Atlantic States Marine Fisheries COMMISSION

2025 Atlantic Menhaden Single-Species Update

Caitlin Craig, NY DEC

Atlantic Menhaden TC Chair

October 28, 2025

Atlantic Menhaden TC & SAS

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- James Boyle, Atlantic States Marine Fisheries Commission
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- Alexei Sharov, Maryland Department of Natural Resources
- Chris Swanson, Florida Fish and Wildlife Research Institute

Outline

- TOR 1: Fishery-dependent data
- TOR 2: Fishery-independent data
- TOR 3: Life history information and model structure
- TOR 4: Population estimates
- TOR 5: Stock status
- TOR 7: Research Recommendations

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TOR 1: Fishery-Dependent Data

- Added 2 additional years of reduction, bait, and recreational removals to the last update (2022-2023)

- Continue to revise historical bait landings, resulting in some minor changes to the time-series

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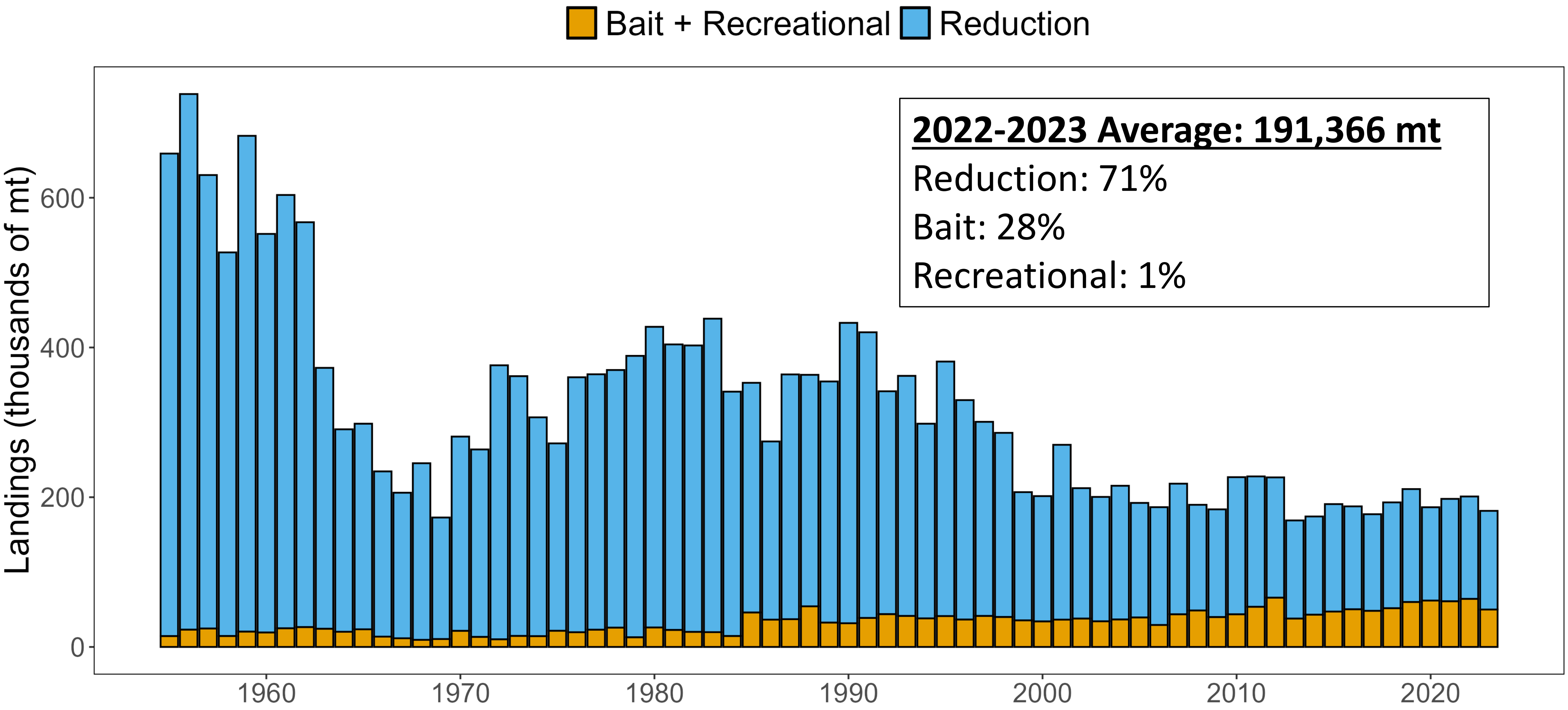
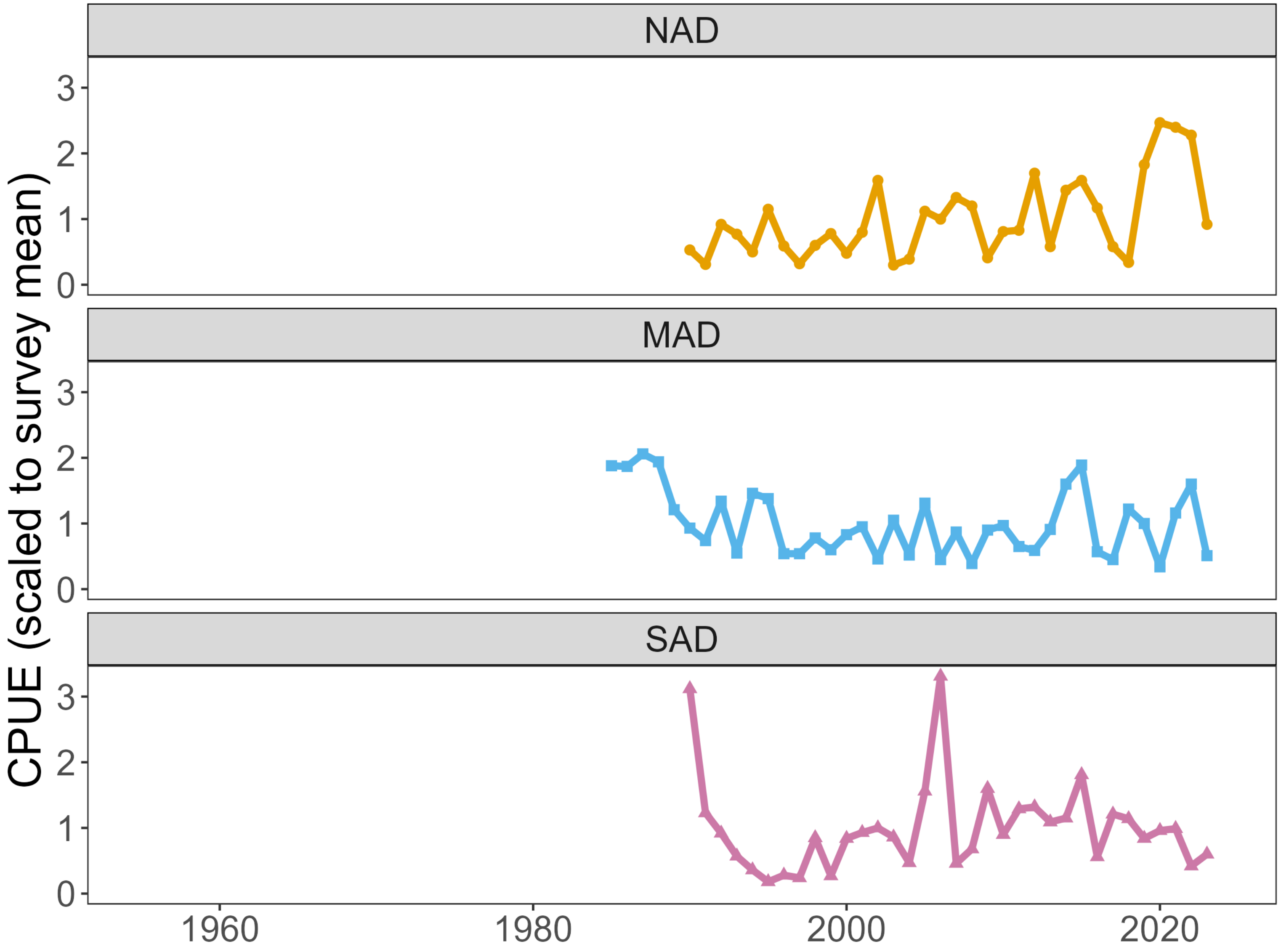
TOR 1: Fishery-Dependent Data



TOR 2: Fishery-Independent Data

- Northern Adult (NAD) Index:
  - CT Long Island Trawl Survey
  - Delaware Bay Adult Trawl
  - NJ Ocean Trawl
- Mid-Atlantic Adult (MAD) Index
  - MD Gillnet
  - VIMS Shad Gillnet
- Southern Adult (SAD) Index
  - NC p195 Trawl
  - SEAMAP
  - GA Ecological Monitoring Trawl Survey



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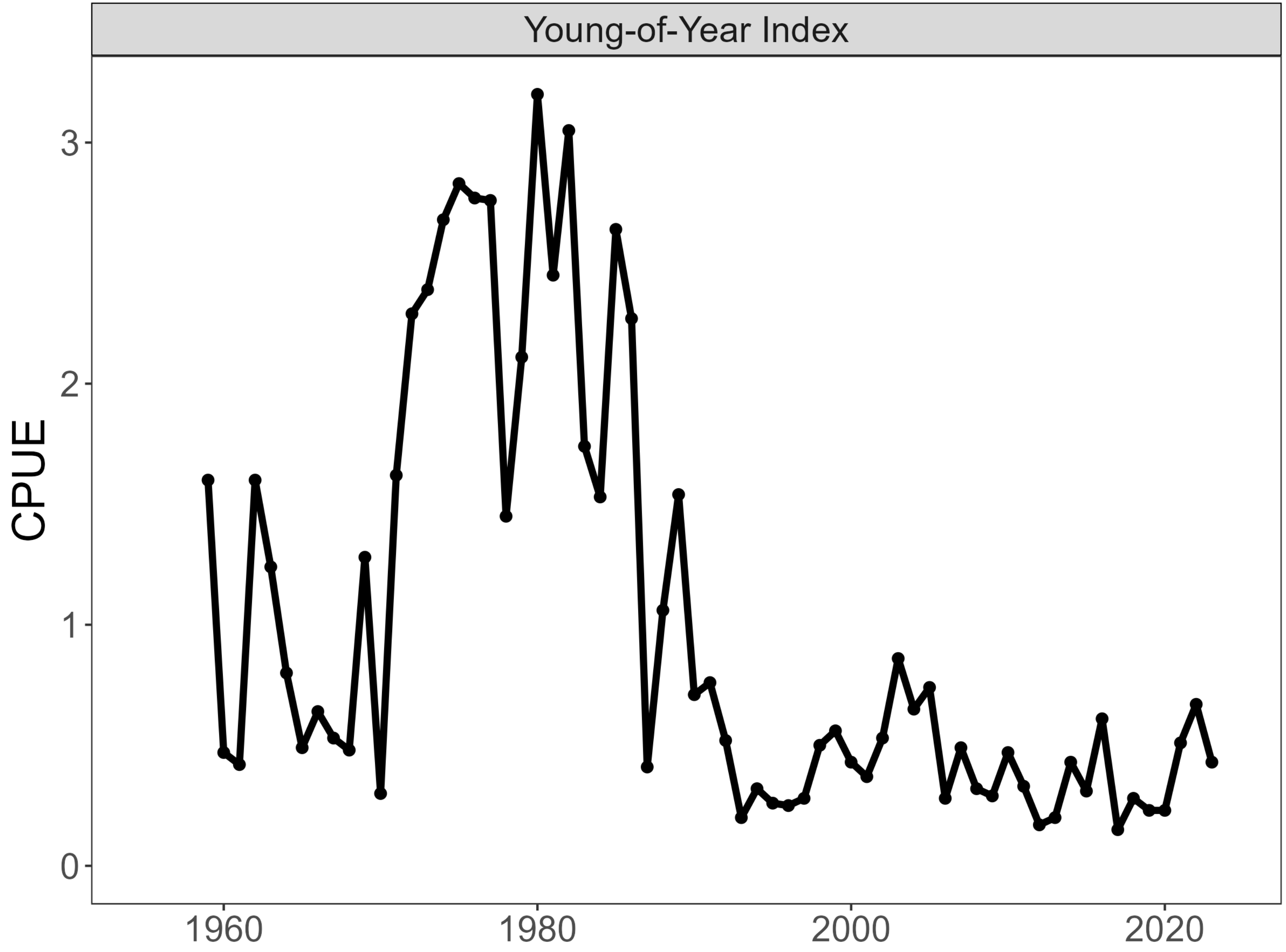
TOR 2: Fishery-Independent Data

- Composite YOY
  - RI Trawl
  - CT LISTS
  - CT River Alosine
  - CT Thames River Alosine
  - NY Juvenile Striped Bass Seine
  - NY Peconic Bay Trawl
  - NY WLIS Seine
  - NJ Ocean Trawl
  - NJ Striped Bass YOY Seine
  - DE Inner Bays
  - MD Coastal Trawl
  - MD Juvenile Striped Bass
  - VIMS Juvenile Trawl
  - VIMS Striped Bass Seine
  - NC p120
  - SC Electrofishing



