaps renamed to the "Summer Survey").
4. Reduction in Port sampling for individual lengths and age structures represents a significant threat to the stock assessment enterprise. NOAA should decide whether it can return Port sampling to levels comparable with those achieved prior to 2019. If they cannot, they should increase catch sampling by observers (either ASM or NEFOP) to balance the loss of these data.
5. NOAA should continue to evaluate the use of dynamic reference points with analytic assessments.
6. Assessments for stocks at very low abundance with low fishery mortality rates, showed sharp increases in abundance in projection years (e.g., Gulf of Maine winter flounder, SNE/MA yellowtail flounder). This is a highly uncertain prediction because these increases may be an artifact of the model considering that low fishing mortality directly leads to increased abundance.

The Panel considered general data changes that were applied across assessments, including:

1. Adaptation to survey indices resulting from the missing 2020 research surveys due to the Covid-19 pandemic;
2. Increased uncertainty in catch related indices resulting from reduced Port, NEFOP/ASM observer, and recreational intercept sampling in 2020;
3. Use of the Catch Accounting and Monitoring System (CAMS) data for commercial landings for 2020 and 2021; and
4. Revised swept-area adjusted survey indices for the NEFSC Bigelow Bottom Trawl Surveys.

Monkfish - North

The 2022 assessment for the northern stock of monkfish (*Lophius piscatorius)* updates the 2019 assessment (NEFSC 2020[7]) with additional commercial fishery catch data through 2021, and research survey indices of abundance and area-swept biomass through 2022.

An analytic assessment was not possible due to the lack of a reliable aging methodology. As a result, the "Ismooth" (previously planBsmooth; Legault et al. in press[8]; https://github.com/cmlegault/ PlanBsmooth) approach used in the 2020 assessment was updated for this management track assessment. This "Ismooth" approach re-scales the NMFS spring and fall BTS by their respective means (i.e., so each time series has mean equal to one) and averages the fall observation in year y with the spring observation in year y+1 to create a single time series for analysis. A LOESS-smooth is then applied to the combined time series, and a log-linear regression fit to the most recent three years of index predictions from the LOESS fit. The slope of the regression provides a direction and rate of change in the indices that is multiplied by recent catch to provide catch advice. However, neither of the 2020 bottom trawl surveys were available. Consequently, the preferred approach was to use a combined spring and fall BTS time series with the missing 2020 observations replaced with the mean of the 2019 and 2021 observations. Using this method, the multiplier was 0.829 in the North.

An "Ismooth" assessment does not allow for the estimation of reference points (i.e., $F_{MSY,}$ and SSB_{MSY} cannot be determined). Therefore, the status of the stock relative to overfishing and being overfished must be unknown.

Short term projections are not possible using the "Ismooth" approach.

The Panel spent considerable time discussing the appropriate term which the multiplier should be applied against – ABC or catch. The former has been the practice since the Ismooth approach was first applied to monkfish and moving to catch would result in a major shift in catch advice. Applying the multiplier against the catch would result in a significant decrease in ABC advice. Estimates of area-swept minimum biomass developed from the chain sweep study indicate a high biomass from what is observed in the BTS but follow the same trends. On the other hand, the Ismooth approach was designed to be applied to catch and is derived from catch data. Other index methods also are based on catch. Thus, application of the multiplier to catch is more consistent with ISmooth's design and other index based methods[9][10]. Ultimately the

[7] NEFSC. 2020. Operational assessment of the black sea bass, scup, bluefish, and monkfish stocks, updated through 2018. NEFSC Ref Doc 20-01; 160 p.

[8] Legault, C.M., J. Wiedenmann, J.J. Deroba, G. Fay, T.J. Miller, E.N. Brooks, R.J. Bell, J.A. Langan, J.M. Cournane, A.W. Jones, and B. Muffley. 2022. Data Rich but Model Resistant: An Evaluation of data- limited methods to manage fisheries with failed age-based stock assessments. Canadian Journal of Fisheries and Aquatic Sciences. https://doi.org/10.1139/cjfas-2022-0045

[9] Carruthers, T., L. Kell, D. Butterworth, M. Maunder, H. Geromont, C. Walters, M. McAllister, R. Hillary, P. Levontin, T. Kitakado, and C. Davies. 2015. Performance review of simple management procedures. ICES Journal of Marine Science 73(2):464−482.

[10] NEFSC. 2020. Research Track Assessment for Index-Based Methods and Control Rules. Woods Hole, MA. 59 p.

group could not reach a consensus decision, though a majority supported the application of the multiplier against catch.

The Panel also considered whether stock status should be considered unknown. Given that the current stock status is based on a failed assessment, and that the Ismooth approach does not generate reference points, the Panel strongly ***recommended*** *listing stock status as unknown.*

The Panel had several research ***recommendations****:*

- *Both the shrimp and scallop survey indices should be considered for inclusion in future assessments*
- *Given the lack of success developing an aging technique, NMFS should not continue to pursue this avenue of research; consider estimating growth through cohort tracking*
- *Given the lack of growth information on Monkfish, it was recommended the analyst explore a Simple Delay-Difference Model as a potential modeling approach relative to the Ismooth method*
- *Other Data Limited methods should also be considered for the assessment.*
- *A better understanding of stock structure (beyond North and South) could improve the assessment effort*
- *Reconsider the catchability coefficient of the chain swept estimates and how this applies to separate surveys*

The Panel concluded that the 2022 assessment update for northern stock of monkfish fulfilled the recommendations of the AOP and is technically sufficient to provide scientific advice and meets the Terms of Reference for the stock's assessment. It does not provide sufficient information to evaluate stock status. The assessment represents Best Scientific Information Available (BSIA) for this stock for management purposes.

Monkfish - South

The 2022 assessment for the southern stock of monkfish (*Lophius piscatorius)* updates the 2019 assessment (NEFSC 2020[11]) with additional commercial fishery catch data through 2021, and research survey indices of abundance and area-swept biomass through 2022.

An analytic assessment was not possible due to the lack of a reliable aging methodology. As a result, the "Ismooth" (previously planBsmooth; Legault et al. in press[12]; https://github.com/cmlegault/ PlanBsmooth) approach used in the 2020 assessment was updated for this management track assessment. This "Ismooth" approach re-scales the NMFS spring and fall bottom trawl survey (BTS) by their respective means (i.e., so each time series has mean equal to one) and averages the fall observation in year y with the spring observation in year y+1 to create a single time series for analysis. A LOESS-smooth is then applied to the combined time

[11] NEFSC. 2020. Operational assessment of the black sea bass, scup, bluefish, and monkfish stocks, updated through 2018. NEFSC Ref Doc 20-01; 160 p.

[12] Legault, C.M., J. Wiedenmann, J.J. Deroba, G. Fay, T.J. Miller, E.N. Brooks, R.J. Bell, J.A. Langan, J.M. Cournane, A.W. Jones, and B. Muffley. 2022. Data Rich but Model Resistant: An Evaluation of data- limited methods to manage fisheries with failed age-based stock assessments. Canadian Journal of Fisheries and Aquatic Sciences. https://doi.org/10.1139/cjfas-2022-0045

series, and a log-linear regression fit to the most recent three years of index predictions from the LOESS fit. The slope of the regression provides a direction and rate of change in the indices that is multiplied by recent catch to provide catch advice. However, neither of the 2020 bottom trawl surveys were available. Consequently, the preferred approach was to use a combined spring and fall BTS time series with the missing 2020 observations replaced with the mean of the 2019 and 2021 observations. Using this method, the multiplier was 0.646 in the south.

An "Ismooth" assessment does not allow for the estimation of reference points (i.e., $F_{MSY,}$ and SSB_{MSY} cannot be determined). Therefore, the status of the stock relative to overfishing and being overfished must be unknown.

Short term projections are not possible using the "Ismooth" approach.

The Panel spent considerable time discussing the appropriate term which the multiplier should be applied against – ABC or catch. The former has been the practice since the Ismooth approach was first applied to monkfish and moving to catch would result in a major shift in catch advice. Applying the multiplier against the catch would result in a significant decrease in ABC advice. Estimates of area-swept minimum biomass developed from the chain sweep study indicate a high biomass from what is observed in the BTS but follow the same trends. On the other hand, the Ismooth approach was designed to be applied to catch and is derived from catch data. Other index methods also are based on catch, rather than ABC[13][14]. Thus, application of the multiplier to catch is more consistent with ISmooth's design and other index based methods. Ultimately the group could not reach a consensus decision, though a majority supported the application of the multiplier against catch.

The Panel also considered whether stock status should be considered unknown. Given that the current stock status is based on a failed assessment, and that the Ismooth approach does not generate reference points, the Panel strongly ***recommended*** *listing stock status as unknown.*

The Panel had several research ***recommendations****:*

- *Both the shrimp and scallop survey indices should be considered for inclusion in future assessments*
- *Given the lack of success developing an aging technique, NMFS should not continue to pursue this avenue of research further. Instead, NMFS should consider estimating growth through cohort tracking*
- *Given the lack of growth information on Monkfish, it was recommended that the analyst explore a Simple Delay-Difference Model as one potential modeling approach in the next research track assessment.*
- *Other Data Limited methods should also be considered for that assessment.*

13 Carruthers, T., L. Kell, D. Butterworth, M. Maunder, H. Geromont, C. Walters, M. McAllister, R. Hillary, P. Levontin, T. Kitakado, and C. Davies. 2015. Performance review of simple management procedures. ICES Journal of Marine Science 73(2):464−482.

14 NEFSC. 2020. Research Track Assessment for Index-Based Methods and Control Rules. Woods Hole, MA. 59 p.

- *A better understanding of stock structure (beyond the border of Northern and Southern stocks) could improve the assessment effort*
- *Reconsider the catchability coefficient of the chain swept estimates and how this applies to separate surveys*

The Panel concluded that the 2022 assessment update for southern stock of monkfish fulfilled the recommendations of the AOP and is technically sufficient to provide scientific advice and meets the Terms of Reference for the stock's assessment. It does not provide sufficient information to evaluate stock status. The assessment represents Best Scientific Information Available (BSIA) for this stock for management purposes.

[15] NEFSC. 2012. 54th Northeast Regional Stock Assessment Workshop (54th SAW) Assessment Report. US Dept Commer, NOAA Fisheries, Northeast Fish Sci Cent Ref Doc. 12-18.; 600 p.

Appendix A. Summary of Assessment Oversight Panel Meetings for September 2022 Management Track Stock Assessments

The NRCC Assessment Oversight Panel (AOP) met to review the operational stock assessment plans for ocean pout, Atlantic wolffish, Georges Bank winter flounder, Gulf of Maine winter flounder, Cape Cod/Gulf of Maine yellowtail flounder, southern New England/mid-Atlantic yellowtail flounder, northern and southern monkfish, Georges Bank haddock, Gulf of Maine haddock, Atlantic halibut, witch flounder, white hake and pollock stocks on May 23-24, 2022. The AOP also met on August 3, 2022 to review the assessment plan for American Plaice, which underwent a Research Track peer review in July 2022. Four assessments were recommended for Level 1 Reviews (Direct Delivery) and these assessments will undergo an internal review before being delivered to the appropriate management body. The assessments for stocks/species recommended for Level 2 and 3 peer reviews will be reviewed during a meeting September 19-23, 2022.

The AOP consisted of:

Russell W. Brown, Ph.D. (AOP Chair), Northeast Fisheries Science Center, Woods Hole, Massachusetts. (5/23, 5/24, 8/3)

Gary Nelson, Ph.D., representing the Atlantic States Marine Fisheries Commission, Massachusetts Division of Marine Fisheries. (5/23, 5/24, 8/3)

Lisa Kerr, Ph.D., Chair of the NEFMC Scientific and Statistical Committee, Gulf of Maine Research Institute. (5/23, 5/24, 8/3)

Paul Rago, Ph.D., Chair of the MAFMC Scientific and Statistical Committee, NOAA Fisheries (retired). (5/24, 8/3)

Michael Wilberg, Ph.D., vice-chair of the MAMFC Scientific and Statistical Committee, University of Maryland. (5/23)

Meeting Details:

These meetings were guided by the NRCC-approved stock assessment guidance documents. Three background documents were provided to the Panel: (1) an updated prospectus for each stock; (2) an overview summary of all the salient data and model information for each stock; and (3) the NRCC Guidance memo on the Operational Assessments. Prior to the meeting, each assessment lead prepared a proposal for their Management Track Assessment. The proposal reflected the research track or most recent assessment results, the peer review panel Summary Report results and any initial investigations conducted for the management track assessment.

At the meeting, each assessment lead gave a presentation on the data to be used, model specifications (if applicable), evaluation of model performance, the process for updating the Biological Reference Points, the basis for catch projections, and an alternate assessment approach if their analytical assessment was rejected by the peer review panel.

Major Recommendations for Review of Individual Stocks:

The sharp increase in landings in Canadian waters and declining indices in the US poses a dilemma for application of the current FSD model. Canada's increase in landings is driven by results of a DFO assessment that increased the quota. This assessment is likely to have indices that are trending upward in contrast to US indices which appear to be either level or slightly decreasing. Nonetheless, the slightly lower FSD multiplier, when multiplied by the increased total catch, results in a large increase in potential US catch. The appropriateness of this calculation was discussed but not resolvable during the AOP meeting.

The Panel suggested that an investigation of the basis for the increase in Canadian landings would be useful. Comparisons of US index trends with Canadian indices of abundance might also be useful. The assessment lead will also investigate the applicability of the Cooperative Longline survey in the Gulf of Maine in the FSD model. The assessment lead also proposes to modify and align some of the Stat Areas with survey areas but does not plan to redefine stock areas. In view of the potential changes in the model framework and addition of a new index, the Panel recommended a **Level 2 (Expedited)** review for Atlantic halibut.

Witch Flounder (AOP Lead: Russ Brown)
Recommendation: Level 1 (Direct Delivery)
Witch Flounder currently uses an empirical approach to provide management advice. It is a unit stock, so is less dependent on CAMS approaches to allocate catch to separate stock areas. The NEFSC bottom trawl surveys will be updated to include swept area adjusted abundance and biomass surveys. 2020 survey values missing due to Covid will be treated as missing in the application of the empirical approach. It was noted that the age structure of the population continues to be truncated and the analyst will include supplement data in the data portal that is not directly used in the empirical analysis. The panel concluded that a **Level 1 (Direct Delivery)** review was warranted.