TOR 3: Life History & Model Structure

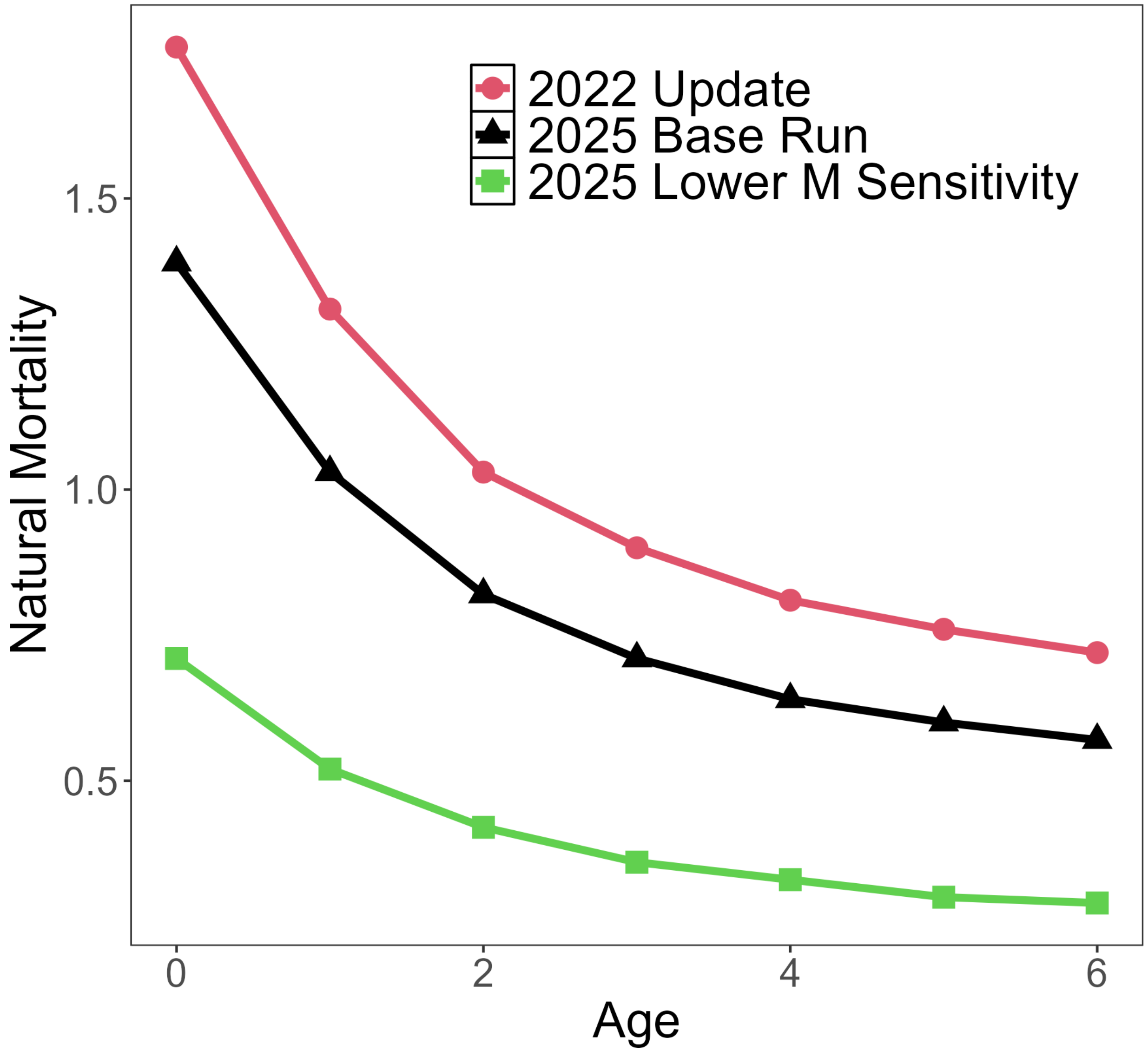
- Estimate of natural mortality (M) used in the assessment was revised

- Ault et al. submitted a reanalysis of the tagging data that resulted in a lower estimate of M than the Liljestrand et al. (2019) estimate used in the 2020 benchmark

- SAS formed a Work Group to review the data and analyses and consulted with the authors to understand what was causing the differences and what was the best estimate of M for use in the single-species model

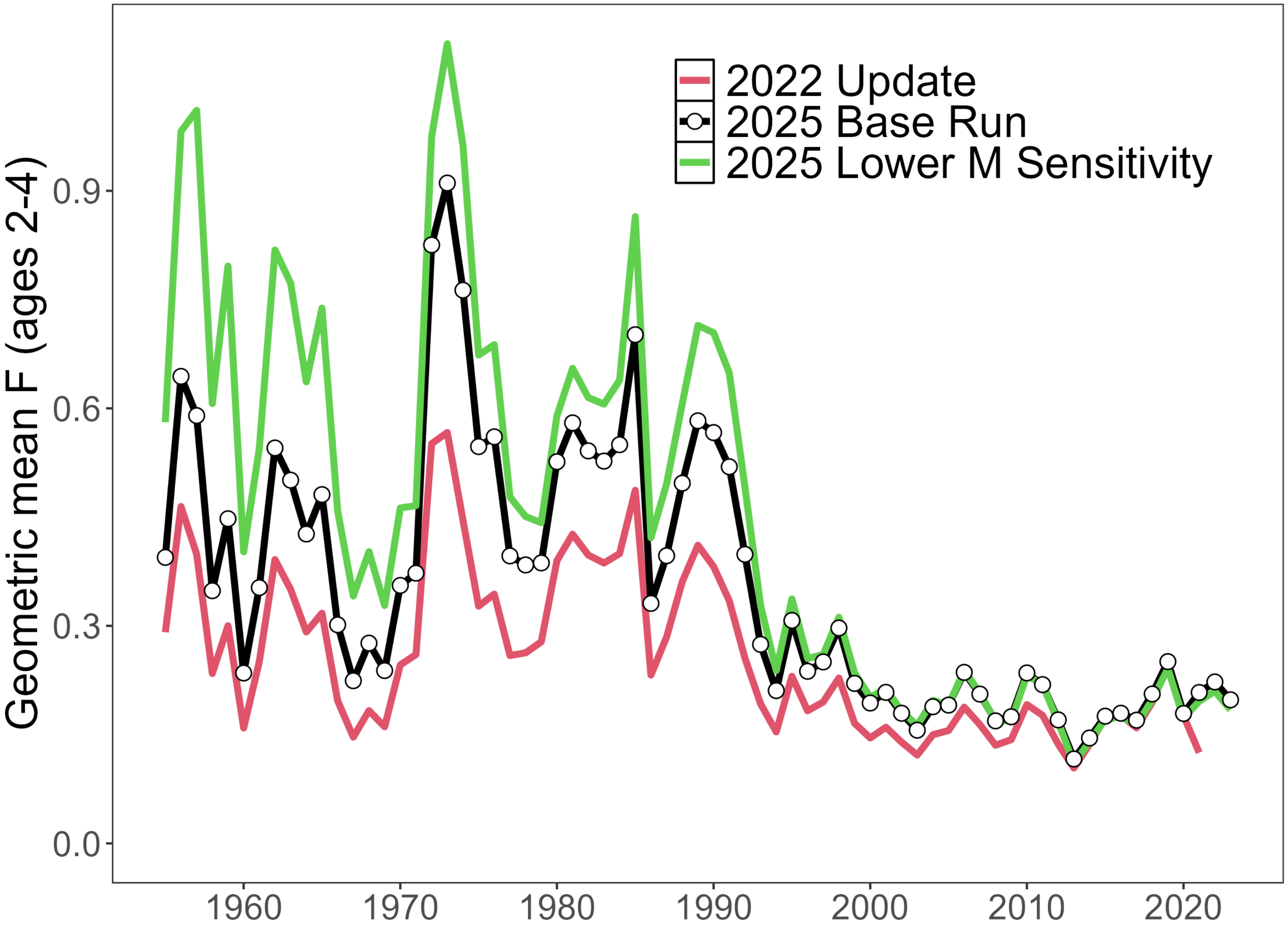
TOR 3: Life History & Model Structure

- Revised tagging model M is ~20% lower than Liljestrand et al. (2019)



TOR 4: Population Estimates

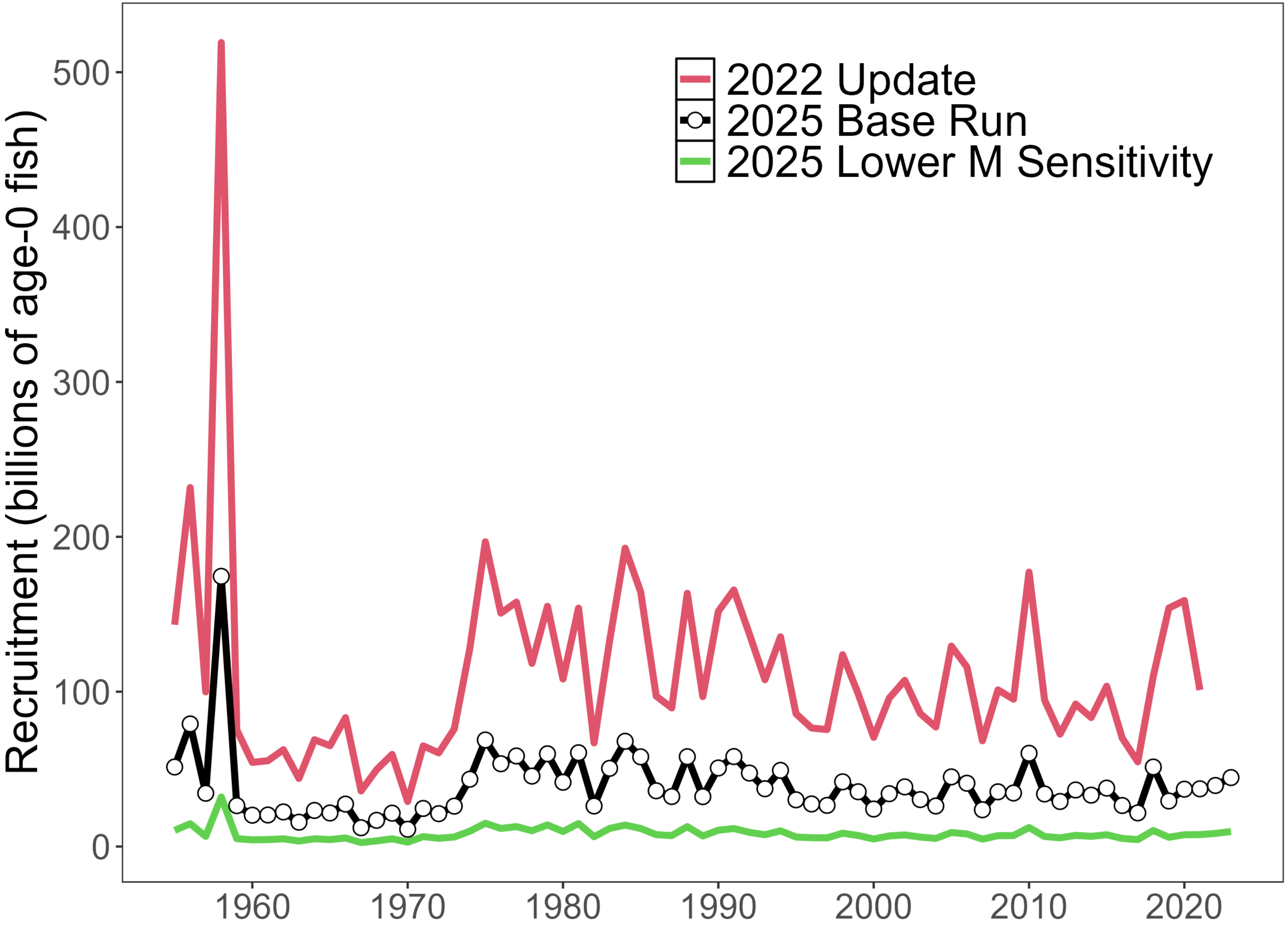
- Change in M had an impact on the scale of the population, but did not change the trends
- Lower M →
  - Higher F



TOR 4: Population Estimates

- Change in M had an impact on the scale of the population, but did not change the trends

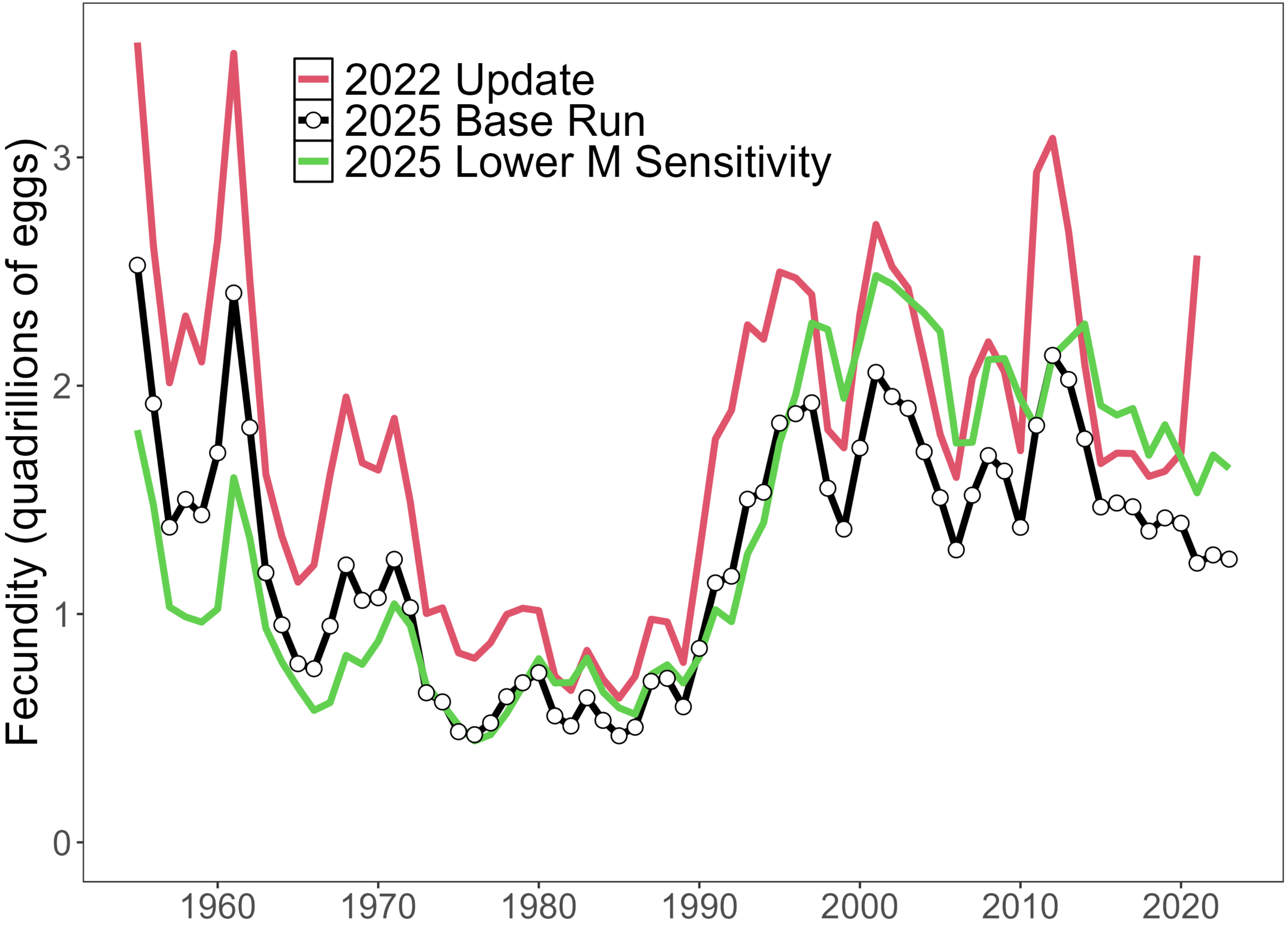
- Lower M →
  - Higher F
  - Lower recruitment



TOR 4: Population Estimates

- Change in M had an impact on the scale of the population, but did not change the trends

- Lower M →
  - Higher F
  - Lower recruitment
  - Lower fecundity



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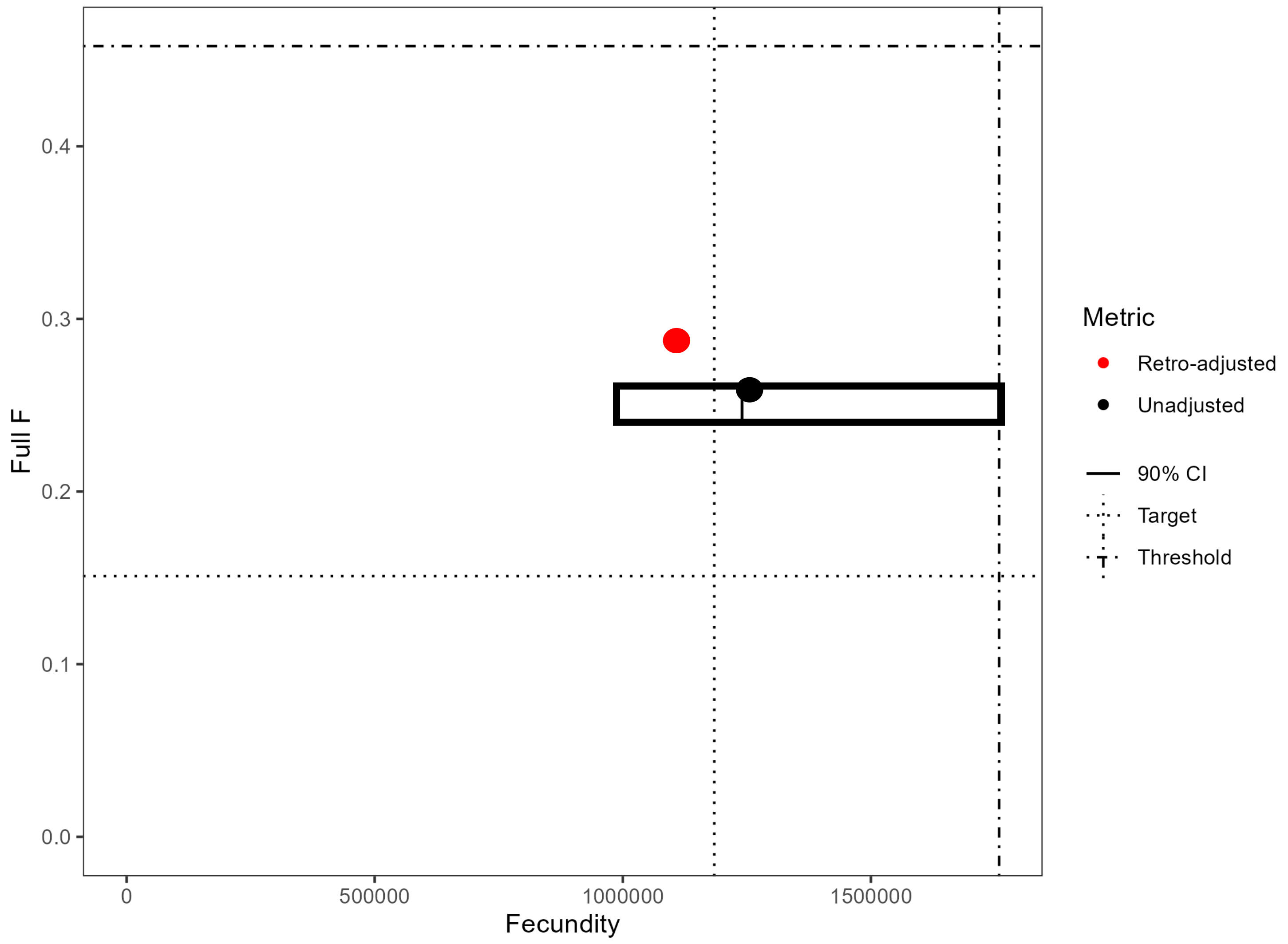
TOR 4: Retrospective Analysis

- TC/SAS applied the ASMFC Retrospective Pattern Guidance Document to determine whether the retrospective pattern in the assessment was significant enough to warrant an adjustment

- ASMFC Guidance looks at:
  - Is Mohn's rho outside the recommended bounds?
  - Is the adjusted estimate outside the 90% CIs of the unadjusted estimate?
  - Is the terminal year of each peel outside the CI of the base run?

TOR 4: Retrospective Analysis

Quantity	Mohn's rho
Fecundity	0.12
Full F	-0.09
Bounds	-0.22 - 0.3



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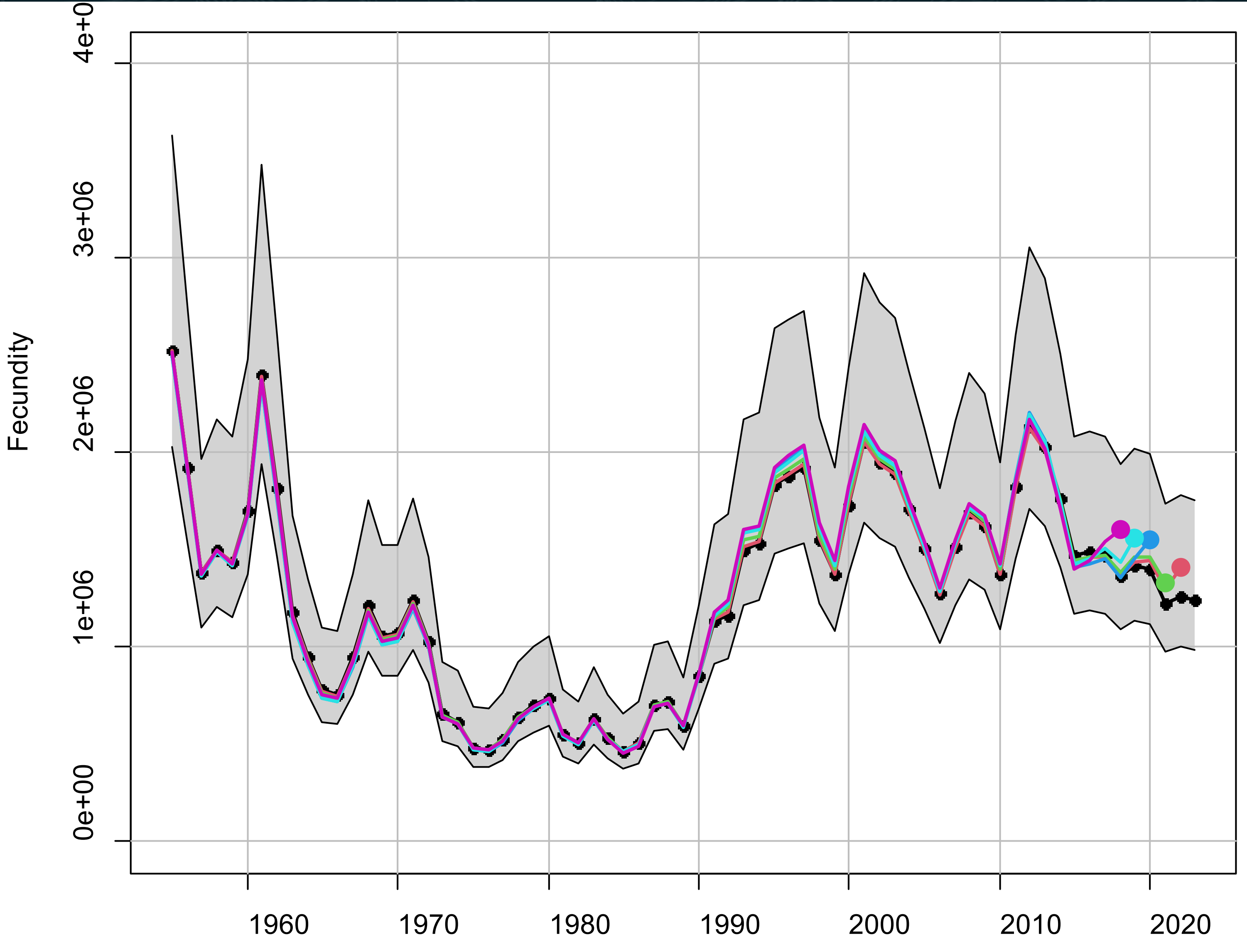
TOR 4: Retrospective Analysis

- Mohn's rho for fecundity: 0.12

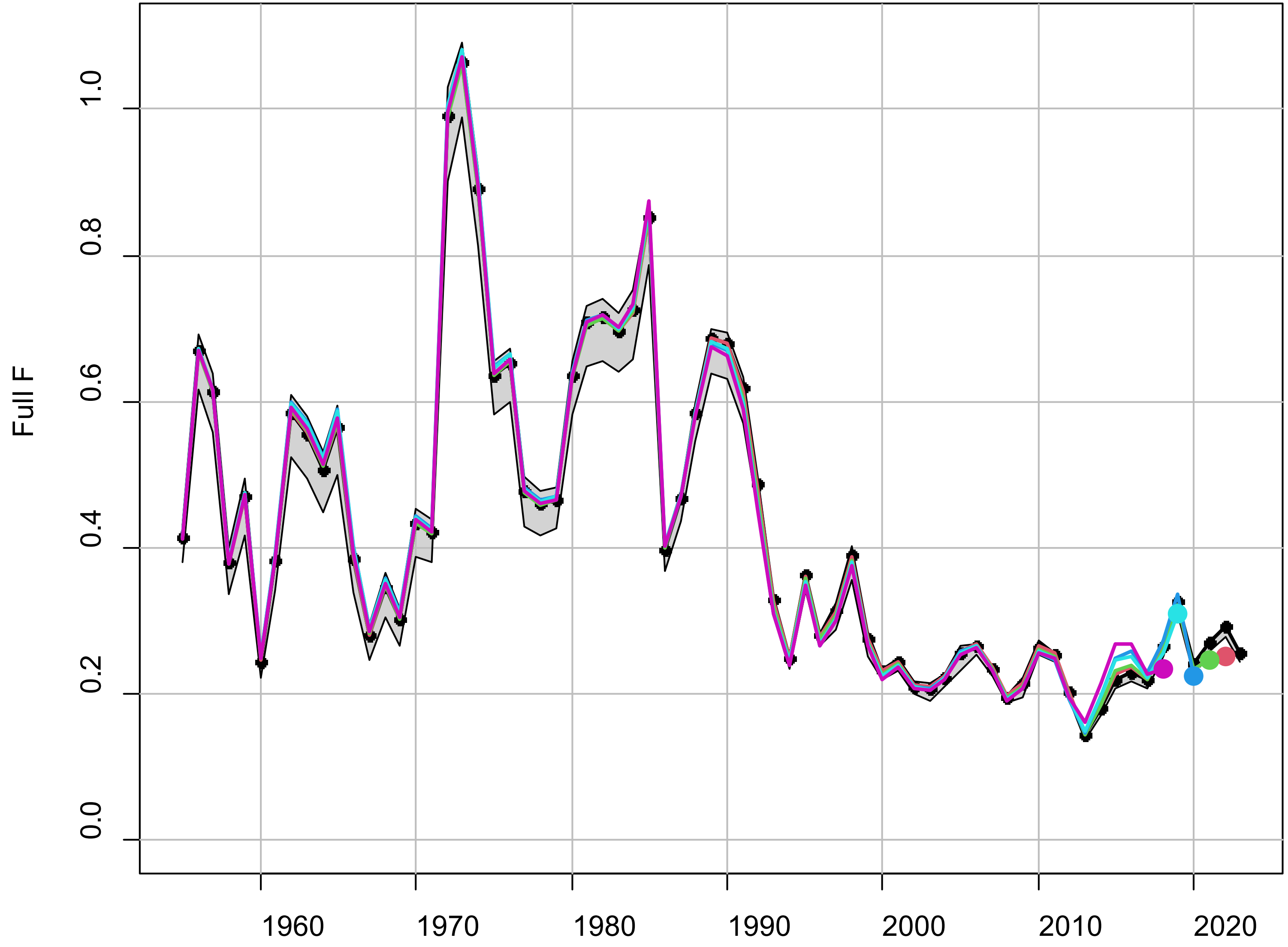
- The terminal year of all peels is within the confidence intervals of the base run



TOR 4: Retrospective Analysis

- Mohn's rho for F: -0.09

- The terminal year of 2 of the 3 most recent peels are outside the confidence intervals of the base run



TOR 4: Retrospective Analysis

- TC/SAS noted that the ASMFC Guidance document is not clear about what to do when one metric (F) would qualify for adjustment and one metric (fecundity) would not

- TC/SAS chose not to apply a retrospective adjustment
  - Fecundity does not require one
  - F does, based on being outside the CIs, but that is likely caused by the narrow CIs in the update
  - Mohn's rho for F is within the bounds, the adjustment would not change stock status, and F is not used in the projections