Northern and Southern Monkfish (AOP Lead: Gary Nelson)
Recommendation: Level 2 (Expedited Review)
The current assessment method for the northern and southern Monkfish stocks is the index-based method known as "PlanBsmooth" that uses fishery landings and discards, and NEFSC fall, spring and summer survey indices. The proposed work for the 2022 management track assessment includes updating all landings, discards and the survey data through 2021 (the spring survey will be updated through 2022). The landings will be updated via the CAMS system and a new method for estimating discards will be examined. Also, the old NEFSC indices will be replaced with new NEFSC area-swept indices and methods for dealing with the missing 2020 survey values will be explored. Additionally, the discard mortality assumption of Monkfish in scallop dredges will be re-examined, how extreme discard observations are handled will be changed, and adjustments to statistical areas that define the managements will be made consistent.

The main discussion of the AOP pertained to the proposed exploration of imputing missing survey values. One member wondered what the potential outcome would be and suggested that including an additional year further back in time might help with stability of resulting catch advice. The analyst responded that, based on earlier simulations examining biases in the PlanBsmooth method, catch advice should be fairly robust with a missing year, but he will try the suggested method. The AOP panel agreed that a **Level 2 (Expedited)** review is appropriate for the proposed changes.

Draft 2022 Monkfish Management Track Assessment Report

Jonathan J. Deroba

8/15/2022

TOR 1. Estimate catch from all sources including landings and discards.

Catch (landings and discards) were updated from 1989, when observer data first became available for discard estimation, to 2021. The Northeast Fisheries Science Center estimates discards by fleet (gear), half year (semester), and management area using observer data (NMFS 2014). For otter trawls and gillnets, the observed monkfish discard-per-kept-monkfish ratio is used to expand the sampled observations to total monkfish discards, while for scallop dredges and shrimp trawls the observed monkfish discard-per-all-kept-catch ratio is used. Several changes were made to the discard estimation methods. The ratio estimator used for discard estimation was changed from a simple ratio (D1) to a combined ratio (D2), which is the regional norm used by the Standardized Bycatch Reporting Methodology (NMFS 2014). Also, some observations that were previously excluded from the discard estimation were added back to the dataset. These observations were returned to the dataset because the reasons for their exclusion were not clear and avoiding manual deletions of observations makes the discard time series more easily reproducible. Switching the ratio estimator had a negligible effect on the discard time series, but adding the observations that were previously excluded caused some significant changes in a few years, most notably 2001 for both areas (Figure 1). The increase in discards in 2001 in both regions can be traced to 1-2 observations with unusually large discards. The fact that this increase in estimated discards occurred in 2001 in both regions appears to be a coincidence because the observations occurred in different fleets in each region (gillnet in semester 2 in the North but trawl in semester 1 in the South). The statistical areas used to define each management area for discard estimation were discovered to be in error during this management track assessment. The areas were corrected and made consistent with the stock definitions used for landings and the Catch Accounting and Monitoring System (NEFMC 1998; https://www.fisheries.noaa.gov/resource/map/monkfish-fishery-management-areas). Correcting the areas had a relatively minor effect on the discard estimates (Figure 2). The most notable change made to the discard estimation was a downward revision of the assumed discard mortality rate in the scallop dredge fleet from 100% to 64%. This revision was based on Weissman et al., 2021. While Weissman et al., 2021 reported a range of possible discard mortality rates from 28% to 64% depending on assumptions about the causes of post-release mortality, consultation with the monkfish Plan Development Team suggested a preference for using a more conservative value on the higher end, rather than make a larger change based on a single study with a relatively small sample size that only occurred in one management area (Table 1; Figures 3-6). Consequently, a value of 64% was used.

Table 1: Total monkfish landings, discards, and total catch (MT), assuming a 64% discard mortality rate in the scallop dredge fleet.

YEAR	Landings	Discards	Region	TotCatch
1989	6396	364	North	6760
1990	5842	240	North	6081
1991	5727	491	North	6218
1992	6925	703	North	7628
1993	10645	638	North	11283
1994	10847	325	North	11172

YEAR	Landings	Discards	Region	TotCatch
1995	12020	1655	North	13675
1996	10769	1886	North	12654
1997	9659	857	North	10516
1998	7482	722	North	8204
1999	8898	726	North	9625
2000	10681	870	North	11551
2001	13224	3066	North	16290
2002	13634	1159	North	14794
2003	14398	1117	North	15515
2004	12796	516	North	13312
2005	10097	624	North	10722
2006	7016	578	North	7594
2007	5093	575	North	5668
2008	3875	317	North	4192
2009	3321	455	North	3777
2010	2923	294	North	3217
2011	3328	370	North	3698
2012	4081	493	North	4574
2013	3355	459	North	3814
2014	3434	484	North	3918
2015	4086	572	North	4658
2016	4723	734	North	5457
2017	7105	840	North	7945
2018	6009	1253	North	7262
2019	6084	1080	North	7163
2020	5587	723	North	6310
2021	5121	802	North	5923
1989	8296	3401	South	11697
1990	7142	197	South	7339
1991	9800	252	South	10052
1992	13925	600	South	14525
1993	15061	918	South	15979
1994	12052	1764	South	13816
1995	14311	2359	South	16671
1996	15729	1932	South	17661
1997	18508	1480	South	19987
1998	19128	1148	South	20276
1999	16300	1797	South	18097
2000	10188	1706	South	11895
2001	10074	9210	South	19285
2002	9259	2682	South	11941
2003	11679	2886	South	14565
2004	8374	2515	South	10889
2005	8917	2222	South	11140
2006	7565	1683	South	9248
2007	7055	2023	South	9078
2008	7139	1390	South	8529
2009	5260	1139	South	6399
2010	4330	1476	South	5806
2011	5271	1566	South	6837
2012	5674	1962	South	7636
2013	5207	1372	South	6579

YEAR	Landings	Discards	Region	TotCatch
2014	5099	1188	South	6287
2015	4550	919	South	5468
2016	4331	2114	South	6445
2017	3796	3544	South	7339
2018	4388	3476	South	7864
2019	4373	3358	South	7732
2020	2593	2295	South	4887
2021	2005	2340	South	4346

TOR 2. Evaluate indices used in the assessment (e.g., indices of relative or absolute abundance, recruitment, state surveys, age-length data, etc.).

All indices and length frequencies were updated through 2021, with the exception of National Marine Fisheries Service (NMFS) spring bottom trawl surveys (BTS), which were updated through 2022 (Figures 7-13). Recruitment indices were also updated using the same surveys and length cut-offs to define age-0 monkfish as in previous assessments (Table 2; Figures 14-15). An absolute measure of biomass estimated using paired tows between a chainsweep and rockhopper sweep was also updated for the fall NMFS BTS survey (Figure 16; Miller et al., in review).

Table 2: Range of lengths used to define age-0 recruitment indices.

Stock	Survey	Lengths
North	NMFS Fall BTS	6-18cm
South	NMFS Fall BTS	12-28cm
South	Scallop	7-15cm

TOR 3. Estimate annual fishing mortality, recruitment and stock biomass (both total and spawning stock) as possible (depending on the assessment method) for the time series using the approved assessment method and estimate their uncertainty. Include retrospective analyses if possible (both historical and within-model) to allow a comparison with previous assessment results and projections, and to examine model fit.

No analytical assessment was available due to a lack of reliable aging methodology.

a. Include bridge runs to sequentially document each change from the previously accepted model to the updated model proposed for this peer review.

N/A

b. Prepare a backup assessment approach that would serve as an alternative for providing scientific advice to management if the analytical assessment were to not pass review.

The "Ismooth" (previously planBsmooth; Legault et al. in press; https://github.com/cmlegault/PlanBsmooth) backup approach used in the previous assessment was updated for this management track. This Ismooth approach re-scales the NMFS spring and fall BTS by their respective means (i.e., so each time series has mean equal to one), and averages the fall observation in year y with the spring

observation in year *y+1* to create a single time series for analysis. A LOESS-smooth is then applied to the combined time series, and a log-linear regression fit to the most recent three years of index predictions from the LOESS fit. The slope of the regression provides a direction and rate of change in the indices that is multiplied by recent catch to provide catch advice.

For this management track, neither the spring or fall BTS were conducted in 2020. The Ismooth approach can function normally with these missing values, but consideration was given to replacing the missing 2020 observations with the average of the observations from 2019 and 2021. To evaluate a preferred method, the Ismooth approach was repeatedly applied with 10 different terminal years (2010-2019), and the multipliers compared between using all data, having a missing observation in the year before the terminal year, or replacing the observations in the year before the terminal year with the mean of the surrounding years. This entire analysis was also repeated using only the fall BTS because it is considered more reliable than the spring BTS and consideration was given in previous assessments to using only the fall BTS, as opposed to combining it with spring. In the North region using the spring and fall time series combined, the multipliers were similar and not significantly different from using all the data whether a missing value was present or imputed (Figures 17-18). In the South, however, the multipliers estimated in the presence of a missing value were often significantly lower than using the full data, but replacing the missing value with the surrounding average resolved the disparity (Figures 19-20). Regardless of management area or whether a missing value was present or imputed, using only the fall survey produced more imprecise estimates for the multipliers, and they were systematically different than the multipliers produced from using all data (Figures 21-24). Consequently, the preferred approach was to use a combined spring and fall BTS time series with the missing 2020 observations replaced with the mean of the 2019 and 2021 observations. Using this method, the multiplier was 0.829 in the North 0.646 in the South (Figures 25-26).

TOR 4. Re-estimate or update the BRP's as defined by the management track level and recommend stock status. Also, provide qualitative descriptions of stock status based on simple indicators/metrics (e.g., age-and size-structure, temporal trends in population size or recruitment indices, etc.).

Biological reference points are unavailable for these stocks and stock status is unknown. Survey length frequencies and indices of recruitment suggest increasing and above average recruitment in the North in recent years, but continued low or decreasing recruitment in the South (Figures 8-15). Thus, the stock in the Northern area seems relatively high and is likely to remain so, while abundance in the Southern area seems low and is also likely to remain so, if not continue to decline.

TOR 5. Conduct short-term stock projections when appropriate.

N/A

TOR 6. Respond to any review panel comments or SSC concerns from the most recent prior research or management track assessment.

Below is a list of the research topics included in the previous assessment (NEFSC 2020) and an update on progress.

- A benchmark assessment should consider the feasibility of using both observer and port samples in estimating length composition of commercial landings.
  - No progress
- Ongoing research on age and growth of monkfish may lead to an acceptable growth curve, even if not an aging method that could be used for routine aging. If so, age structured models could be explored assuming static growth.

  - Finding a routine aging method seems unlikely. The growth and maturity characteristics of monkfish, however, make attempts at delay-difference type models likely worth trying.

- A better understanding of monkfish movements and stock structure would be helpful to interpretation of monkfish population data.
  - No progress

- Future modeling efforts may want to consider the possible role of cannibalism in stock dynamics of monkfish in light of the strong negative relationship observed in the north between median size of monkfish in the population and recruitment indices.
  - No progress

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Weissman, A., Knoteck, R., Mandelman, J., Rudders, D., Roman, S., and Sulikowski, J. 2021. Determining discard mortality of monkfish in a sea scallop dredge fishery. North American Journal of Fisheries Management 41: 856-870.

Acknowledgements

Susan Wigley, Leonaa Burgess, and the StockEff team contributed analyses and data preparation that made completing this management track assessment more efficient and timely than it otherwise would have been.

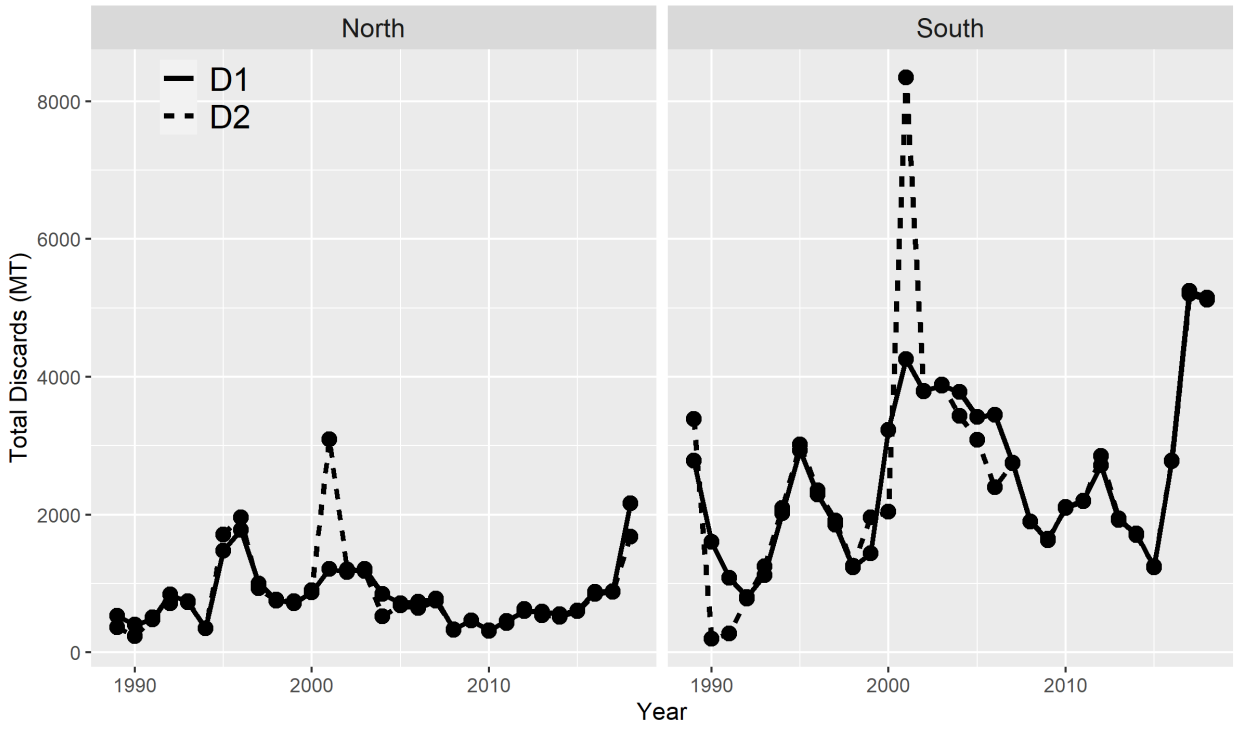

Figure 1: Time Series of total monkfish discards with some observations manually deleted and using a simple ratio estimator (D1) as in the previous assessment, and the time series with no observations deleted and using a combined ratio estimator (D2)