TOR 5: Stock Status

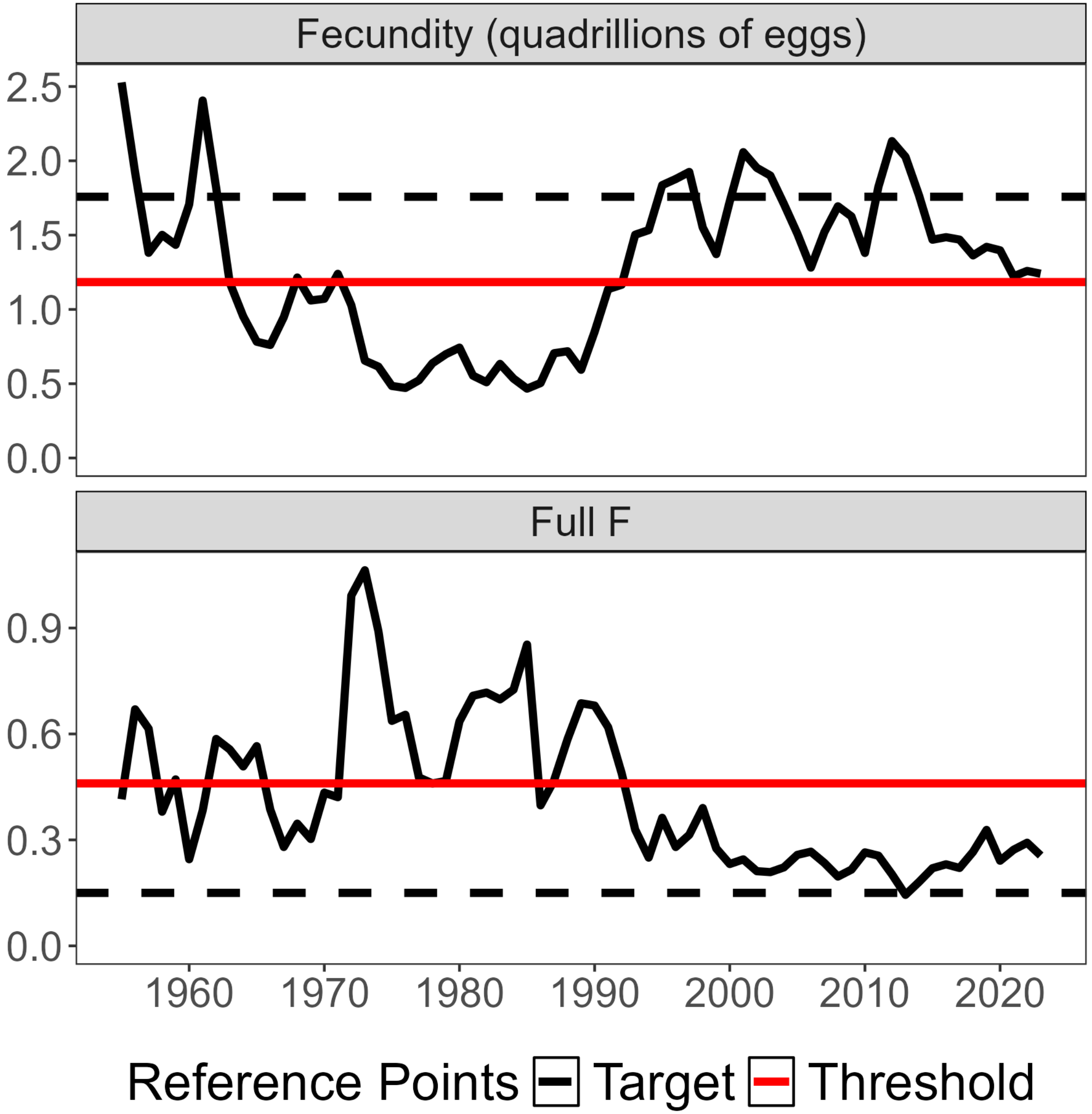
- Stock status determined using the updated Ecological Reference Points model from the 2025 Benchmark Assessment and the definitions adopted by the Board in 2020

- **ERP F target:** the maximum fishing mortality rate (F) on Atlantic menhaden that sustains Atlantic striped bass at their biomass target when striped bass are fished at their F target

- **ERP F threshold:** the maximum F on Atlantic menhaden that keeps Atlantic striped bass at their biomass threshold when striped bass are fished at their F target.

TOR 5: Stock Status

Reference Point	ERP Value	2023 Value	Stock Status
$F_{THRESHOLD}$	0.46	0.26	Not Overfishing
F_{TARGET}	0.15		
$FEC_{THRESHOLD}$	1.18 quadrillion eggs	1.24 quadrillion eggs	Not Overfished
FEC_{TARGET}	1.76 quadrillion eggs		



TOR 7: Research Recommendations

- Develop and implement a multi-year coastwide or regional fishery-independent survey(s) for Atlantic menhaden
  - Pilot studies conducted but no long-term survey established
- Evaluate the adequacy of the current sampling levels for the bait fishery
  - In progress
- Conduct an ageing workshop to assess precision and error among readers with the intention of switching bait fishery age reading to state ageing labs
  - Workshop conducted, additional work on standardizing protocols ongoing

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ERP Assessment Overview

Matt Cieri, ERP WG Chair

ASMFC Annual Meeting

October 28th, 2025

ERP Working Group Members

- Matt Cieri (Chair), Maine Department of Marine Resources
- Jason Boucher, National Marine Fisheries Service
- Andre Buchheister, California State Polytechnic University, Humboldt
- Michael Celestino, New Jersey Division of Fish and Wildlife
- David Chagaris, University of Florida
- Micah Dean, Massachusetts Division of Marine Fisheries
- Katie Drew, Atlantic States Marine Fisheries Commission
- Shanna Madsen, New Jersey Division of Fish and Wildlife
- Jason McNamee, Rhode Island Division of Marine Fisheries
- Jainita Patel, Atlantic States Marine Fisheries Commission
- Amy Schueller, National Marine Fisheries Service
- Alexei Sharov, Maryland Department of Natural Resources
- Howard Townsend, National Marine Fisheries Service

Outline

- Recommended tool for ERPs
- Models Considered
- Data Updates
- Model Updates
- Results and proof-of-concept ERPs
- Sources of Uncertainty
- Next Steps

Recommendation

- As with the 2020 assessment, the ERP WG recommends using an intermediate complexity ecosystem model to evaluate trade-offs between menhaden fishing and predator abundance to find an *F* rate that meets the Board's ecosystem objectives in the long term
- Use the single-species BAM to evaluate stock status and set TACs in the short term based on that *F* rate

Models Considered

Last Time.....

- In 2020, we explored many model types
  - Simple structure, minimal data requirements: surplus production models with time-varying *r* or predation
  - Intermediate complexity: multispecies statistical catch-at-age, Ecopath with Ecosim (EwE) model with limited species
  - Very complex, very data-intensive: Full EwE
- This time, focused on intermediate complexity models and updating the full EwE for comparison
  - Based on the direction at Peer Review
  - Manager expectations and needs

Models Considered

- NorthWest Atlantic Coast Shelf (NWACS) EwE models
  - NWACS-MICE: intermediate complexity EwE model focused on key species
  - NWACS-Full: full complexity EwE model including a large number of species/species groups

- Virtual Assessment for the Description of Ecosystem Responses (VADER)
  - Multispecies statistical catch-at-age model focusing on key species

ERP Data

- <u>Predators</u>
- Bluefish
- Spiny dogfish
- Striped bass
- Weakfish

- <u>Prey</u>
- Atlantic herring
- Atlantic menhaden

Selection based on:
- Consumption ranking
- Availability of other data sources for predator and prey sources to inform assessment (reliable landings, indices, life history data, etc.)
- <u>Relevance</u> to ASMFC management process

ERP Data: Other Species

- **Blue** catfish
  - More extensive diet study indicated menhaden are a small component of their diet, and only overlap in Chesapeake Bay
  - **Not included in this assessment, consider inclusion in spatial ERP models in future**

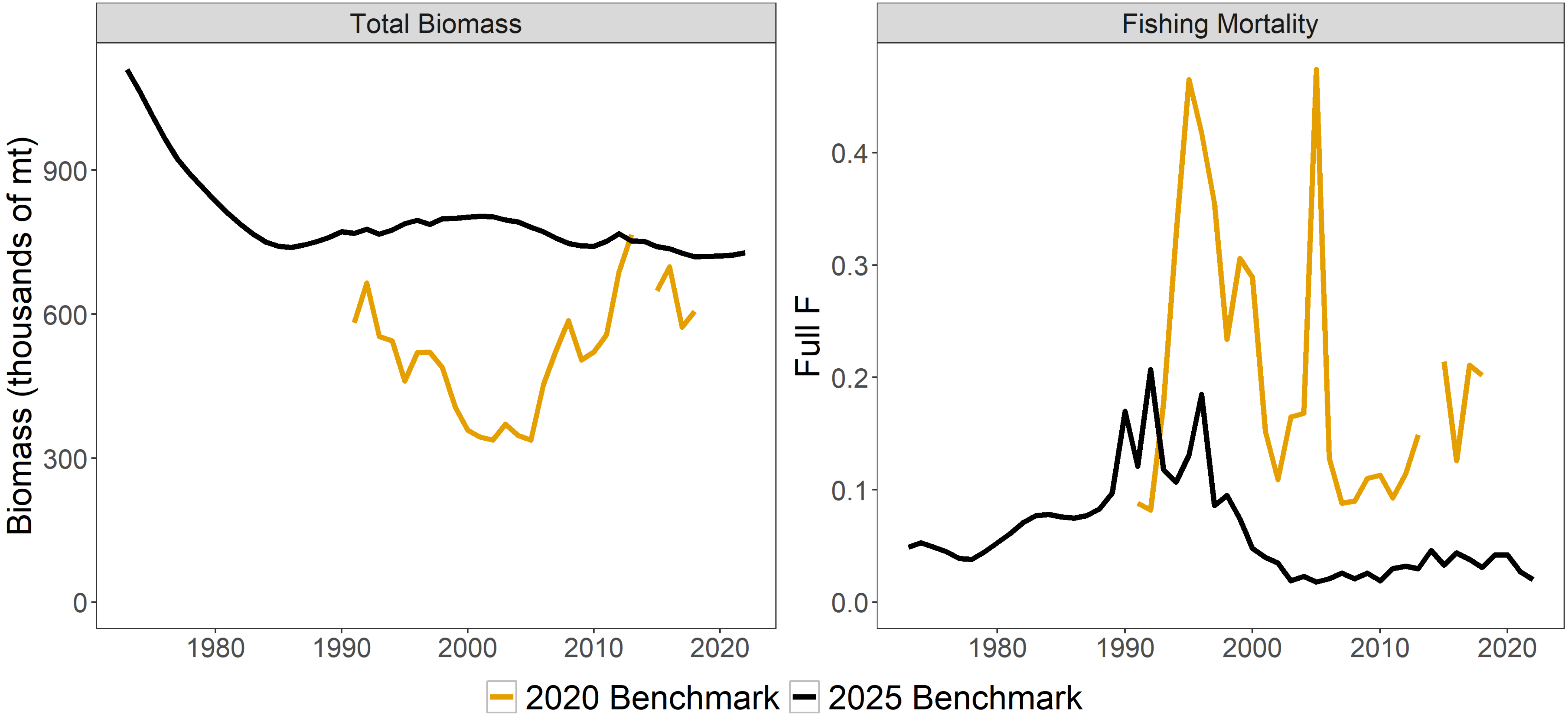
- **Bluefin** tuna
  - Menhaden can be a large component of bluefin tuna diet, but range of bluefin tuna extends well beyond range of NWACS model/menhaden
  - **Use bluefin tuna data to parameterize highly migratory species group in NWACS-Full model**

ERP Data: Other Species

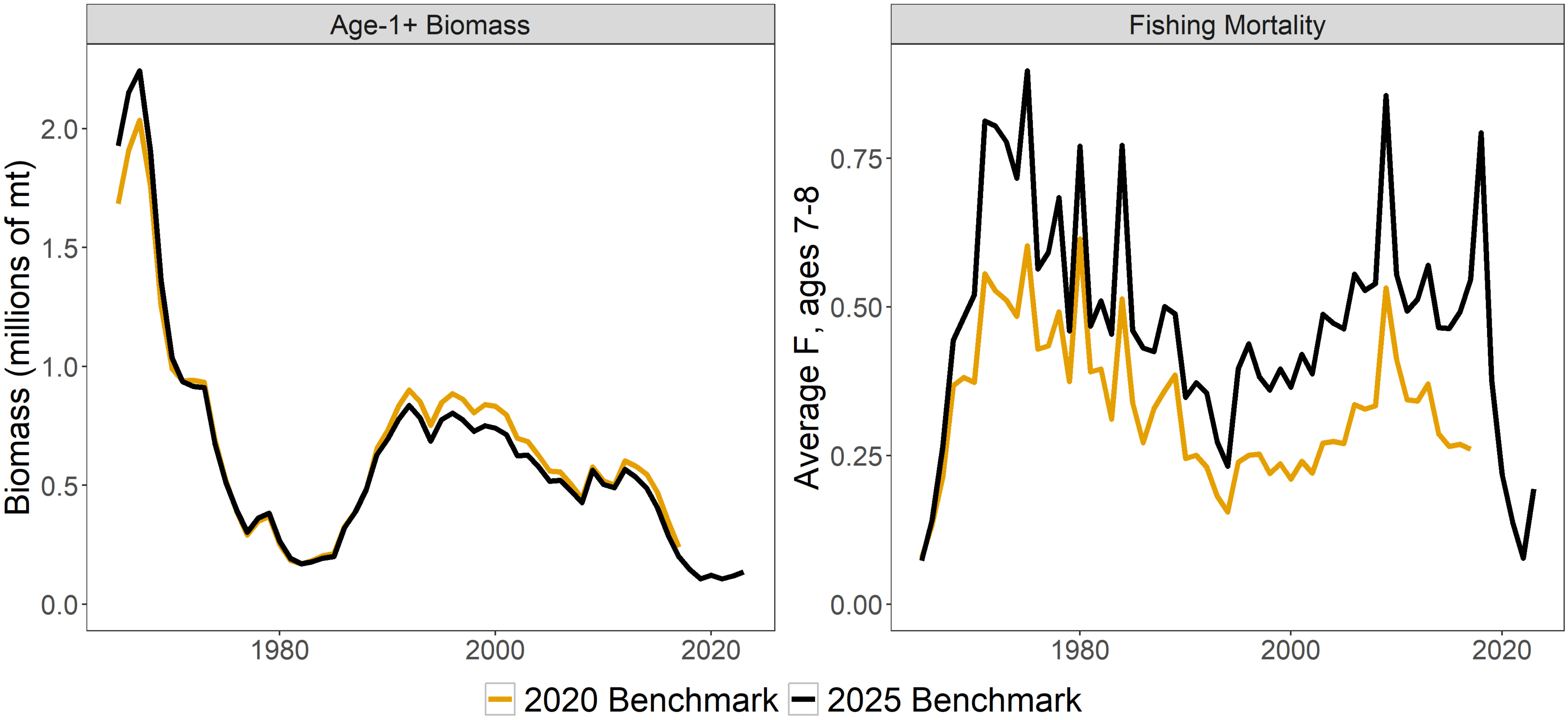
- Marine mammals
  - Data on diet and abundance are sparse
    - Updated data sources for NWACS-Full model
    - Not included in MICE

- Osprey
  - High-profile species, a lot of stakeholder interest
  - Better data sources than other similar species but still limited compared to fish species
  - **Include as a separate group in NWACS-Full (previously within other "nearshore piscivorous birds"), not in MICE**

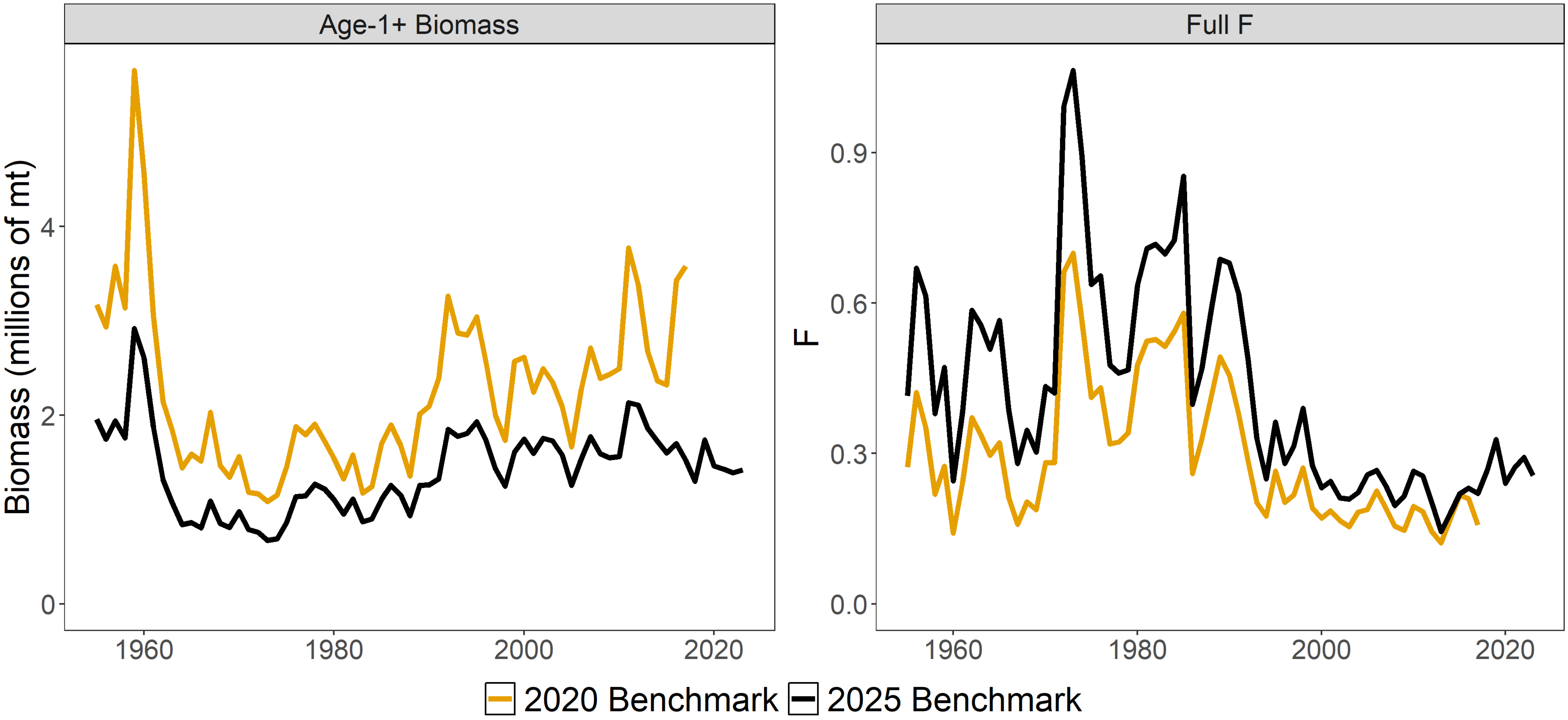
ERP Data: Dogfish



ERP Data: A. herring



ERP Data: Menhaden



ERP Data: Diet

- Long-term monitoring
  - ChesMMAP, NEAMAP, NEFSC Food Habits
- New monitoring/sampling programs
  - NJ, RI
- Individual studies:
  - MSVPA database, new literature searches, ME bluefin diet studies, whatever we could get our hands on.

Model Updates

- All Models
  - New assessment added and diet data updated
  - New time series for Zooplankton, anchovies, etc.
  - Diet comps updated and revamped
- VADER
  - Bottom-up feedback was challenging to implement
  - Progress was made, but **not recommended to move forward**
- NWACS-Full
  - Added in species as mentioned before (BFT, Ospreys, etc.)
  - Primary production forcing function
  - **Recommended as a supporting model**
- NWACS-MICE
  - Seasonal time-step, including seasonal predator-prey interactions and egg production
  - Primary productivity forcing, external recruitment information for A. herring
  - **Recommended for developing management advice**

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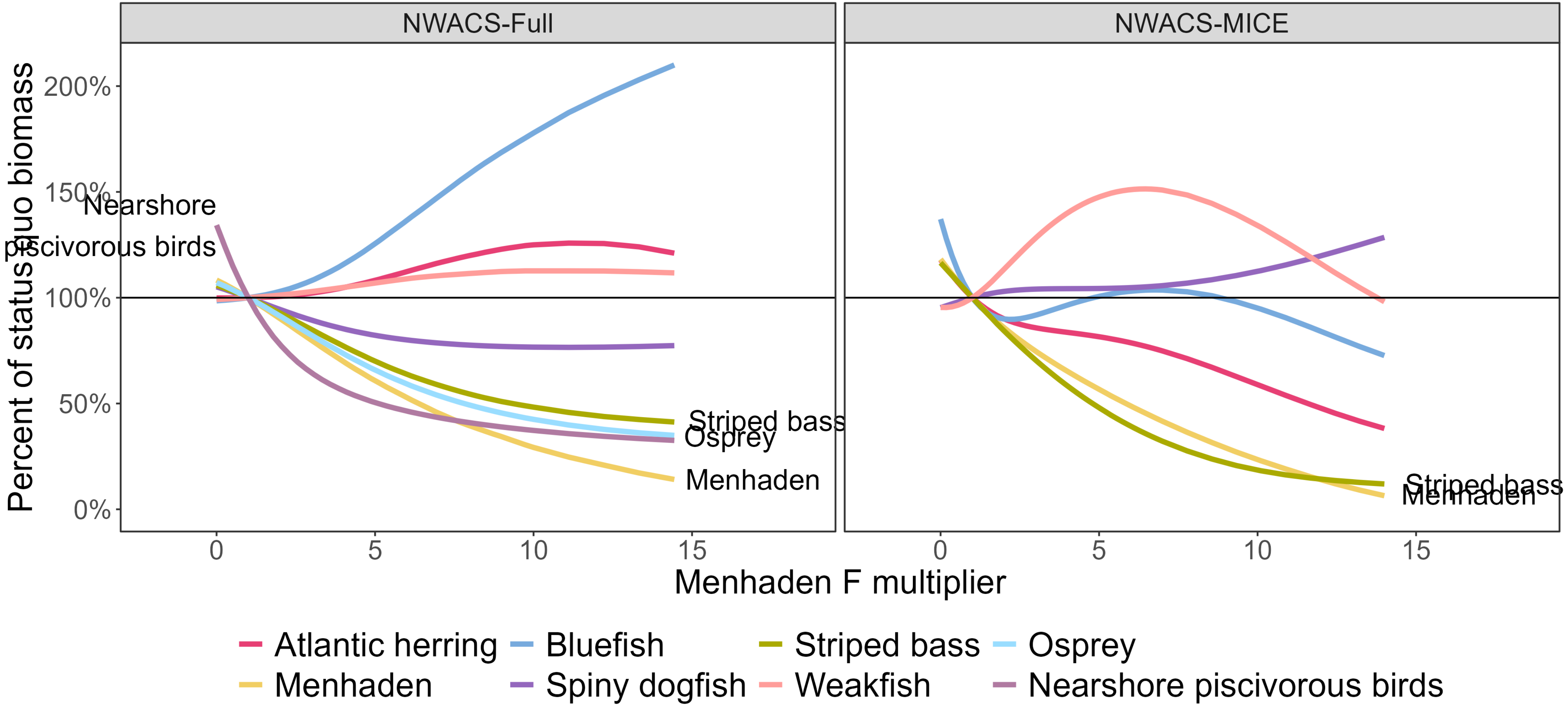
Results



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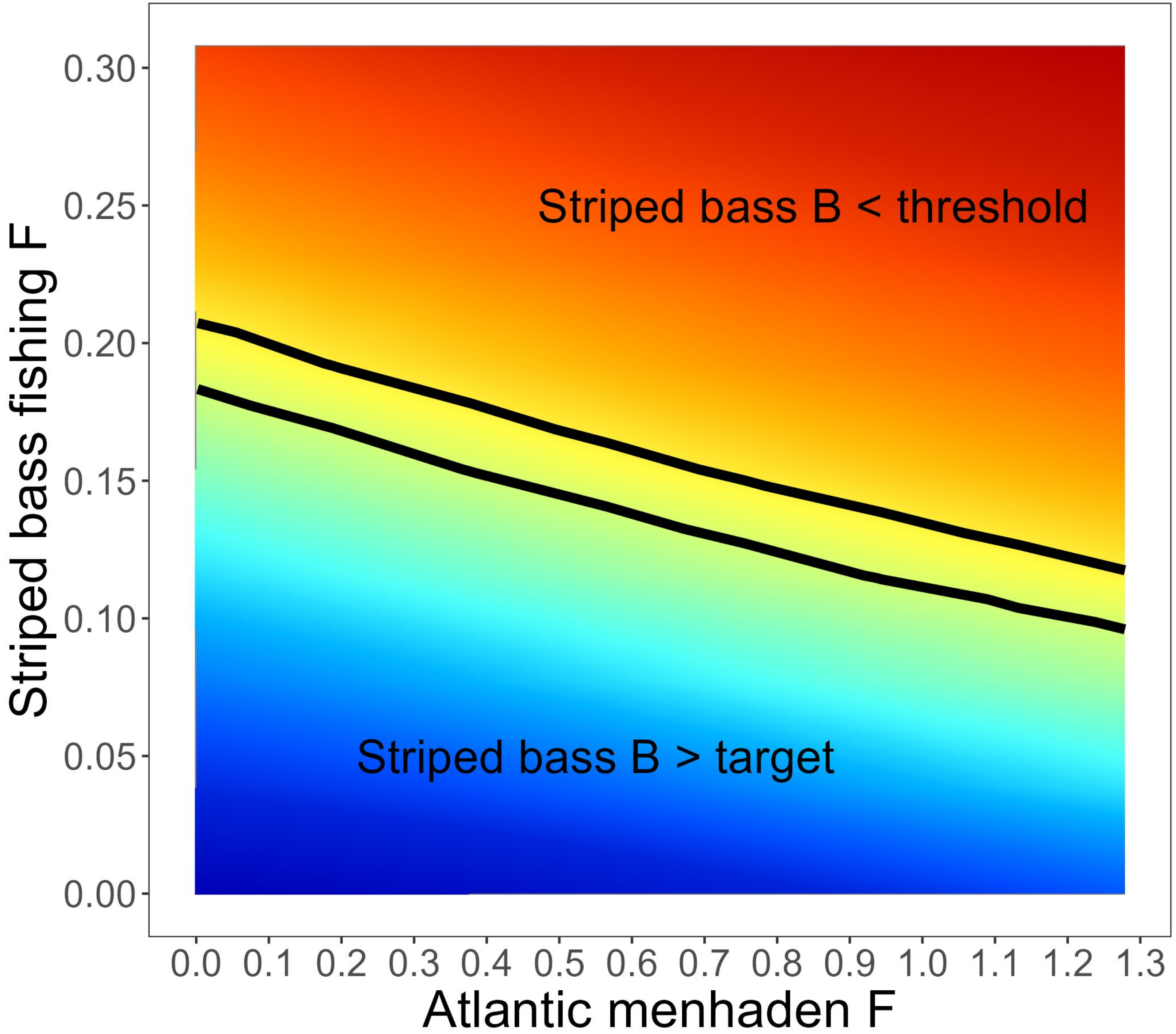
Results