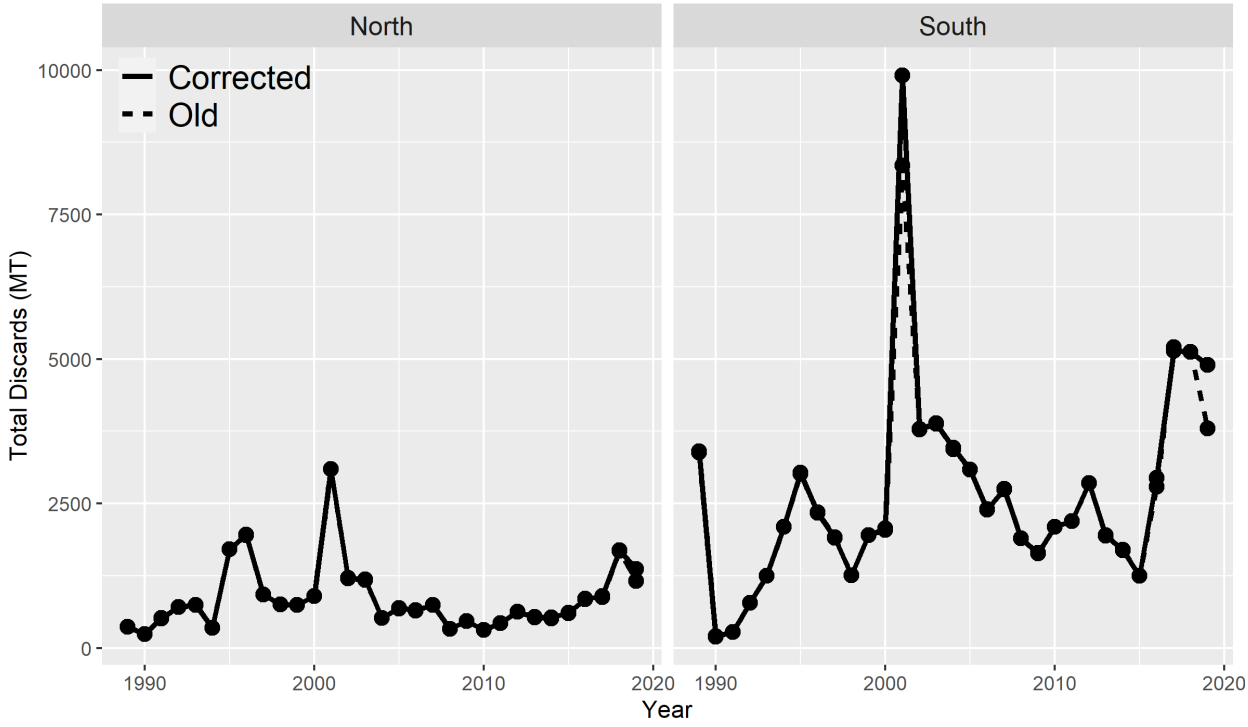

Figure 2: Time Series of total monkfish discards using the incorrect statistical area definitions (Old) and with the areas corrected.

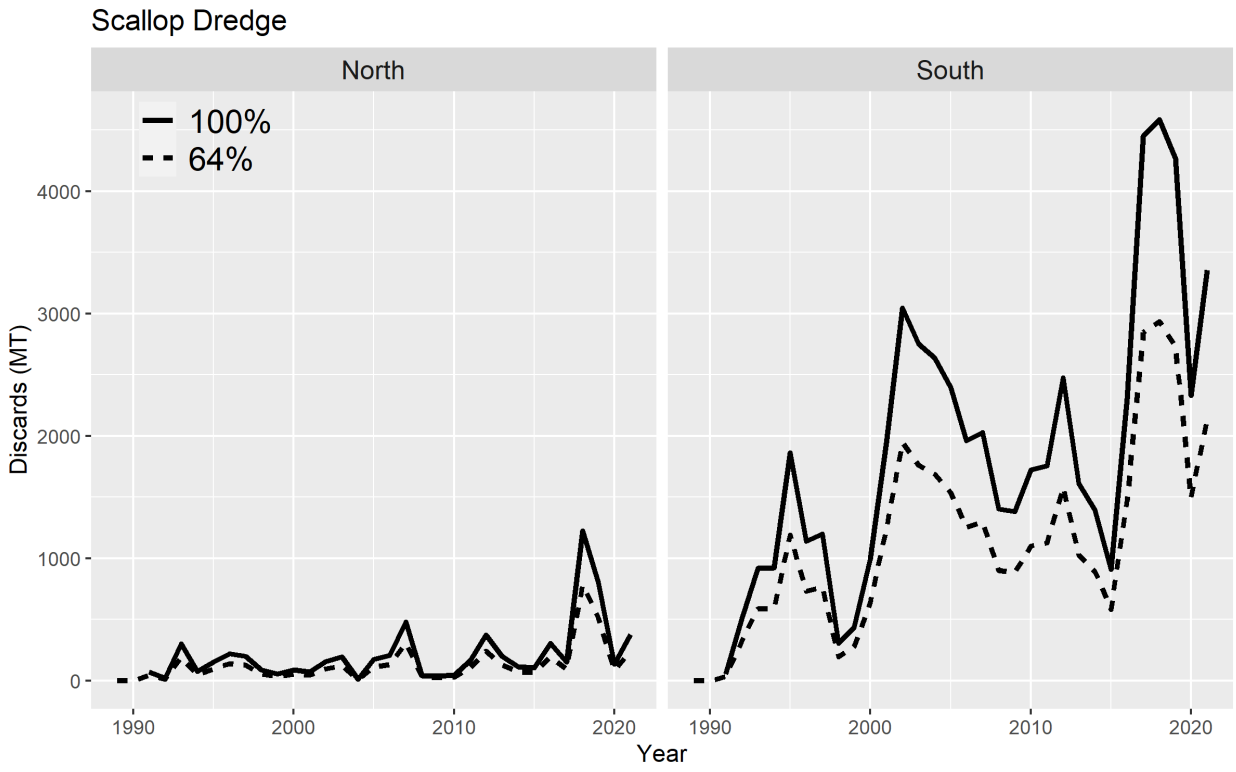

Figure 3: Scallop Dredge monkfish discards using a mortality rate of 100percent or 64percent

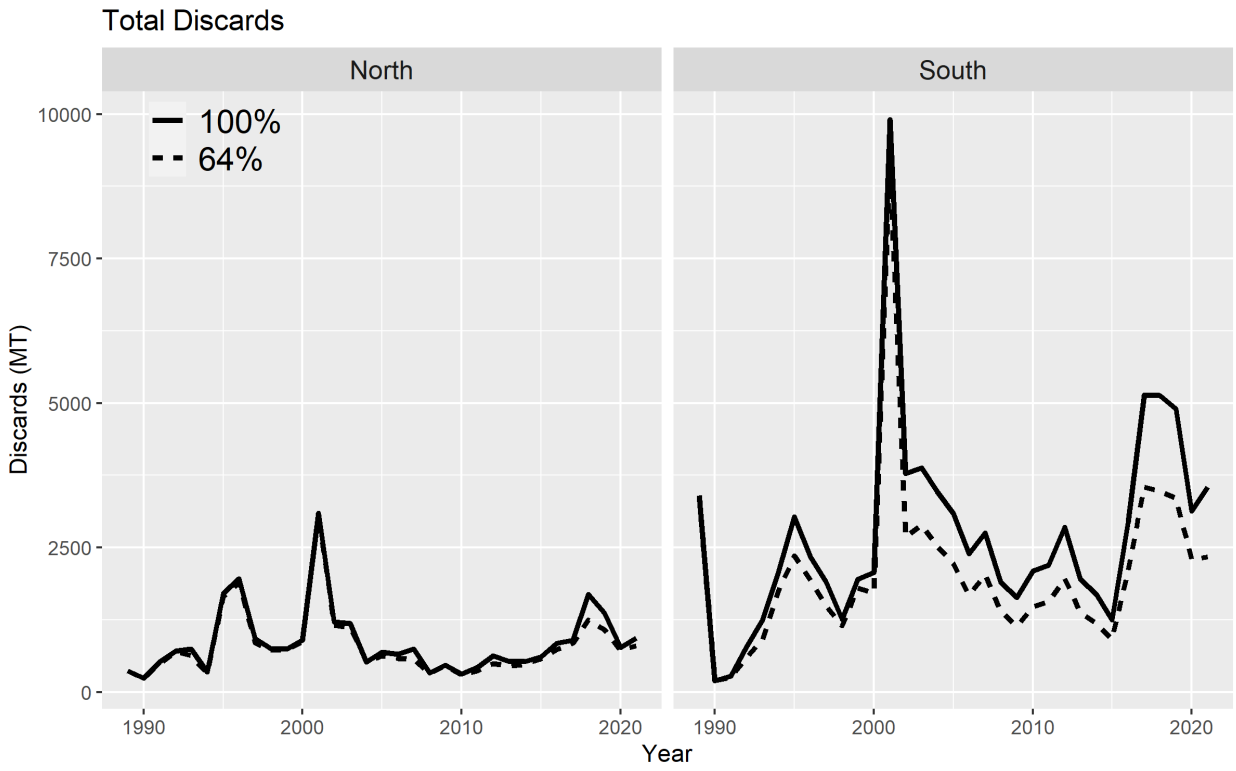

Figure 4: Total discards using a discard mortality rate of 100percent or 64percent for the scallop dredge fleet.

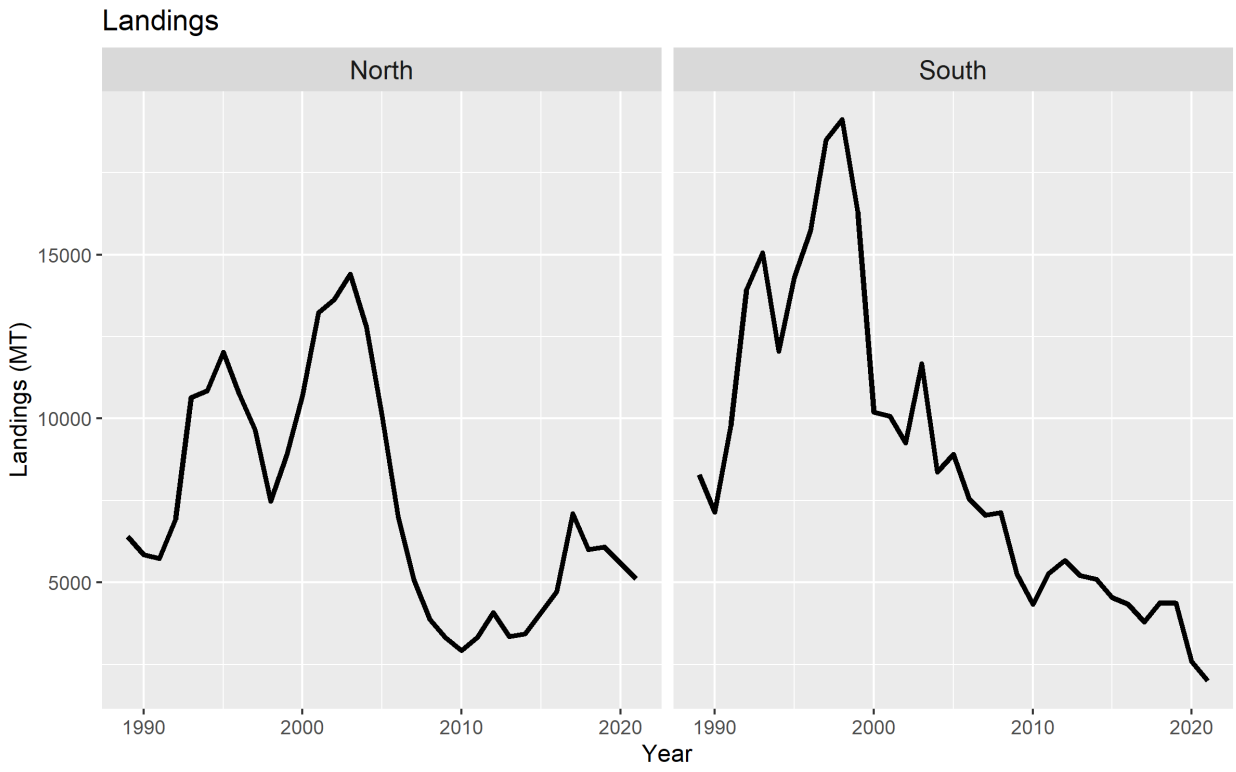

Figure 5: Total monkfish landings.