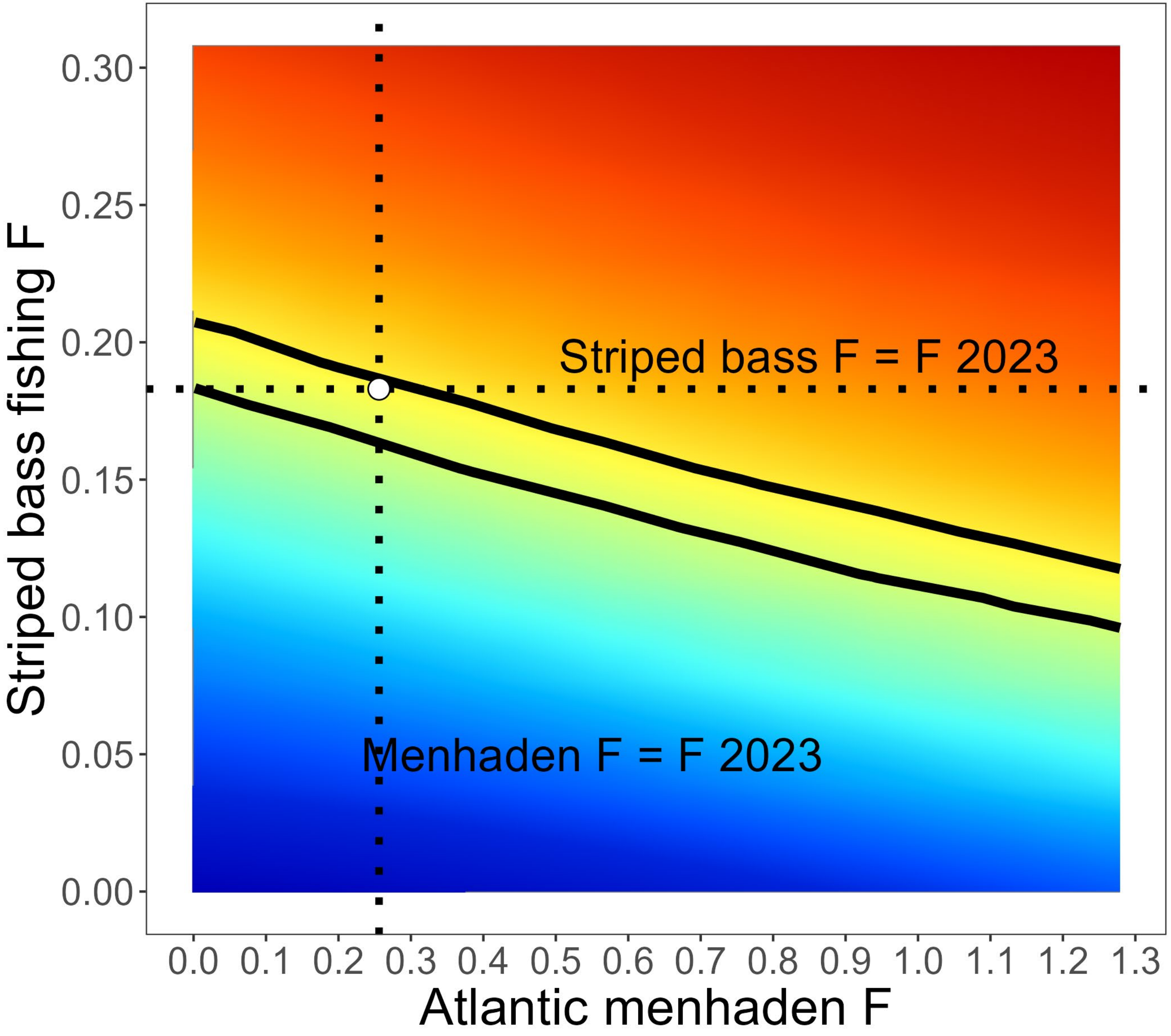
- Many different combinations of striped bass F and menhaden F will allow striped bass to reach their biomass target in the long run

- Higher menhaden F requires a lower striped bass F (and vice versa) to keep striped bass at the biomass target



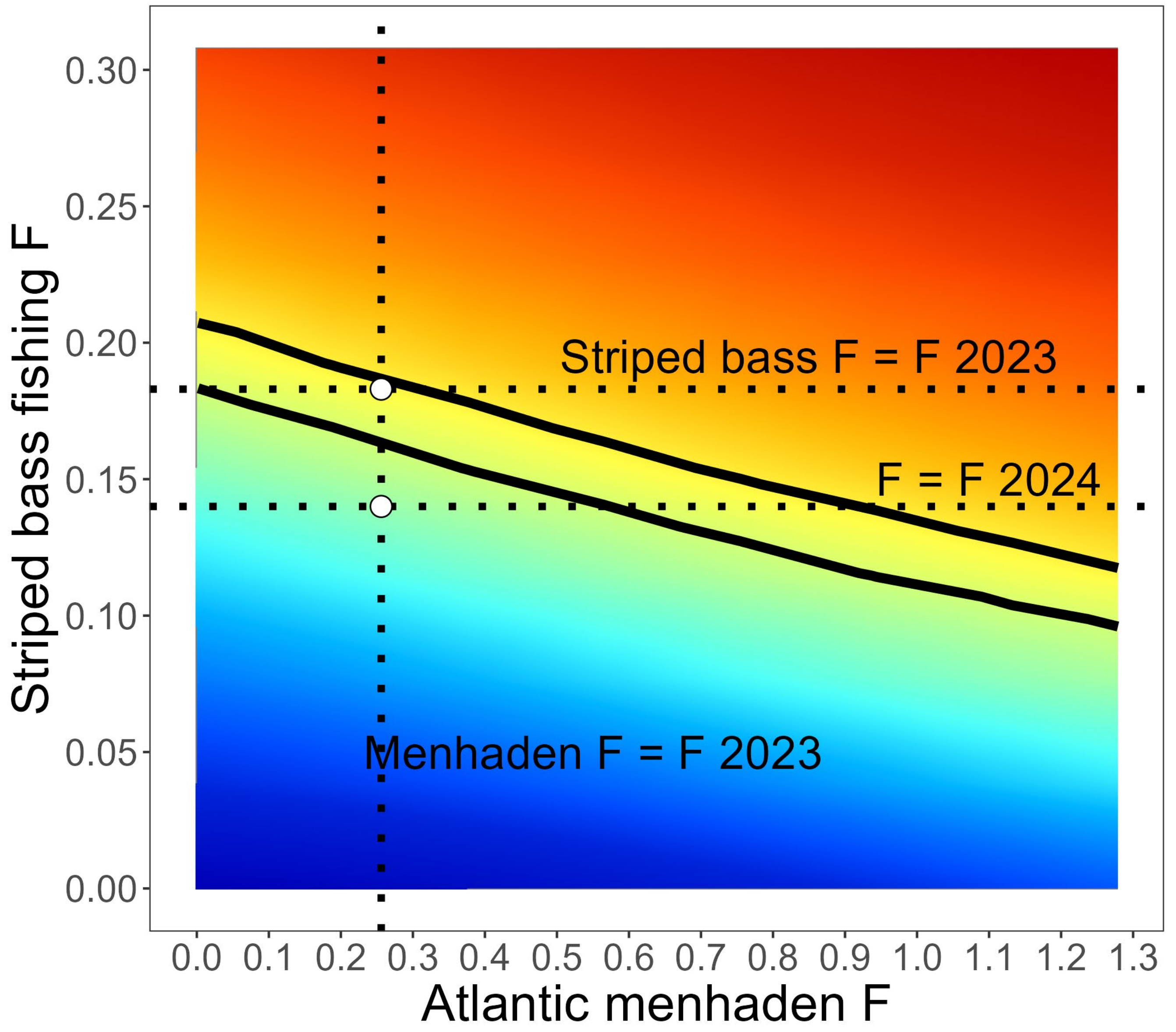
Results

- 2023 striped bass F slightly above the single species target
- Fishing at 2023 striped bass F and 2023 menhaden F in the long-term → striped bass biomass stabilizes just above the **threshold**



Results

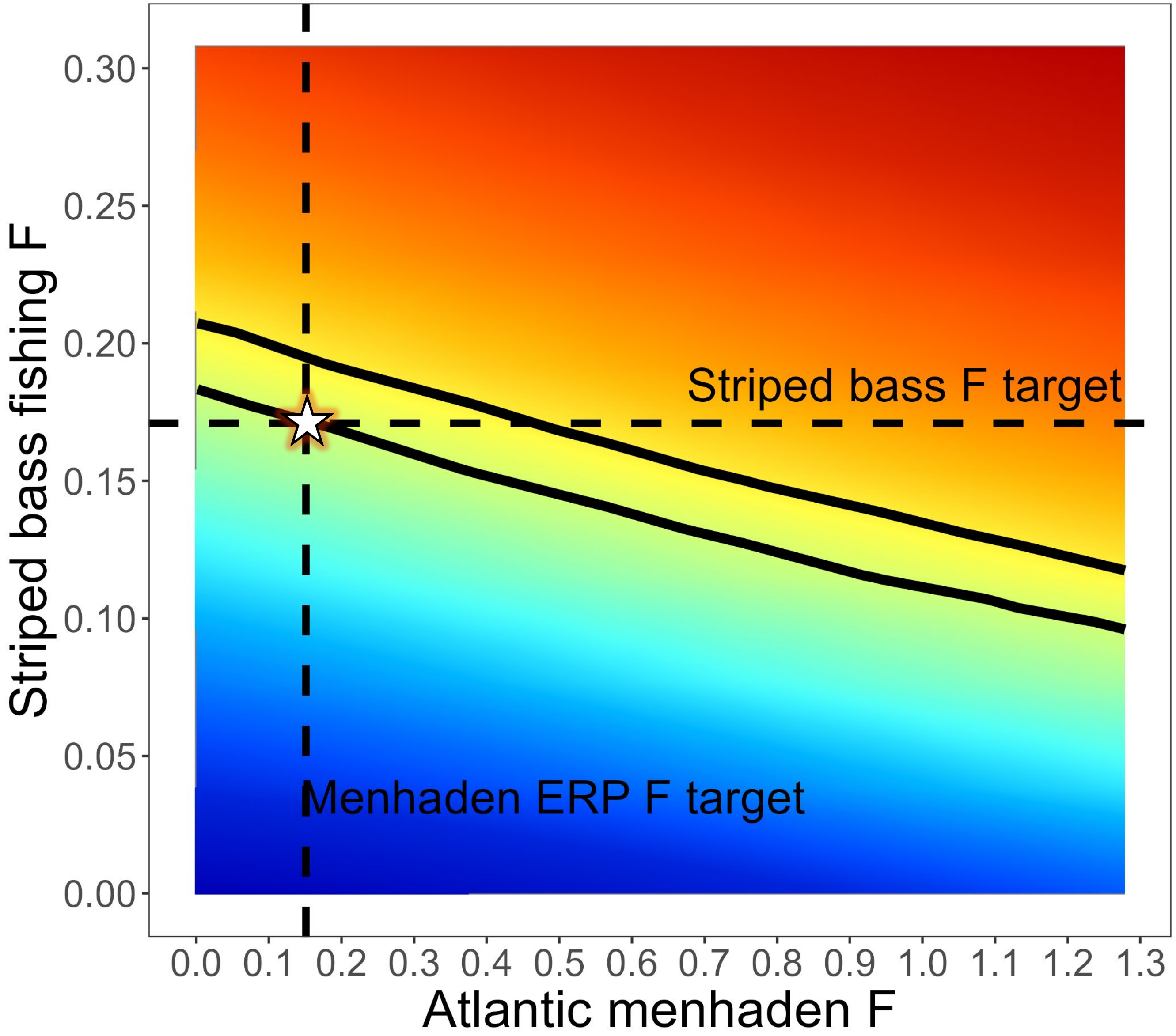
- 2024 striped bass F projected to be below the single species target
- Fishing at striped bass F_{2024} and menhaden F_{2023} in the long-term → striped bass biomass stabilizes above the **target**



ERP Target

- Define ERP F target as the menhaden F rate that will allow striped bass to stay at their biomass target when striped bass are fished at their F target

- **All other species at 2023 levels in this scenario**

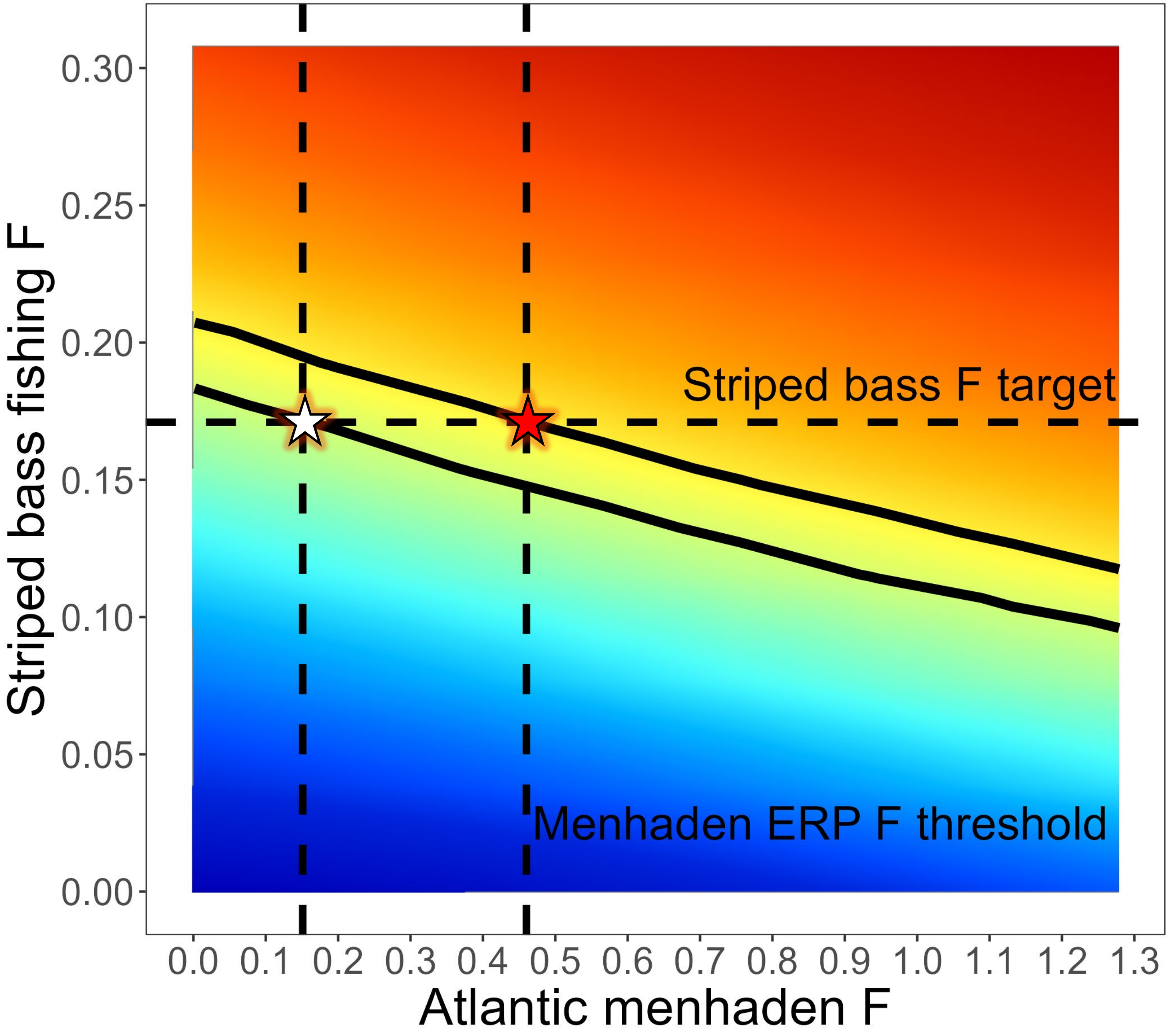


ERP Target

- Define <u>ERP F target</u> as the menhaden F rate that will allow striped bass to stay at their biomass target when striped bass are fished at their F target

- <u>ERP F threshold</u> allows striped bass to remain at their biomass threshold when striped bass are fished at their F target

- **All other species at 2023 levels in this scenario**



Proof-of-Concept ERPs

Menhaden ERP: Based on what was approved last time

Reference point	2025	2022 Update
F_{target}	0.15	0.19
$F_{threshold}$	0.46	0.57
FEC_{target}	1,758,288	2,003,986
$FEC_{threshold}$	1,184,339	1,492,854

Menhaden ERPs:
Not Overfished, Overfishing not occurring

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Sources of Uncertainty

- NWACS-MICE was sensitive to the relationship between striped bass and spiny dogfish
- Small changes to the vulnerability parameters in that relationship affected striped bass's ability to rebuild to the biomass target
  - <u>Striped bass more vulnerable </u>to spiny dogfish predation: do not recover to their biomass target when fished at F target, even when menhaden fishing is zero
  - <u>Striped bass less vulnerable</u>: increase well above their B target when fished at their F target, even when menhaden fishing is increased substantially

Sources of Uncertainty

- Diet data
  - Need more information on size/age prey consumed and more sampling of largest, oldest predators
  - More comprehensive diet data needed for high profile, data poor species groups like birds and marine mammals and influential predators like spiny dogfish

- Recruitment dynamics
  - EwE models do not capture highly variable or environmentally driven recruitment well

- No spatial dynamics, so may not fully capture interactions that are spatially or temporally limited but intense
  - Seasonal dynamics in NWACS-MICE are an improvement and can capture some of this, but more work is needed

Important to Recognize

- The ERP tool, as developed for this assessment, is **not** spatially explicit
- It cannot resolve management issues on a smaller scale
- Is, in its current form, a coast-wide tool

Next Steps

- Spatial model/spatial ERPs is a high priority for Board and stakeholders

- **ERP WG recommends convening a workshop with the Board to understand their spatial management objectives, to create a plan for data collection and model development that will address those objectives**

Next Steps

- Continue work on EcoSpace model to support future spatial ERPs, in between benchmark assessments
- Complete the next single-species benchmark before the next ERP benchmark instead of trying to pair them
  - Timeline depends on a number of factors including how much model development is needed to address Board's spatial objectives

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Questions?

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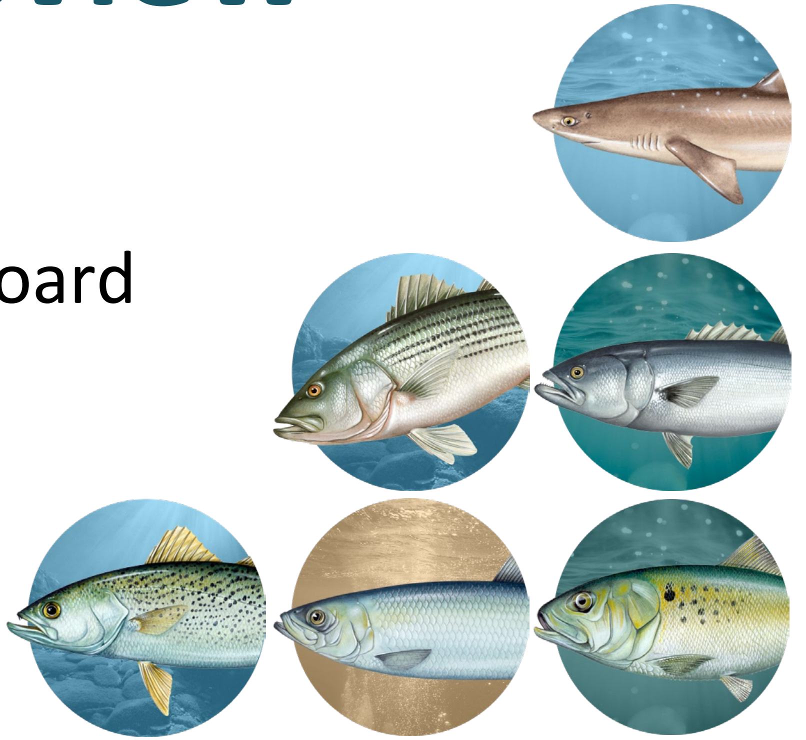
Atlantic Menhaden Ecological Reference Points Assessment Peer Review Report

Menhaden Fishery Management Board
October 28, 2025



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ERP Assessment Peer Review Process

- The Ecological Reference Points (ERP) Working Group developed a new ERP assessment
- Peer Review Workshop: August 12-15, Charleston, South Carolina
- Scientific review of data inputs, analytical methods, results, and overall quality of the ERP assessment

<u>Products</u>

- SEDAR Stock Assessment and Review Report
- https://sedarweb.org/assessments/sedar-102-asfmc-atlantic-menhaden/

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Review Process

Scientific Review Panel

Chair + 2 additional technical reviewers, with expertise in

- Stock assessment and integrated ecosystem assessment
- Marine fish ecology and population dynamics models
- Multispecies and ecosystem models

Dr. Sarah Gaichas (Chair)- Hydra Scientific LLC

Dr. Daniel Howell - Institute for Marine Research, Norway / CIE Reviewer

Dr. Yong Chen - Stony Brook University / CIE Reviewer

Review Scope

- The ERP assessment was developed, reviewed, and approved previously.
- Reviewers focused on whether the existing ERP methods and updated hybrid models were still appropriate, and any changes to the underlying models, rather than a fundamental review of all elements.
- Reviewers evaluated the proposed ERP updates and changes in the single species assessment model for menhaden (principally around a revision to the natural mortality value M), not the menhaden assessment model itself.
- Reviewers agreed with decisions made to update the single species model; the review was not designed to “approve” the menhaden single species assessment model.

Menhaden ERP Review ToR 1

✓ **ToR 1:** Evaluate justification for in/exclusion of assessment data in ERP models

Conclusions

- Use of reviewed and approved assessment data and outputs is well justified
  - Best available for each stock based on individual species assessments
  - Aligns ERP models with information currently used in management
- Modifications from previous assessments are also well justified
  - Menhaden M was thoroughly re-evaluated and updated
  - Weakfish assessment was adjusted to reflect tagging mortality estimates

Recommendations

- Age data from surveys could further inform menhaden M in the future

Menhaden ERP Review ToR 2

✓ **ToR 2:** Evaluate thoroughness of data collection and treatment of data

Conclusions

- Collection and treatment of data was thorough and justified
  - Vetted datasets selected in consultation with species assessment teams
  - Diet data sources expanded and combined systematically
  - New data analyses improved inputs for multiple unassessed model groups
  - Temporal changes in spatial distribution investigated for some stocks

Recommendations

- Comprehensive multispecies distribution analysis could indicate potential changes in predator and prey overlap over time

Menhaden ERP Review ToR 3

✓ **ToR 3:** Evaluate choice of ERP methods and models, and model specifications

Conclusions

- NWACS-MICE is the most appropriate ERP model given available information
  - Includes all key managed fish predators of menhaden
  - Balances appropriate predator prey dynamics and model complexity
    - VADER does not yet include bottom-up prey effects on predators
    - NWACS-Full is too complex for timely testing and operational updates
- NWACS-MICE included reasonable optimization methods and projections to ensure all stocks responded appropriately to fishing pressure
- Reviewers endorse the choice of base case and sensitivity configurations

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Menhaden ERP Review ToR 3

✓ **ToR 3:** Evaluate choice of ERP methods and models, and model specifications

Recommendations

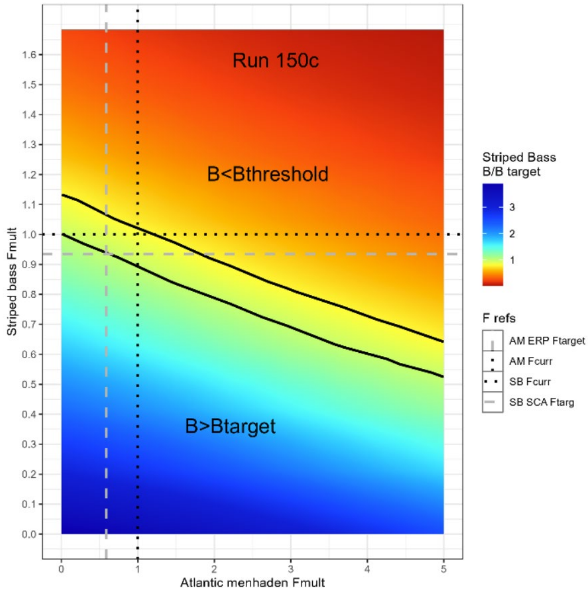
- Continue investigation of uncertainty surrounding spiny dogfish predation
- For future ERP assessments, create a suite of plausible model configurations that are variants from the selected NWACS-MICE base run to comprehensively investigate the impacts of uncertainty
- Align methods for NWACS-MICE and NWACS-Full for future assessments
    - Fit both models to the same indices
    - Apply similar optimization methods, using MICE as starting point for Full
    - Allows more direct comparisons

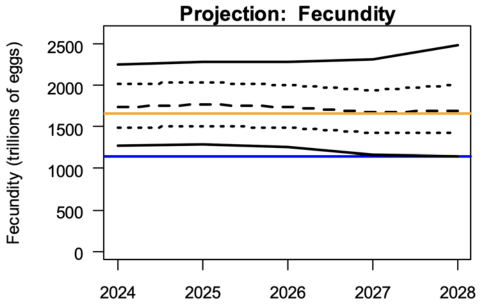
Menhaden ERP Review ToR 4

✓ **ToR 4:** Evaluate methods used to estimate reference points and total catch

<u>Conclusions</u>

- The ERP methods are sound. The same methods were approved in 2020.
- The hybrid ERP approach estimates reference points with NWACS-MICE and uses the single species menhaden assessment for short term projections
- The menhaden assessment projections include uncertainty in M and fecundity to generate probabilities of being within F and fecundity targets or exceeding limits for a given TAC
- Appropriate way to evaluate tradeoffs given objectives and risk tolerance





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Menhaden ERP Review ToR 5

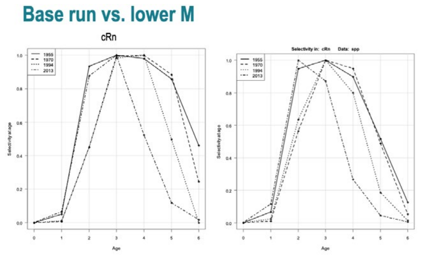
✓ **ToR 5:** Evaluate diagnostic analyses performed for each model

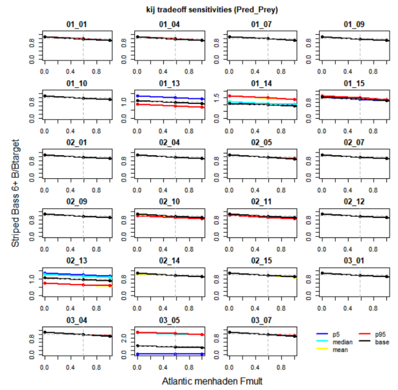
<u>Conclusions</u>

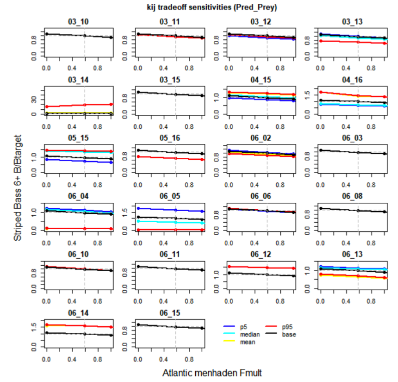
- Diagnostics are appropriate for each model type
- Menhaden assessment model sensitivity to M was explored extensively
- NWACS-MICE explored sensitivity to predator-prey interaction parameters during calibration and presented initial sensitivity for the base case run

<u>Recommendations</u>

- Expand future assessment timeline to evaluate NWACS-MICE base case run sensitivity to input assessment values (B, M, F), data weighting during calibration, prey switching, and predator-prey interaction parameters







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Menhaden ERP Review ToR 6

✓ **ToR 6:** Evaluate methods to characterize and communicate uncertainty

Conclusions

- Methods are appropriate given time and software constraints
- Menhaden assessment model incorporates uncertainty in M and fecundity, carries into projections communicated as probabilities relative to ERPs
- NWACS-MICE focused on key predator-prey interaction parameter with implications for striped bass productivity and ERPs

Recommendations

- Menhaden assessment could consider broader M uncertainty in the future
- Suite of plausible NWACS-MICE models suggested for uncertainty analysis

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Menhaden ERP Review ToR 8

✓ **ToR 8:** Recommend best menhaden biomass and status estimation methods

Conclusions

- Reviewers endorse use of the menhaden single species model to estimate menhaden biomass, abundance, and exploitation rates
- Reviewers endorse use of ERPs arising from the NWACS-MICE model to evaluate menhaden stock status using the menhaden single species model
- Methodology provides an appropriate tool for managers to select from a range of menhaden fishing levels given goals for striped bass and menhaden fisheries and risk tolerance

Menhaden ERP Review ToR 9

✓ **ToR 9:** Review and prioritize research, data, and modeling recommendations

Priorities

- Continue and expand collection of population, life history, and diet data across all ecosystem components
- Determine and agree on clear objectives for spatially explicit ERPs with managers and stakeholders prior to spatial model development
- Allocate adequate time after single species assessment completion for ERP model updates, calibration, base case selection, and full uncertainty analysis

Recommendations

- Consider developing an NWACS-MICE plausible model suite from base case

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Menhaden ERP Review ToR 10

✓ **ToR 10:** Recommend timing of future ERP assessments

<u>Conclusions</u>

- Continue asynchronous benchmarks for the menhaden single species assessment and the ERP assessment
- Recreational fishery data recalibration timeline affects stock assessments
- Allow sufficient time after individual assessments are complete to update and analyze ERP models, including sensitivity analysis

<u>Recommendations</u>

- ERP benchmark should be *at least* one year after the key single species assessments are finalized and information is available for ERP modeling

Review Panel Conclusions

- The ERP assessment provides managers with a scientifically sound framework for evaluating ecosystem trade-offs in menhaden management.
- The methodology advances ecosystem-based fishery management (EBFM) by considering the dual role of Atlantic menhaden as both a harvested species and as part of the forage base for managed predators such as striped bass.
- The ERP assessment and its actionable advice for menhaden management is one of the few cases globally where operational EBFM sets reference points.
- The approach enables informed decision-making about acceptable risk levels while balancing multiple fishery management objectives.
- The assessment will require updates following the 2026 MRIP recalibration and 2027 striped bass benchmark, with the next full ERP benchmark recommended for 2028 or later.