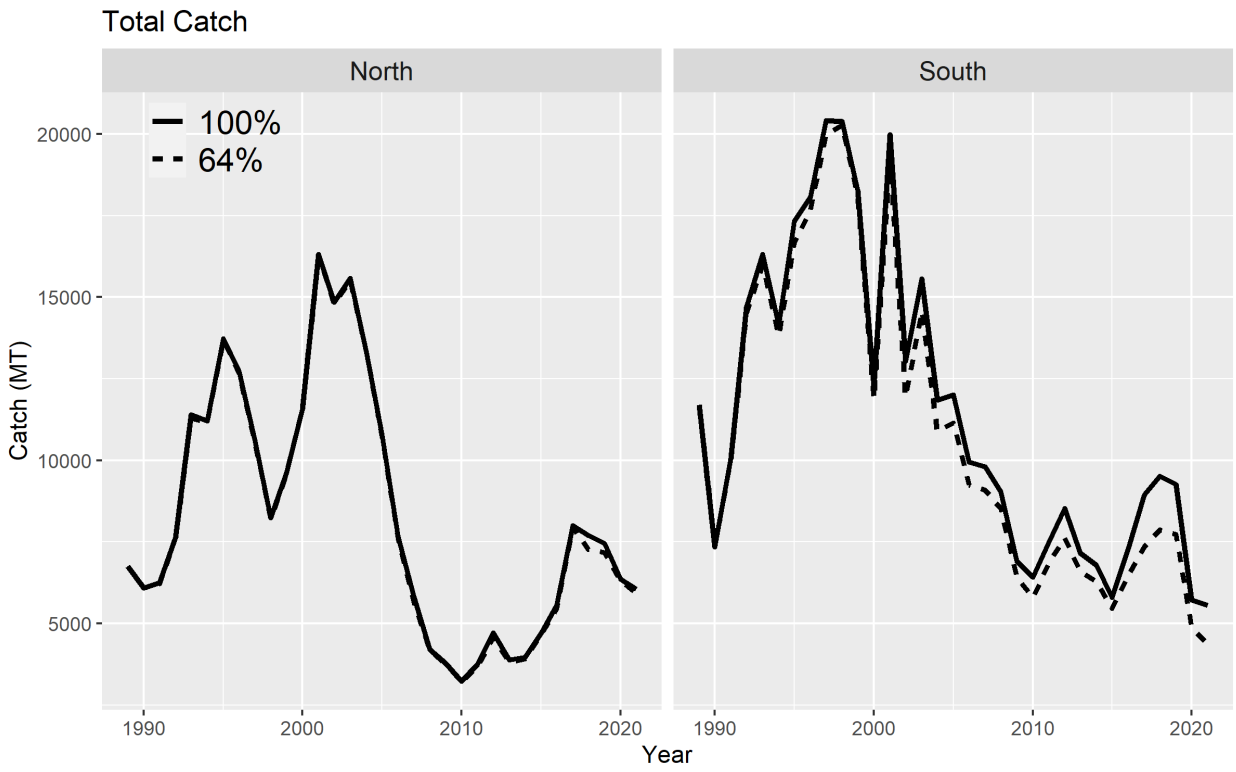

Figure 6: Total monkfish catch (landings and discards) using a discard mortality rate of 100percent or 64percent for the scallop dredge fleet.

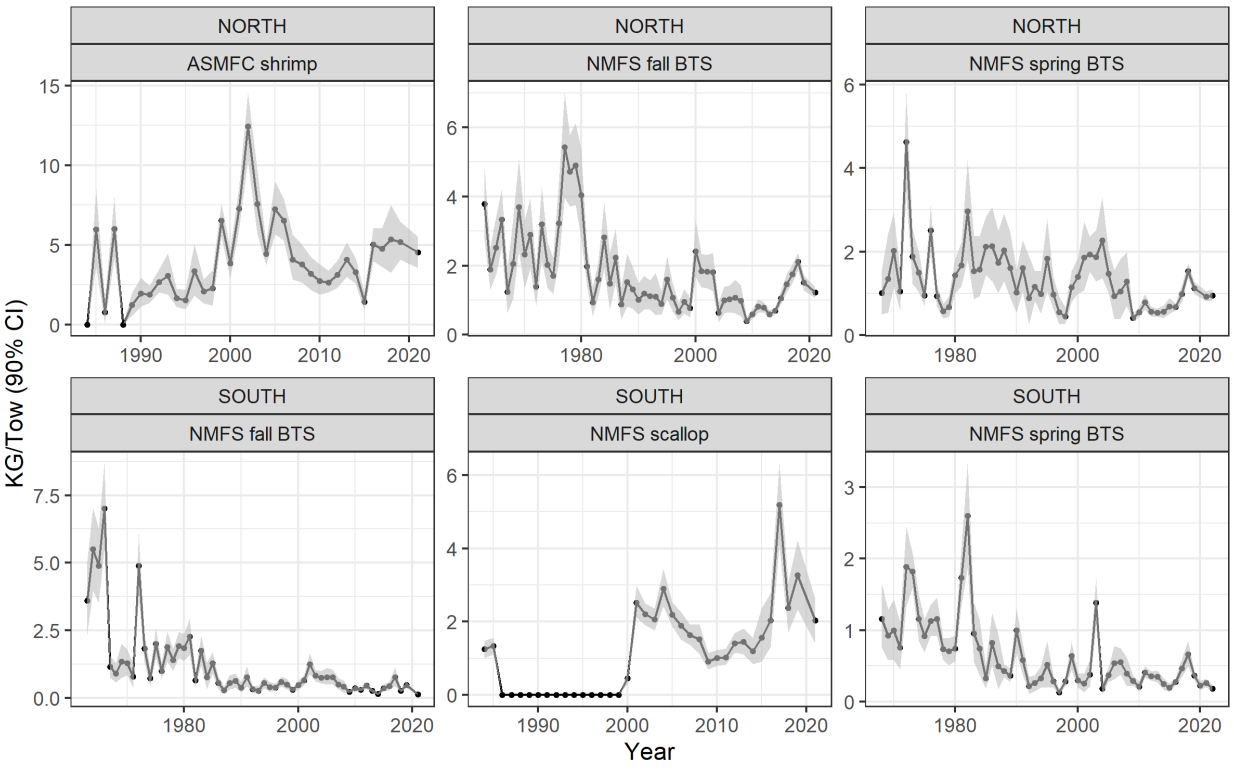

Figure 7: Survey Indices of Abundance.

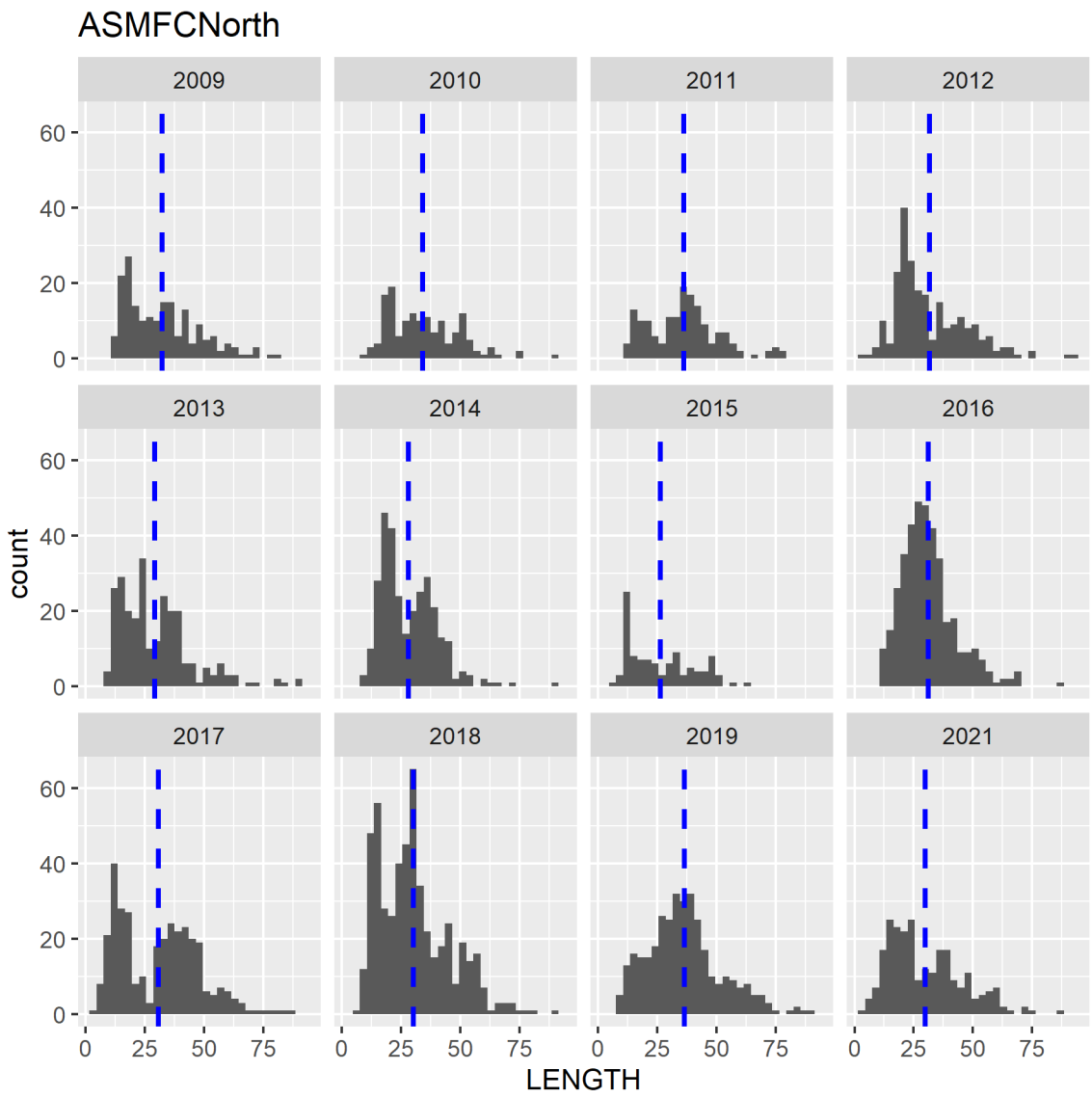

Figure 8: ASMFC survey length frequency in the North. The vertical, dashed, blue line is the mean.

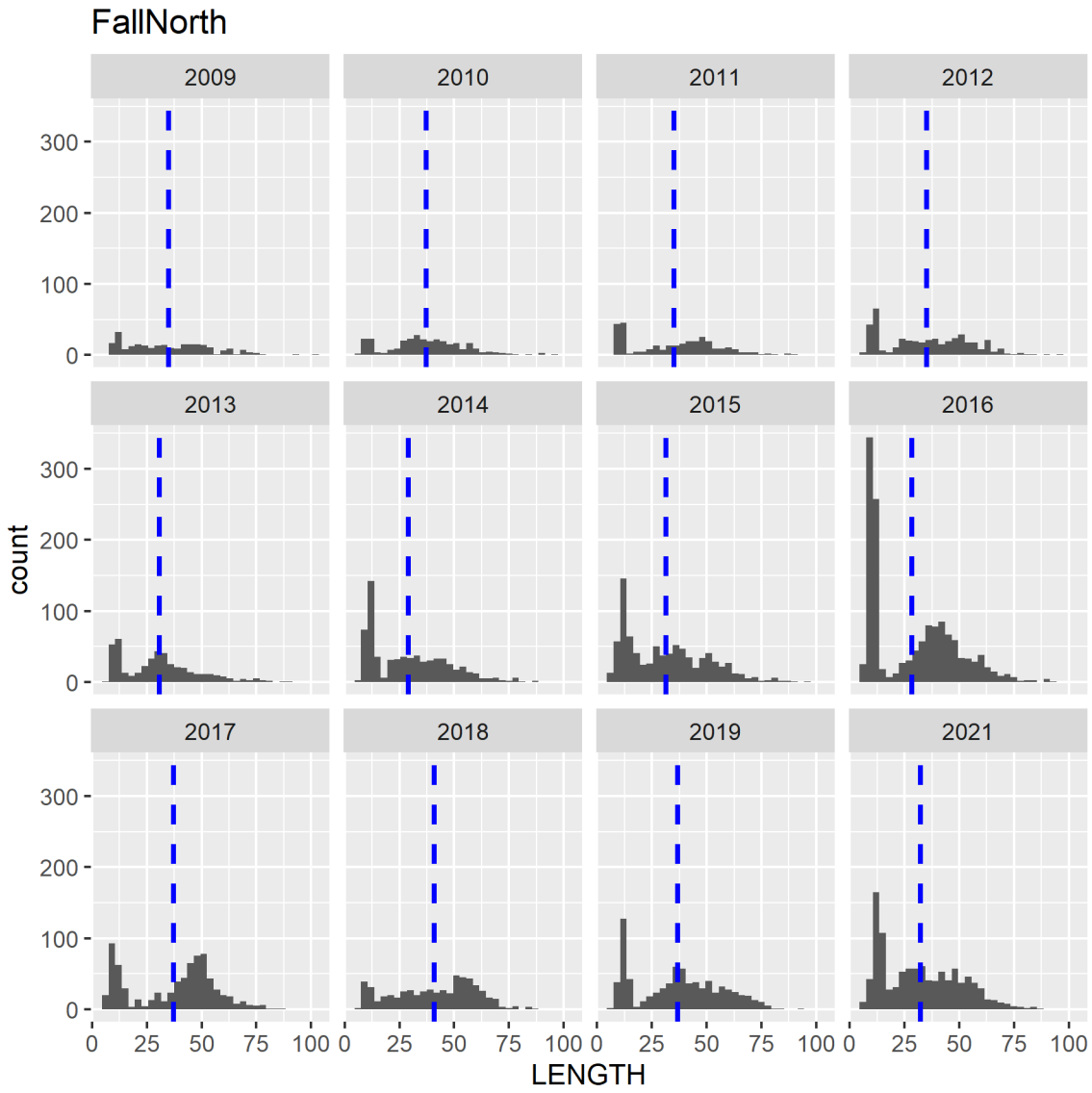

Figure 9: NMFS fall BTS length frequency in the North. The vertical, dashed, blue line is the mean.

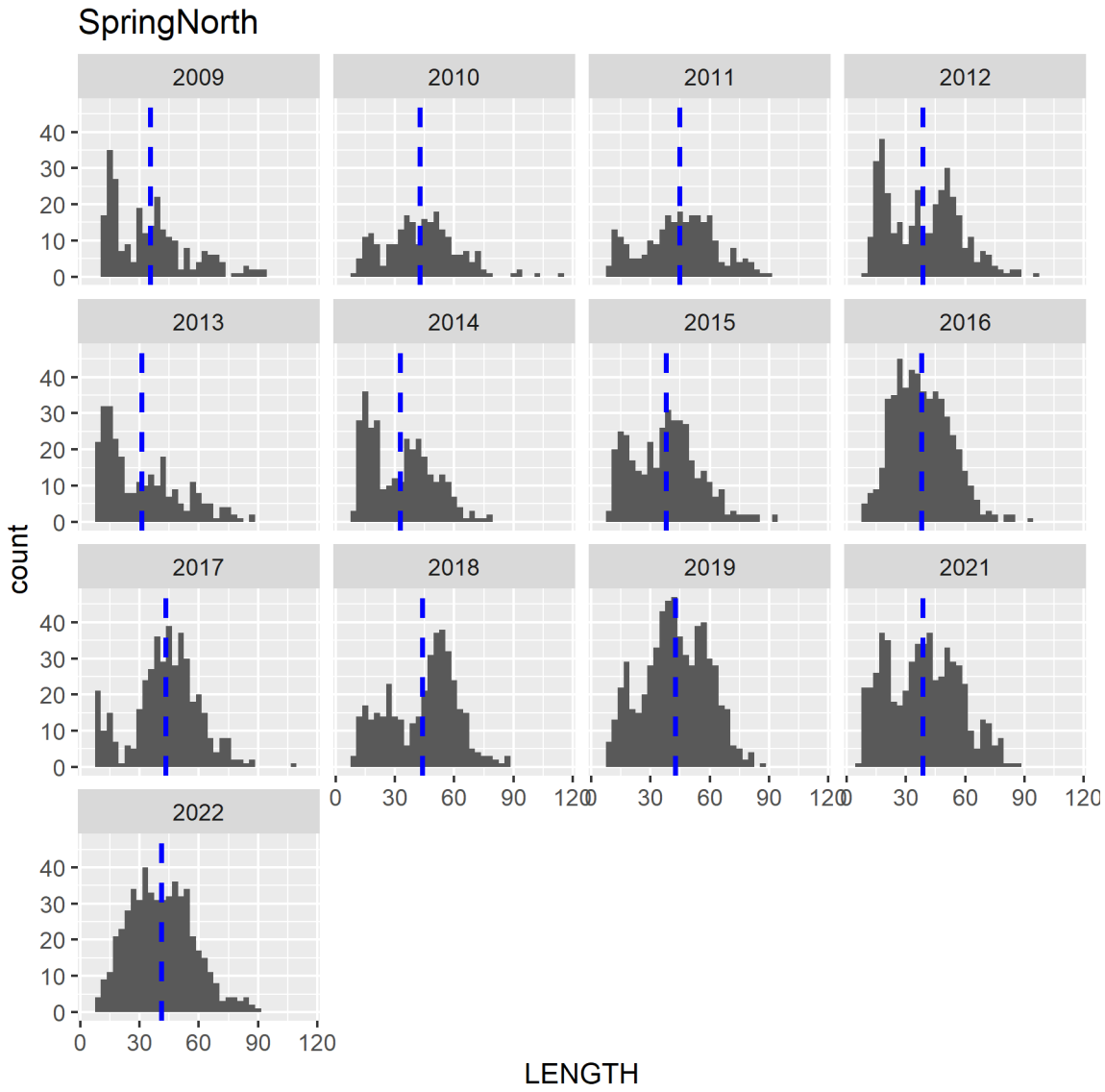

Figure 10: NMFS spring BTS length frequency in the North. The vertical, dashed, blue line is the mean.

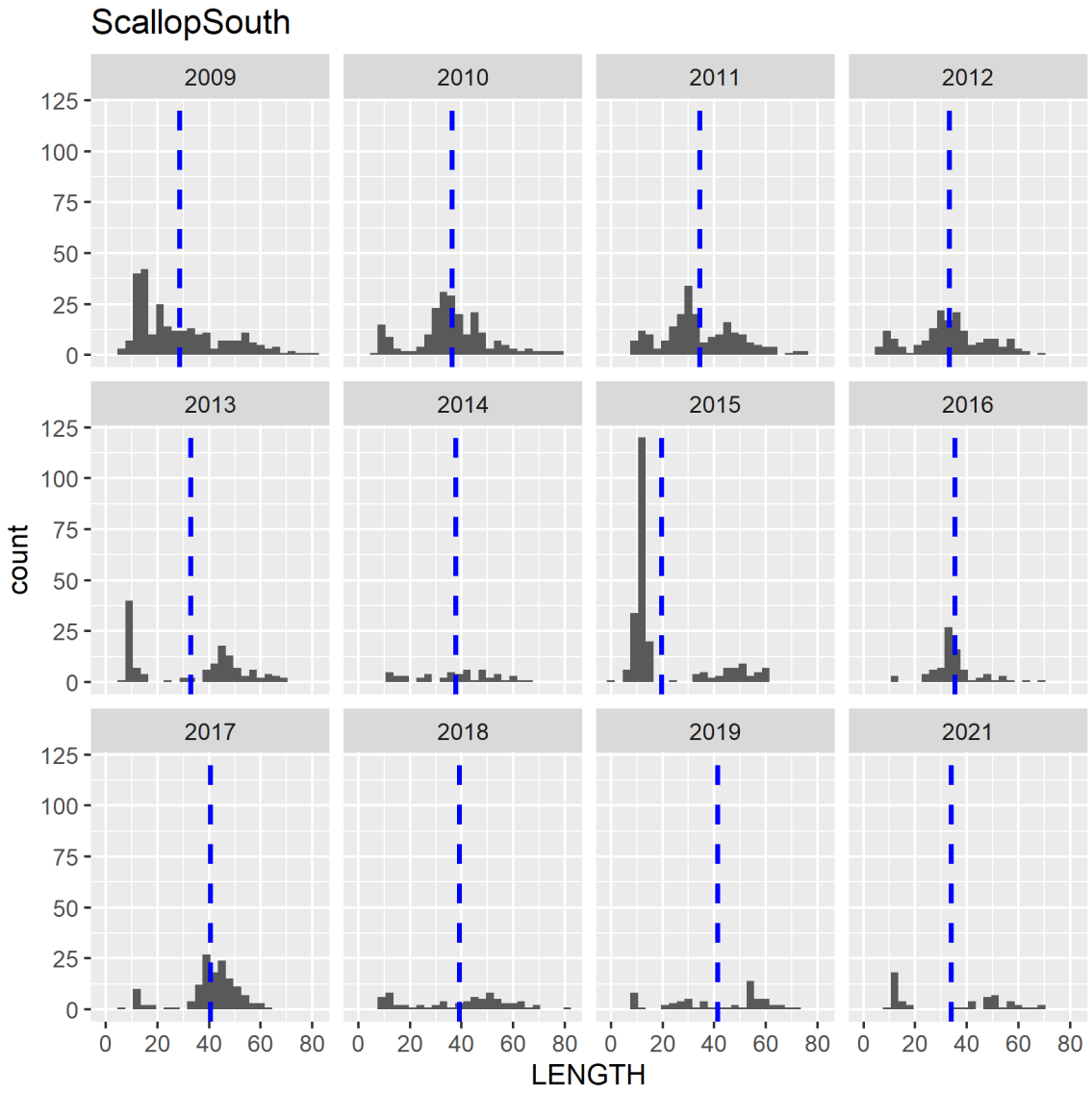

Figure 11: Scallop survey length frequency in the South. The vertical, dashed, blue line is the mean.

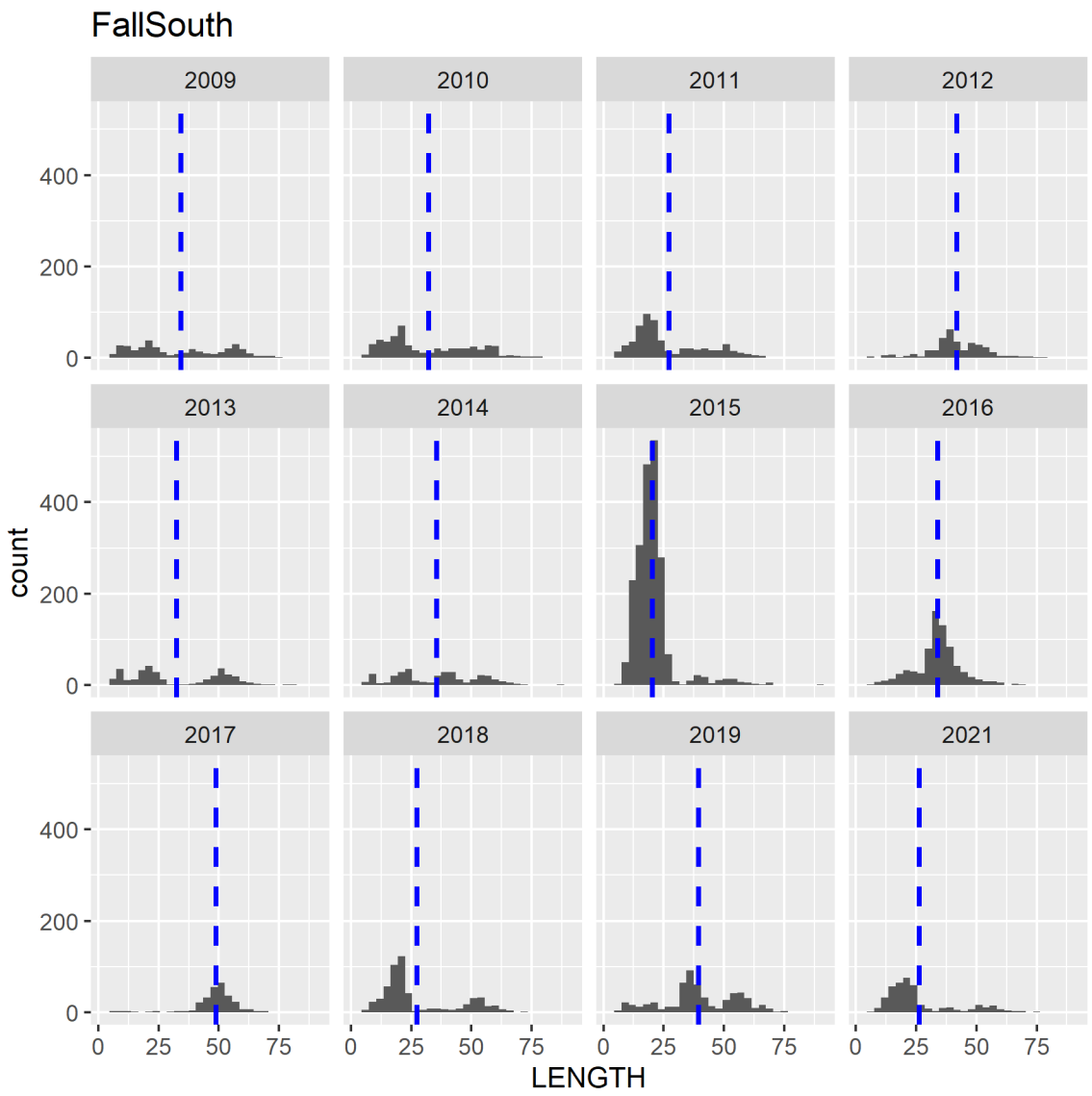

Figure 12: NMFS fall BTS length frequency in the South. The vertical, dashed, blue line is the mean.

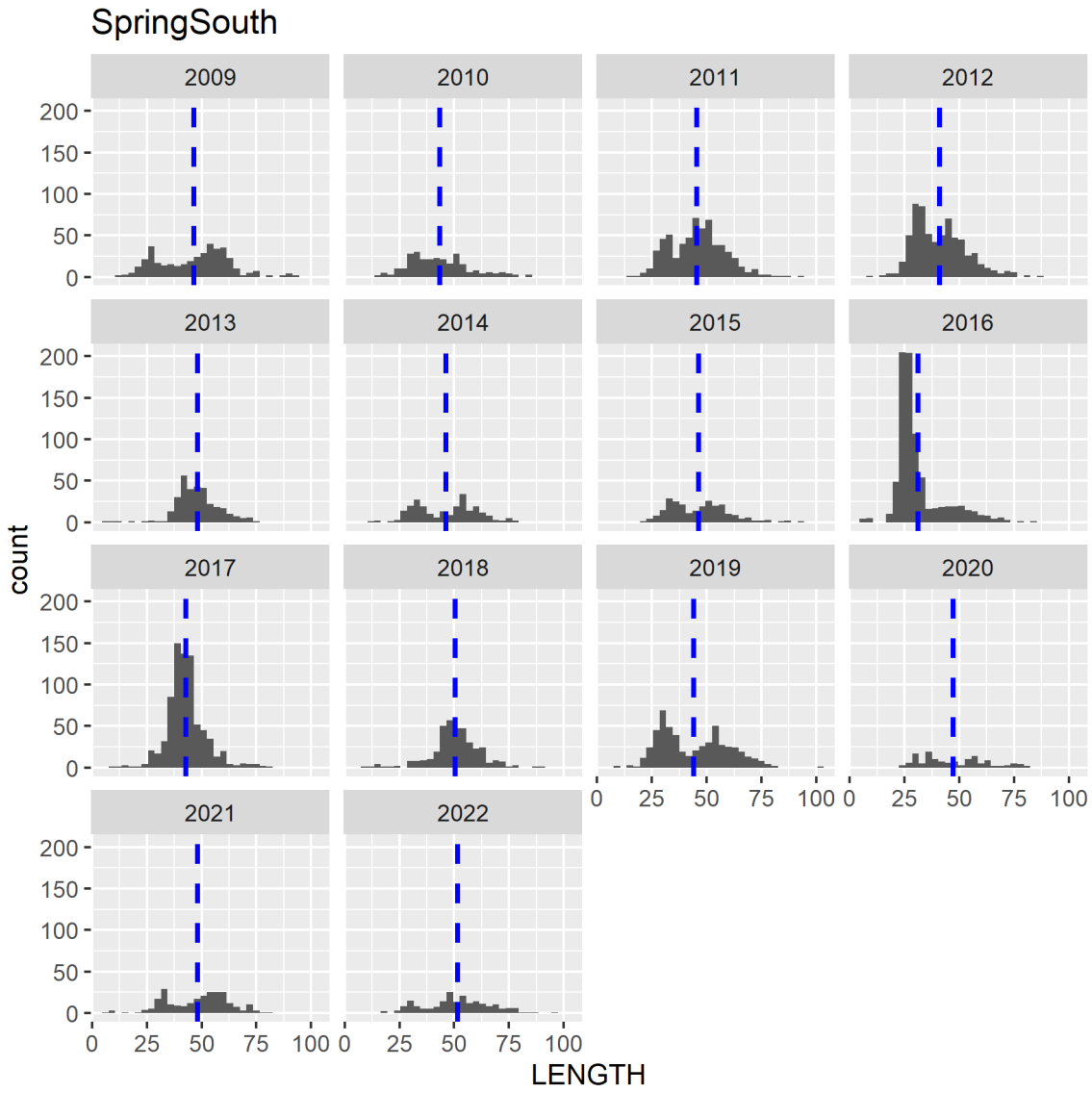

Figure 13: NMFS spring BTS length frequency in the South. The vertical, dashed, blue line is the mean.

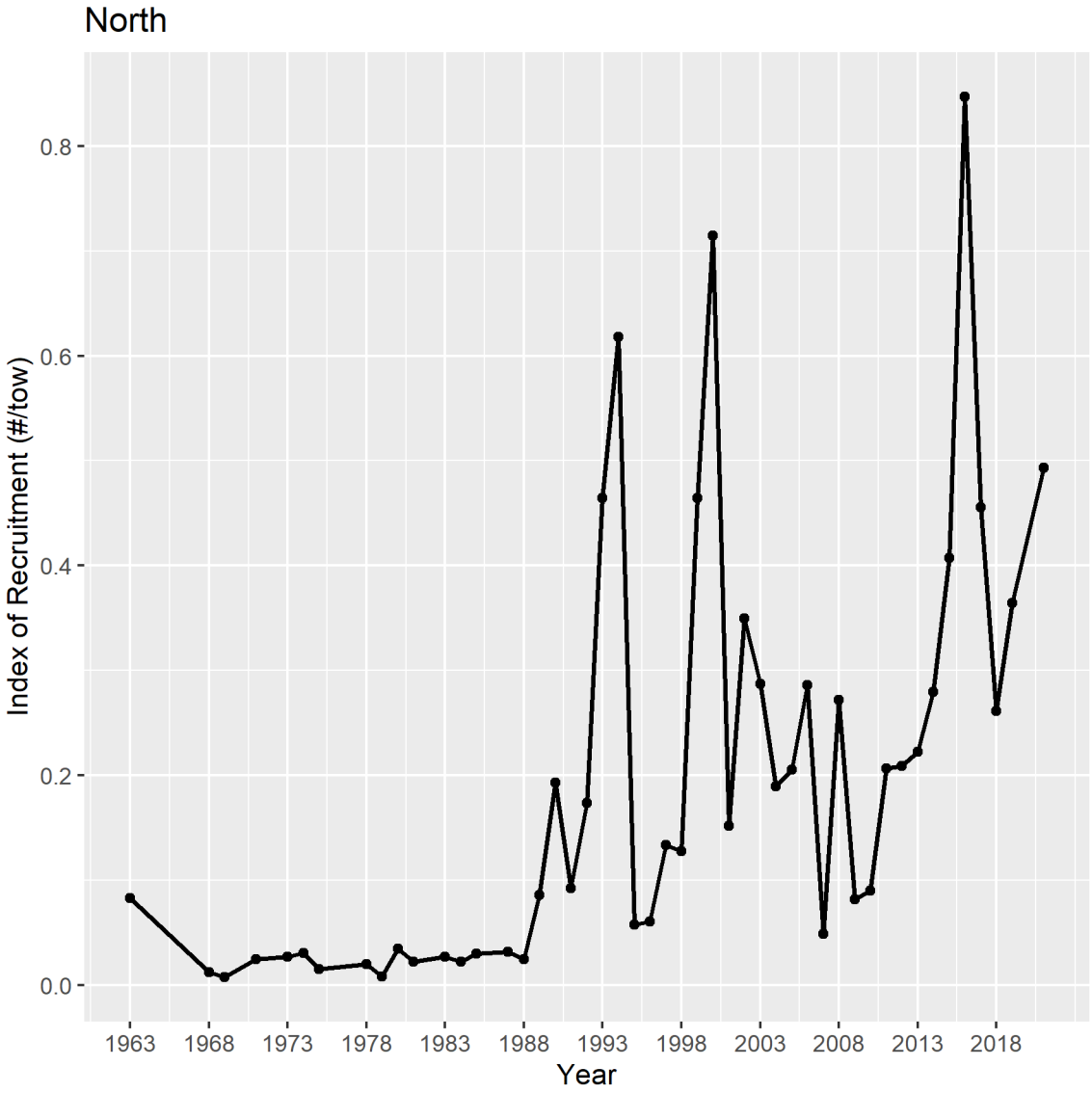

Figure 14: Northern monkfish age-0 recruitment indices of abundance from the NMFS fall BTS.

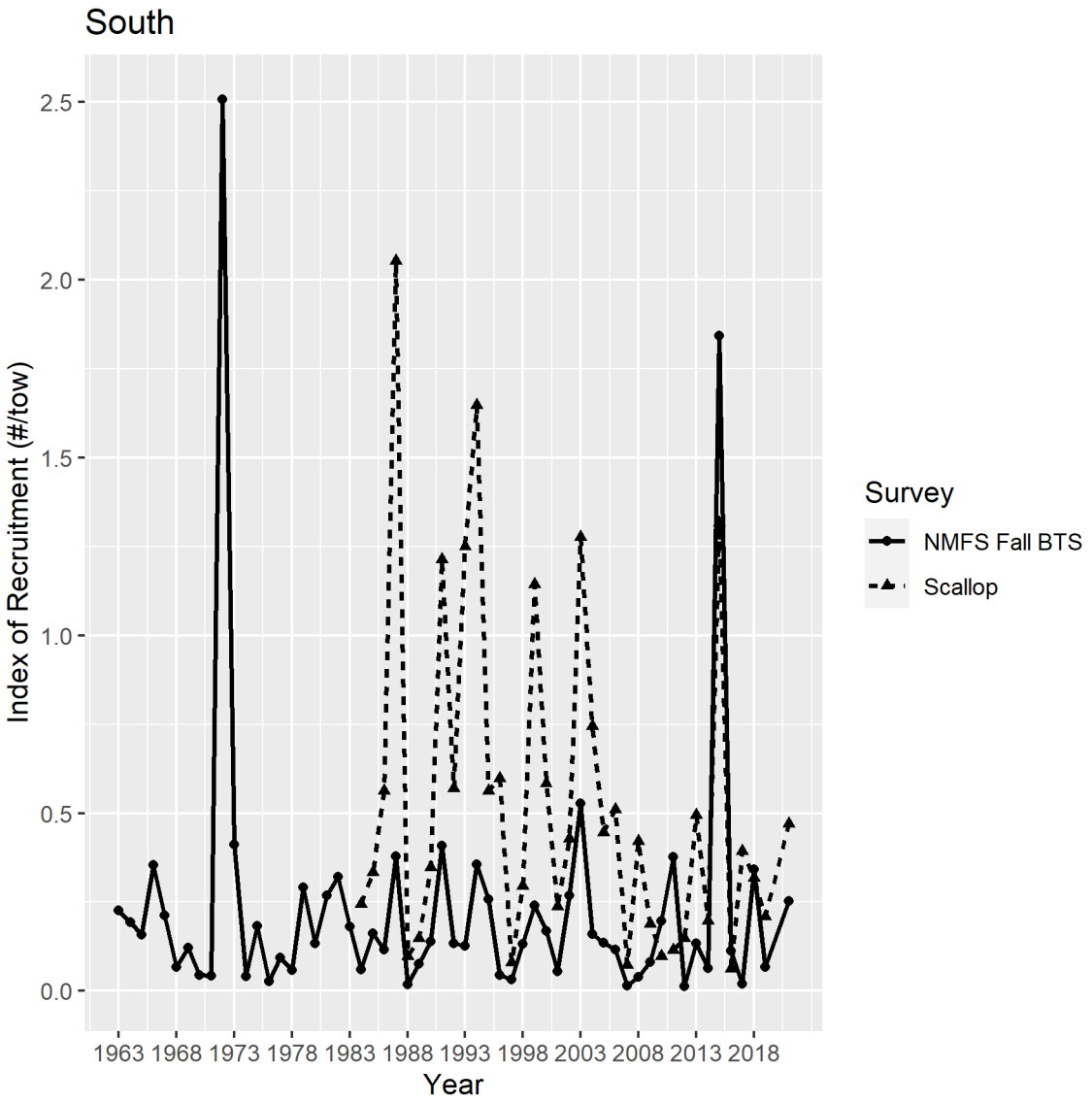

Figure 15: Southern monkfish age-0 recruitment indices of abundance.

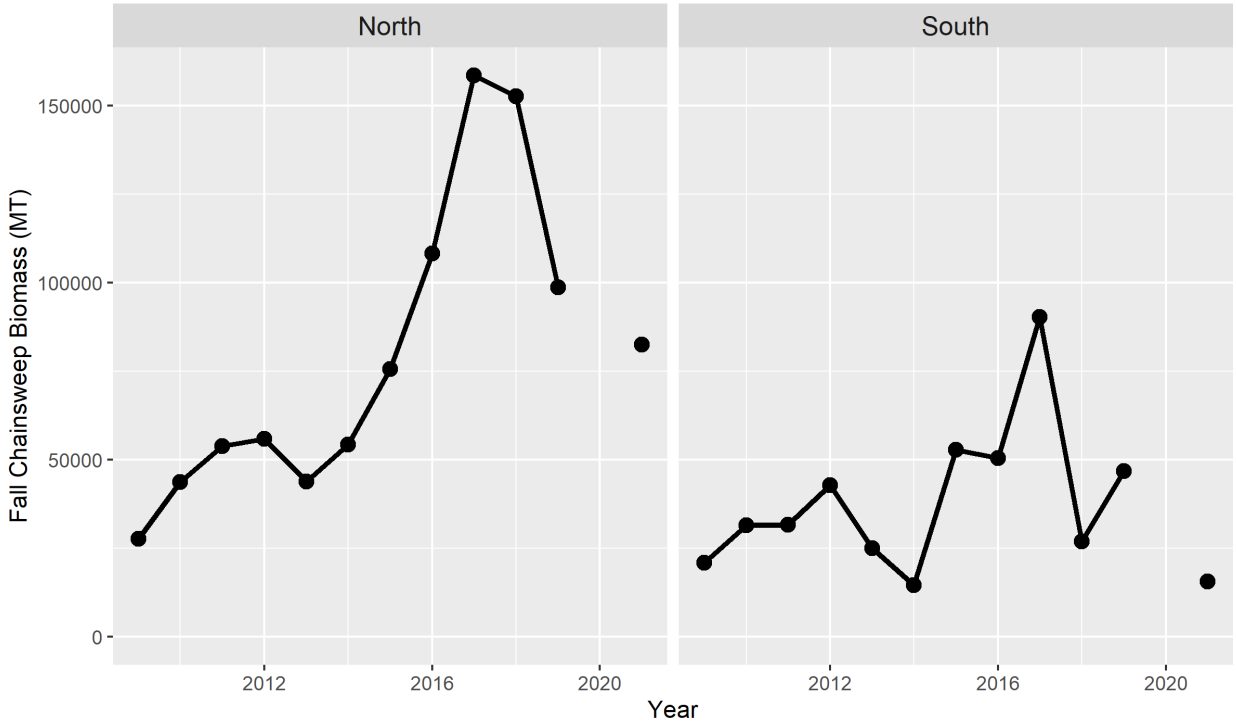

Figure 16: Measure of absolute monkfish biomass based on paired chainsweep and rockhopper sweep for the NMFS fall BTS.

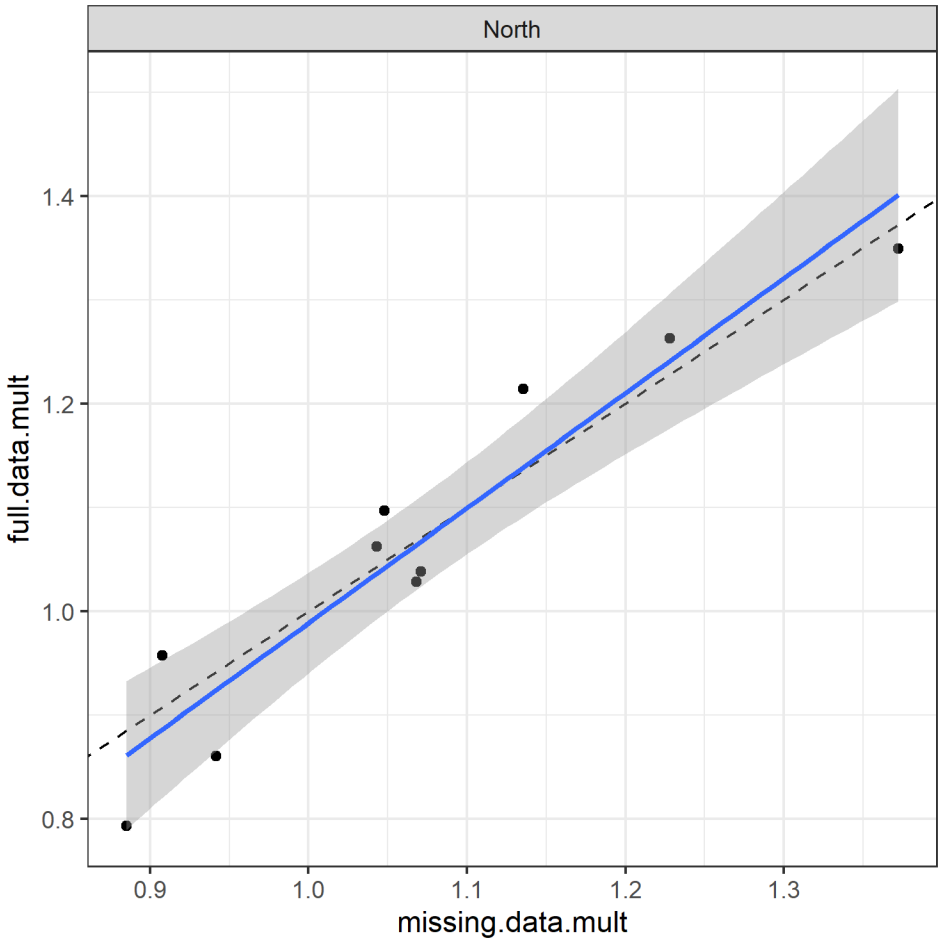

Figure 17: Ismooth applied to data from the North with 10 different terminal years using all data (full.data.mult) and with the year before the terminal year missing (missing.data.mult).

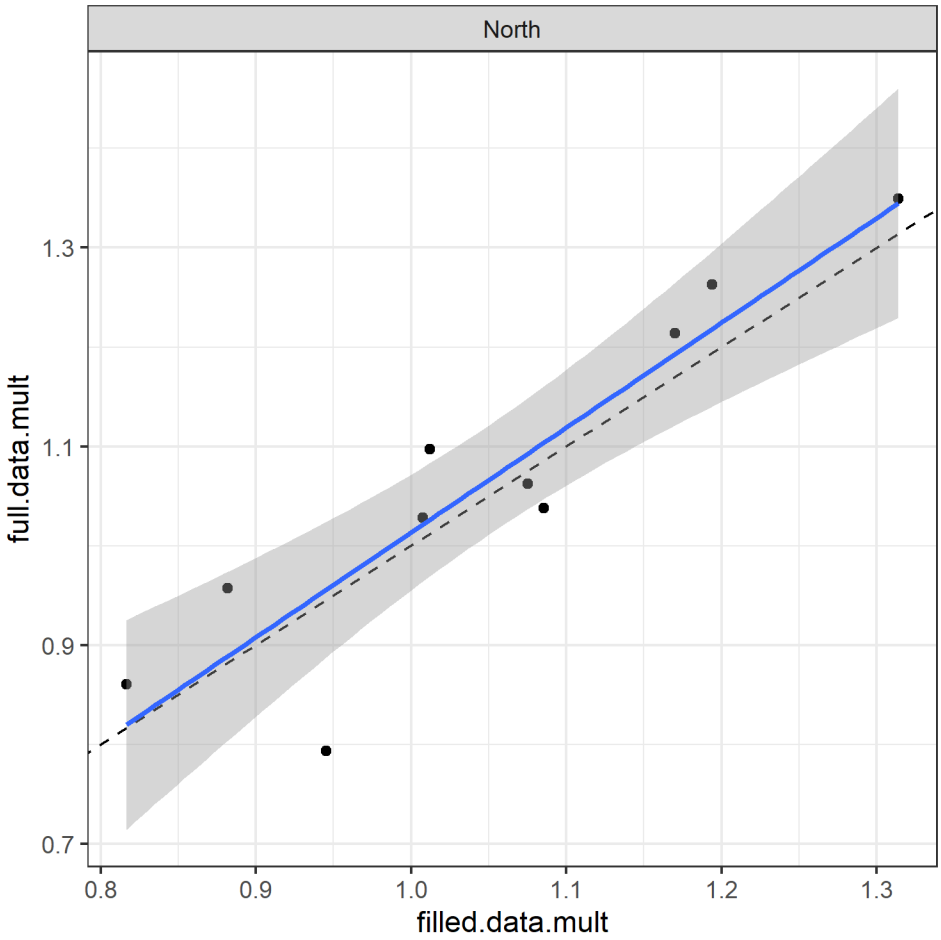

Figure 18: As in Figure 17 except with the missing value imputed using the mean of the surrounding years (filled.data.mult).

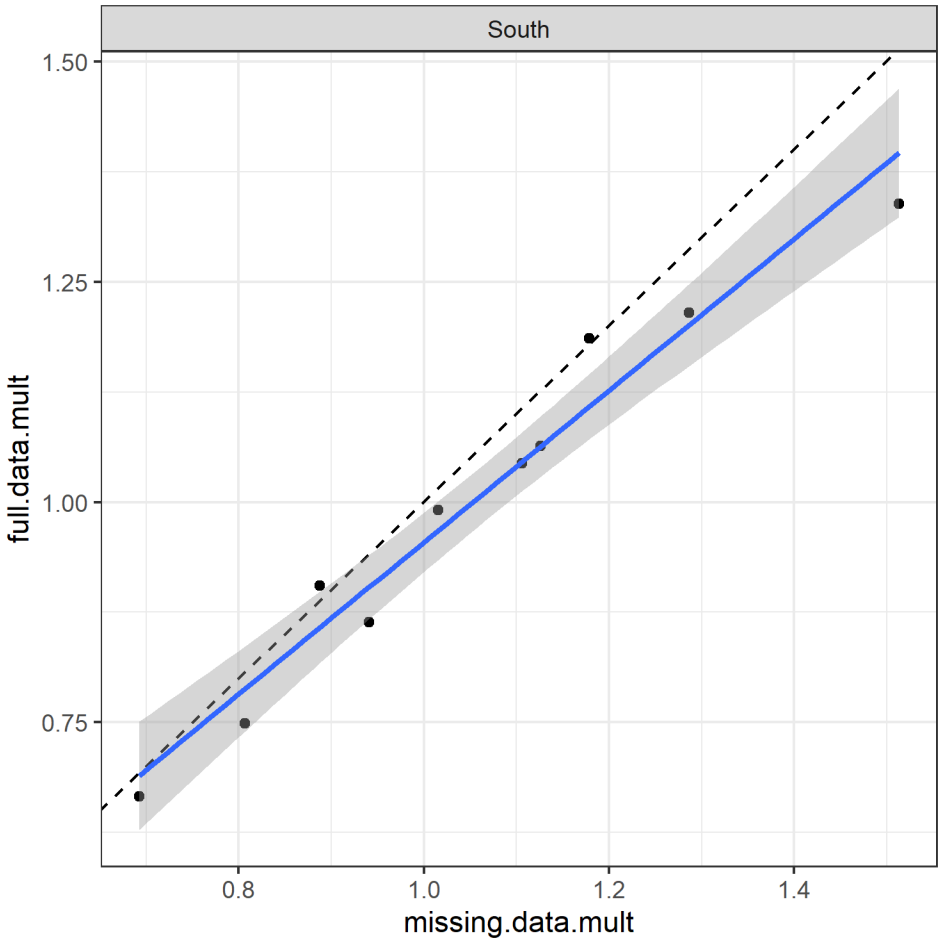

Figure 19: As in Figure 17 except for the South.

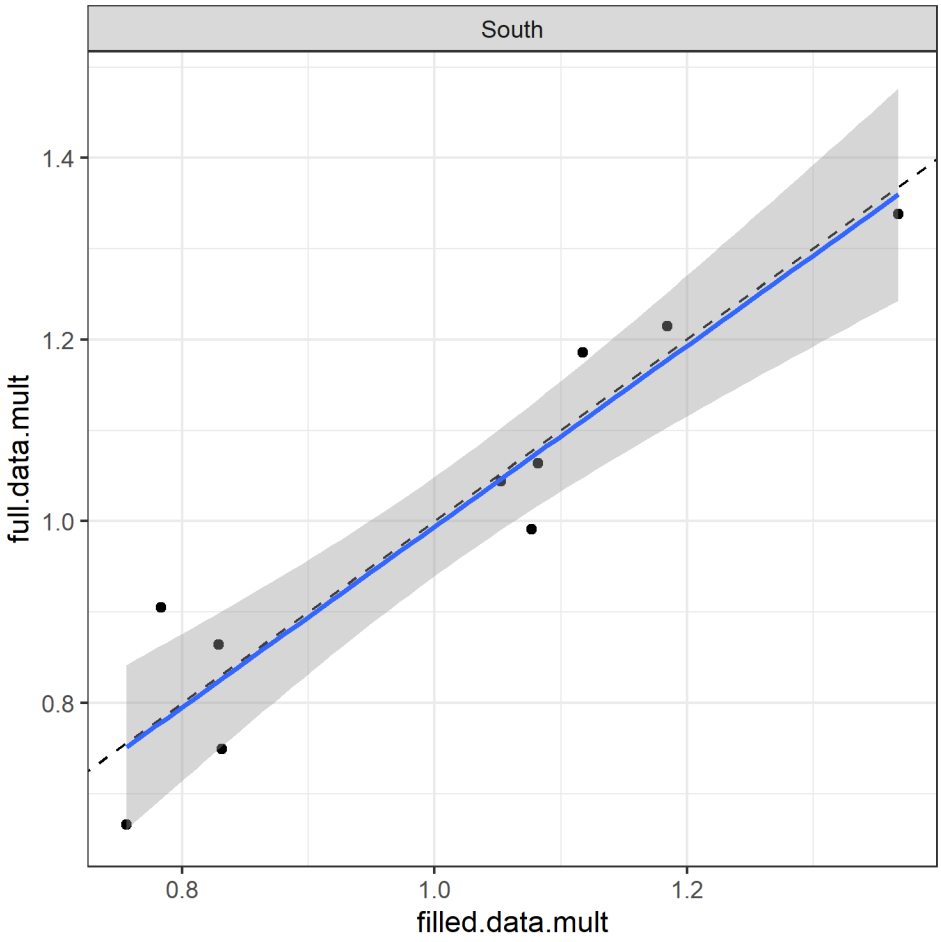

Figure 20: As in Figure 18 except for the South

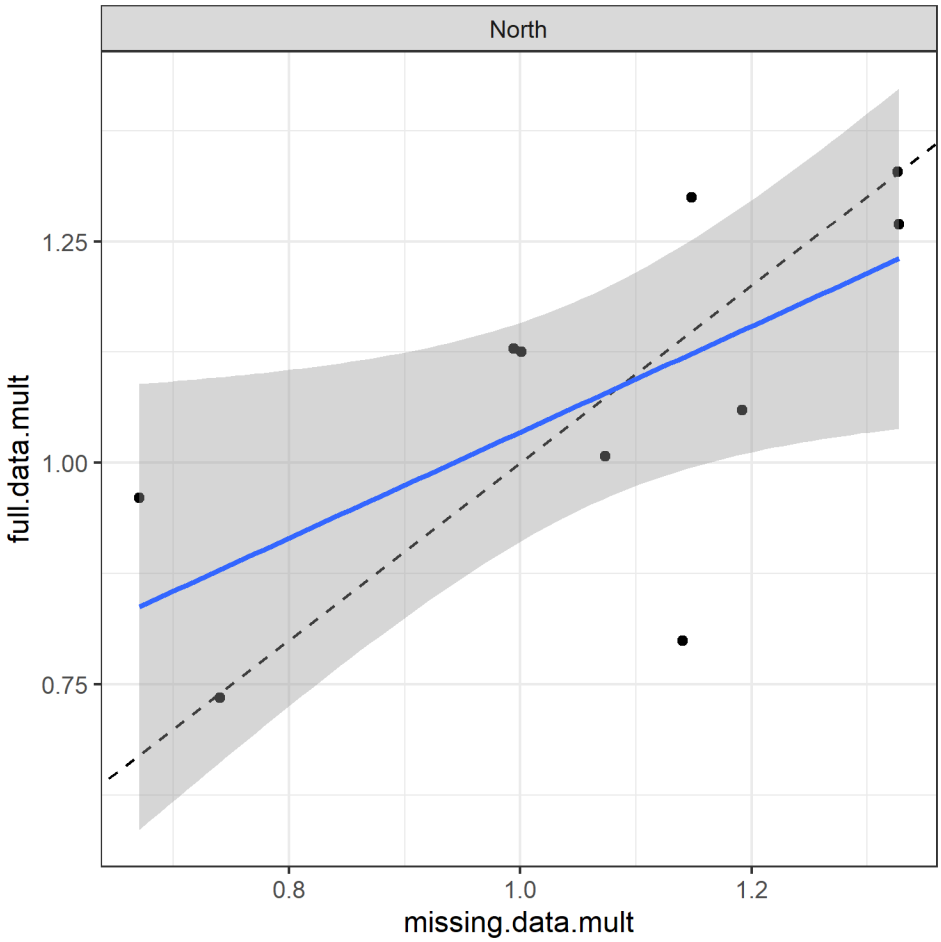

Figure 21: As in Figure 17 but using only the fall survey.

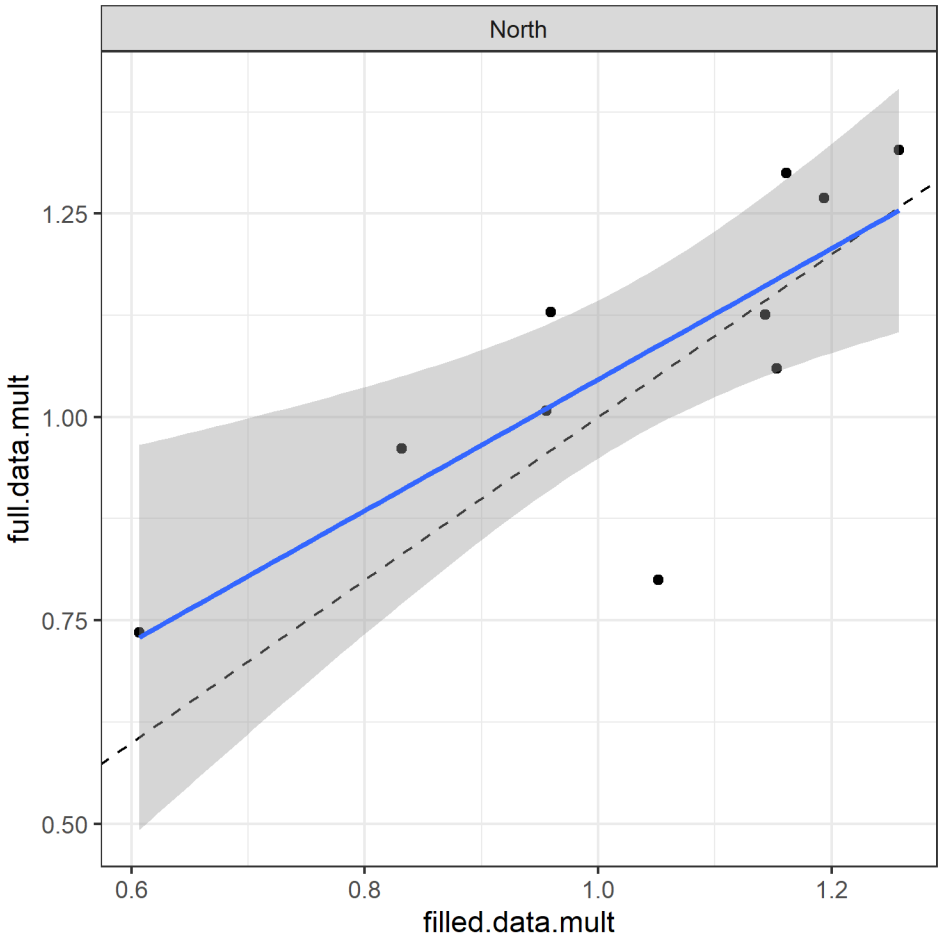

Figure 22: As in Figure 18 but using only the fall survey.

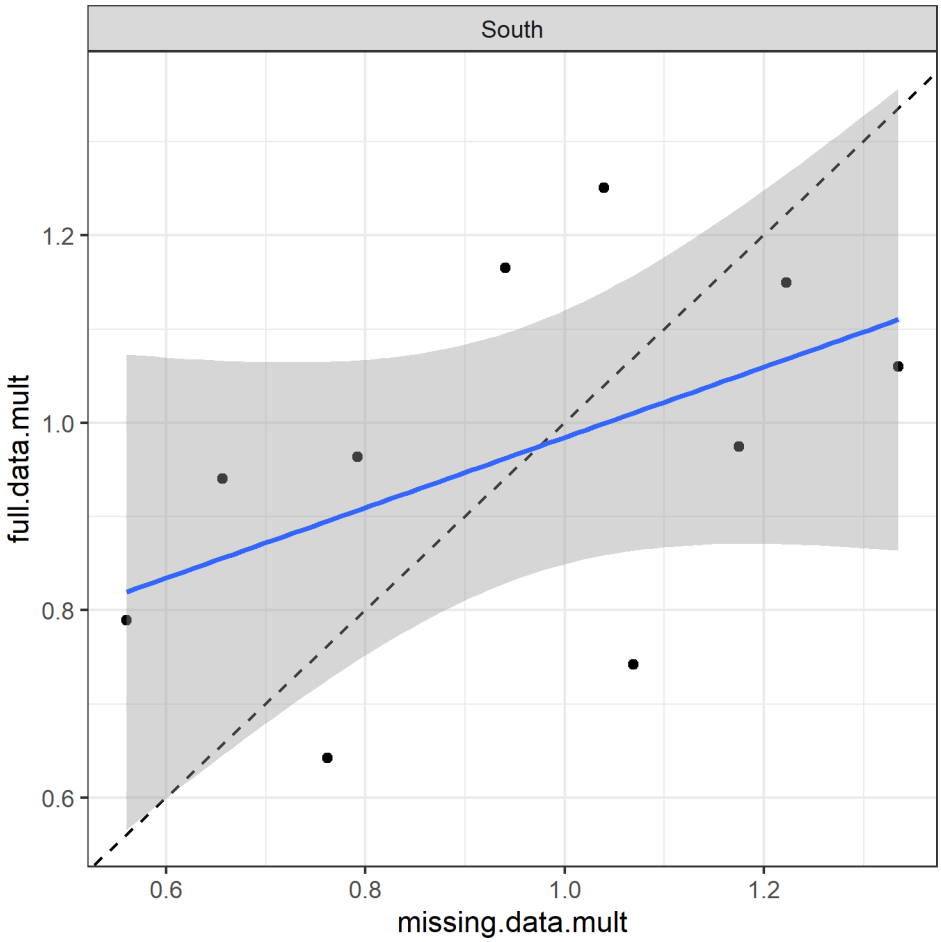

Figure 23: As in Figure 19 but using only the fall survey.

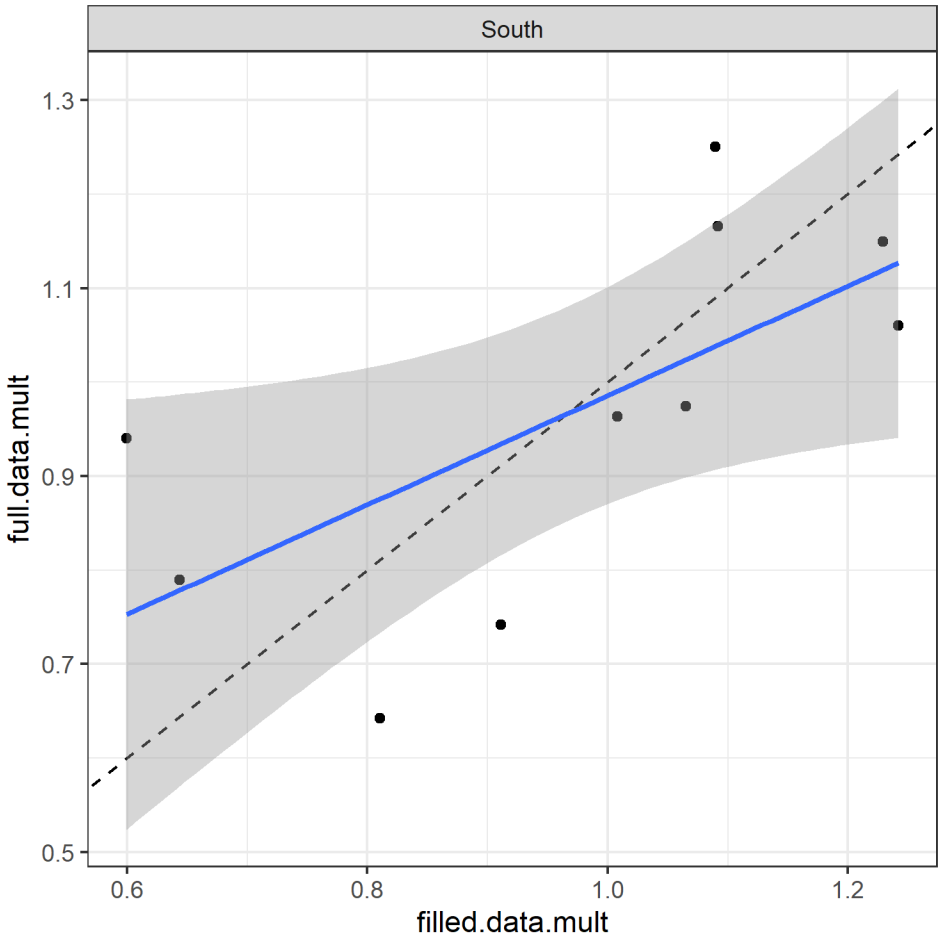

Figure 24: As in Figure 20 but using only the fall survey.

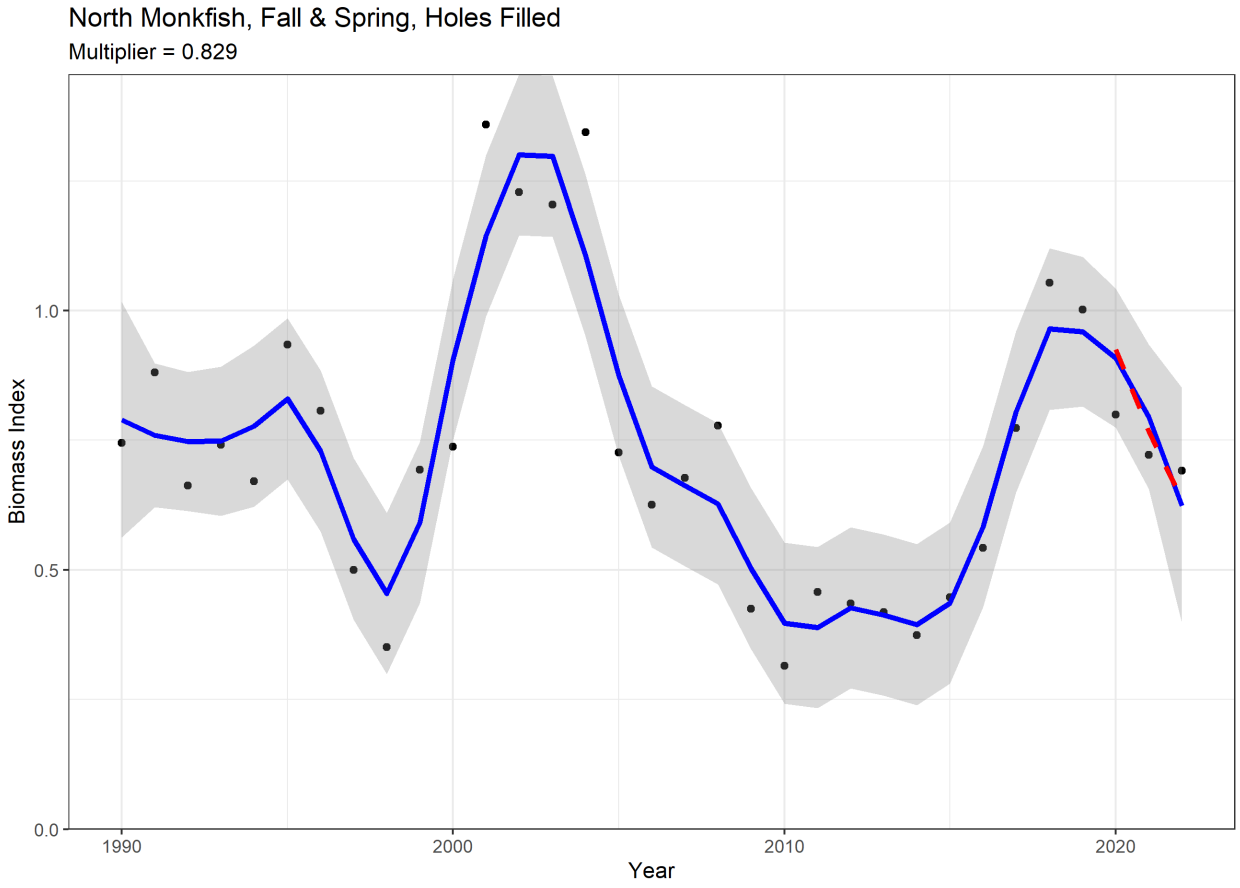

Figure 25: Results of the Ismooth approach in the North.

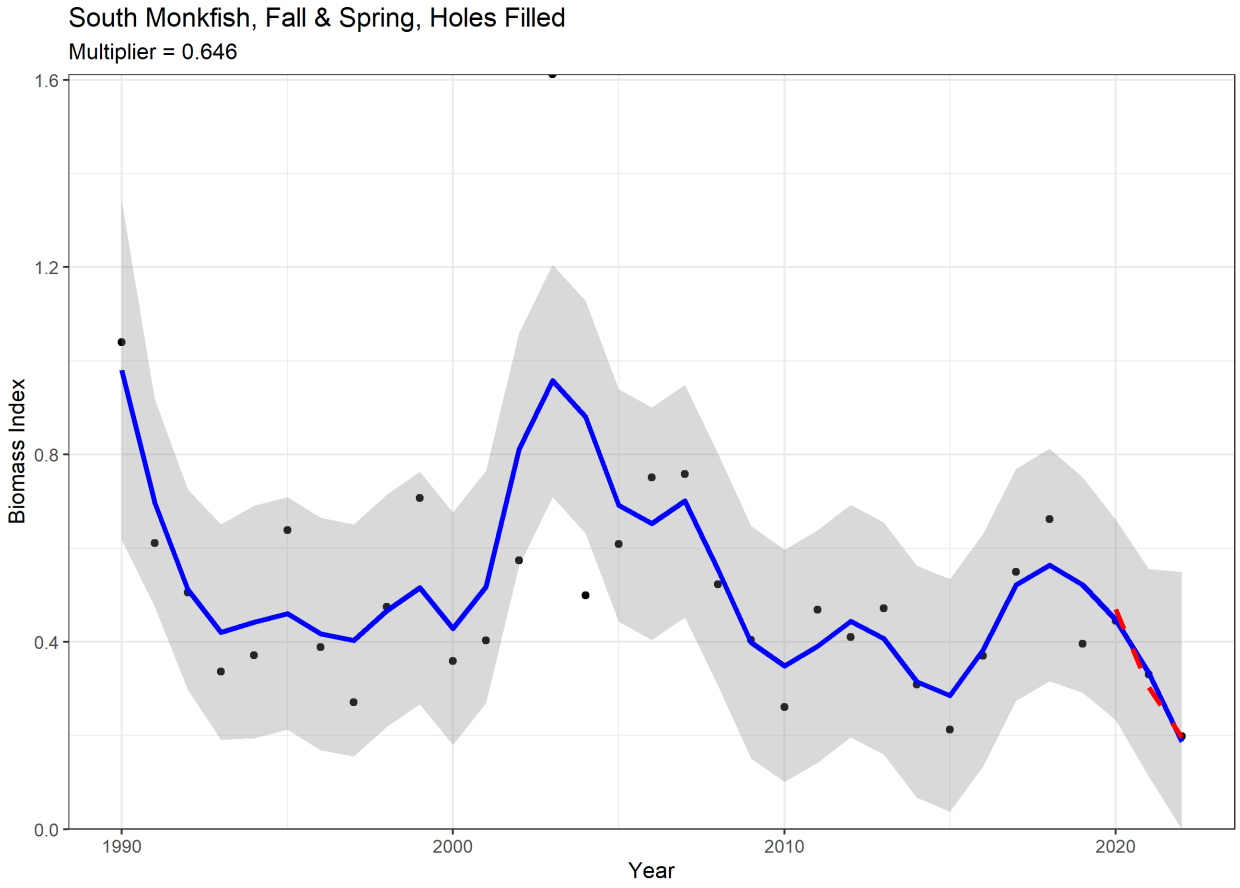

Figure 26: Results of the Ismooth approach in the South.