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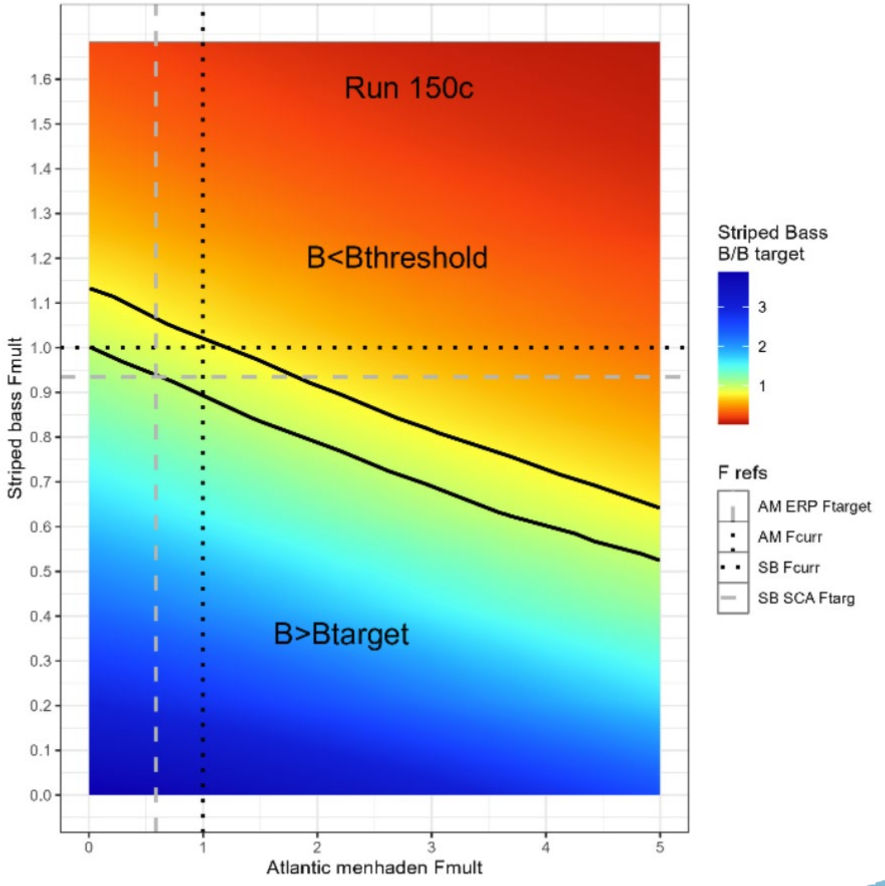
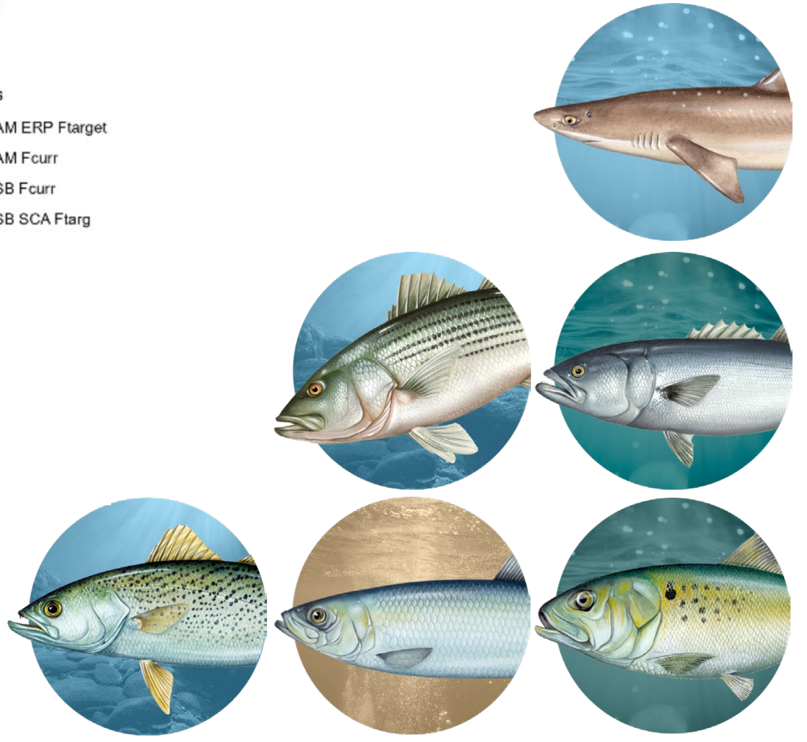
Questions?

Thank you





Sources of Uncertainty

- NWACS-MICE was sensitive to the relationship between striped bass and spiny dogfish

- Small changes to the vulnerability parameters in that relationship affected striped bass's ability to rebuild to the biomass target
  - Striped bass more vulnerable to spiny dogfish predation: do not recover to their biomass target when fished at F target, even when menhaden fishing is zero
  - Striped bass less vulnerable: increase well above their B target when fished at their F target, even when menhaden fishing is increased substantially

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Stock Projections to Inform 2026-2028 Total Allowable Catch (TAC) Levels

Caitlin Craig, NY DEC

Atlantic Menhaden TC Chair

October 28, 2025

Background: TAC Specification

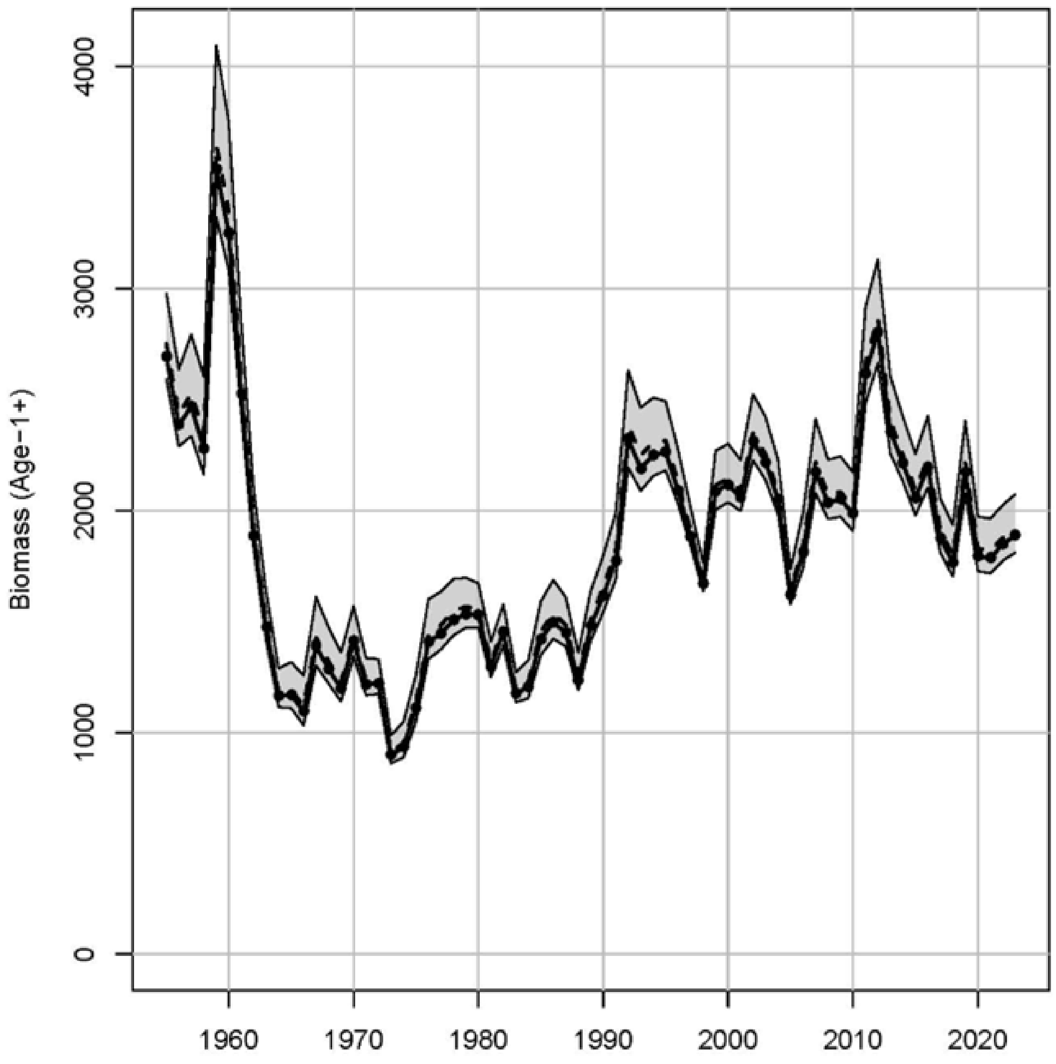
- Set an annual or multi-year TAC through Board action
  - Based on best available science (e.g. projection analysis)
  - Previous TACs:
    - 170,800 mt (2013-2014)
    - 187,880 mt (2015-2016)
    - 200,000 mt (2017)
    - 216,000 mt (2018-2020)
    - 194,400 mt (2021-2022)
    - 233,550 mt (2023-2025)
- In setting a TAC, the Board should consider the level of risk they are willing to accept

Background: TAC Specification

- Board requested the TC examine a range of TACs and associated risk to reference points
  - 40-60% probability of exceeding ERP target (5% increments)
    - 2026-2028 combined, and as separate years
  - Percent risk of exceeding ERP target within +/- 20% of current TAC, including status quo (5% increments)

Projection Methods

- Monte Carlo Bootstrap (MCB) runs used to seed the projections
- M- and fecundity-at-age re-sampled from the uncertainty around those parameters and the BAM is refit using those new values
- Creates a distribution of results, including estimates of recruitment for the time-series and population size at the start of 2024



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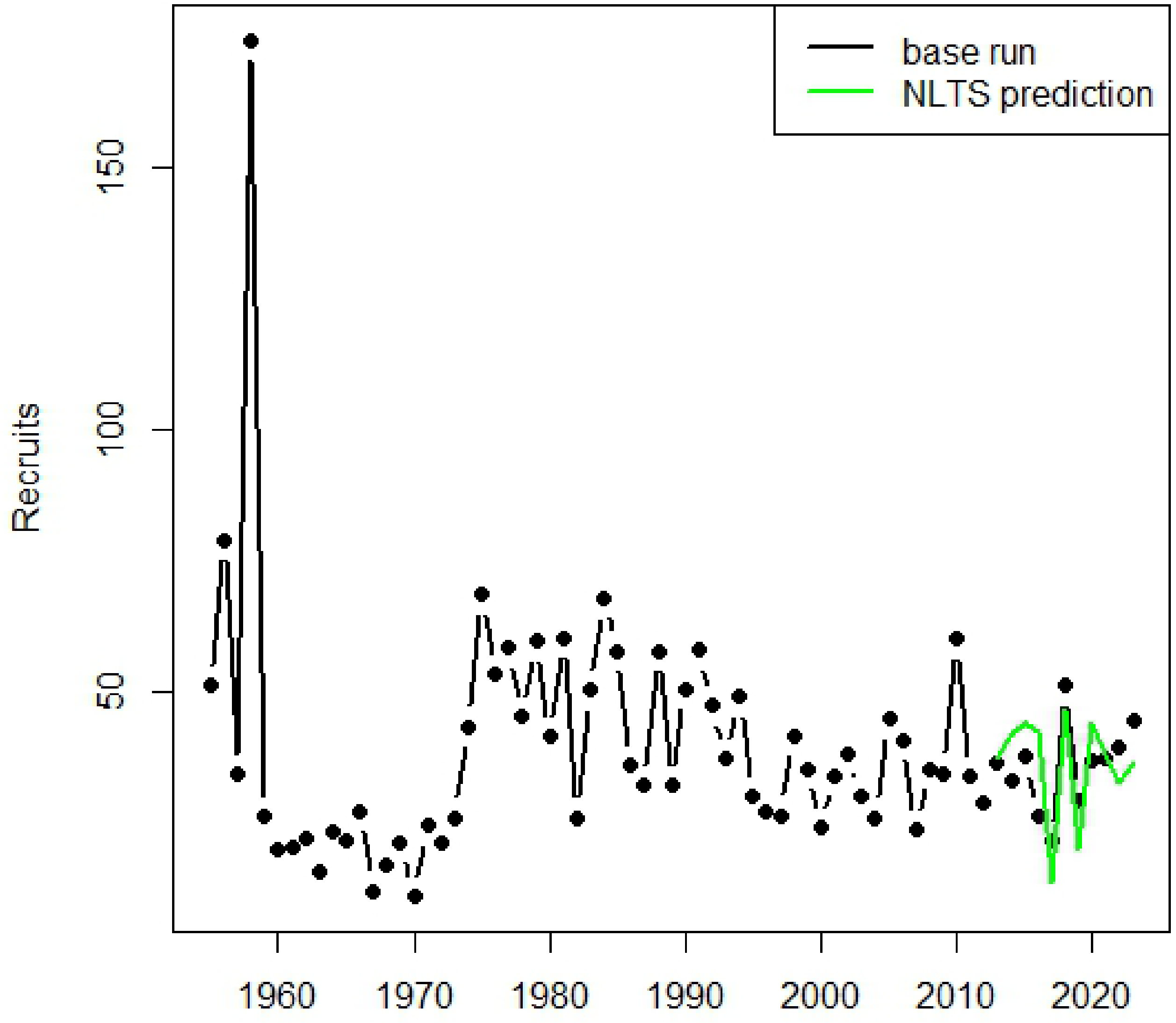
Projection Methods

- Recruitment for 2024-2028 predicted from a non-linear time-series analysis for each MCB run

- Better predictive power than just using the time-series median



Scenarios

- Assumed the catch in 2024 and 2025 would be equal to the current TAC (233,550 mt)
  - Sensitivity runs:
    - 2024 catch = realized catch, 2025 = 2025 TAC
    - 2024 catch = realized catch, 2025 = 80% TAC (based on recent utilization)
- Runs to identify the TACs that would have a 40%-60% probability of exceeding the ERP F target
- Runs to calculate the probability of exceeding the ERP F target and thresholds from TACs ranging from a 20% decrease to 20% increase from the current TAC

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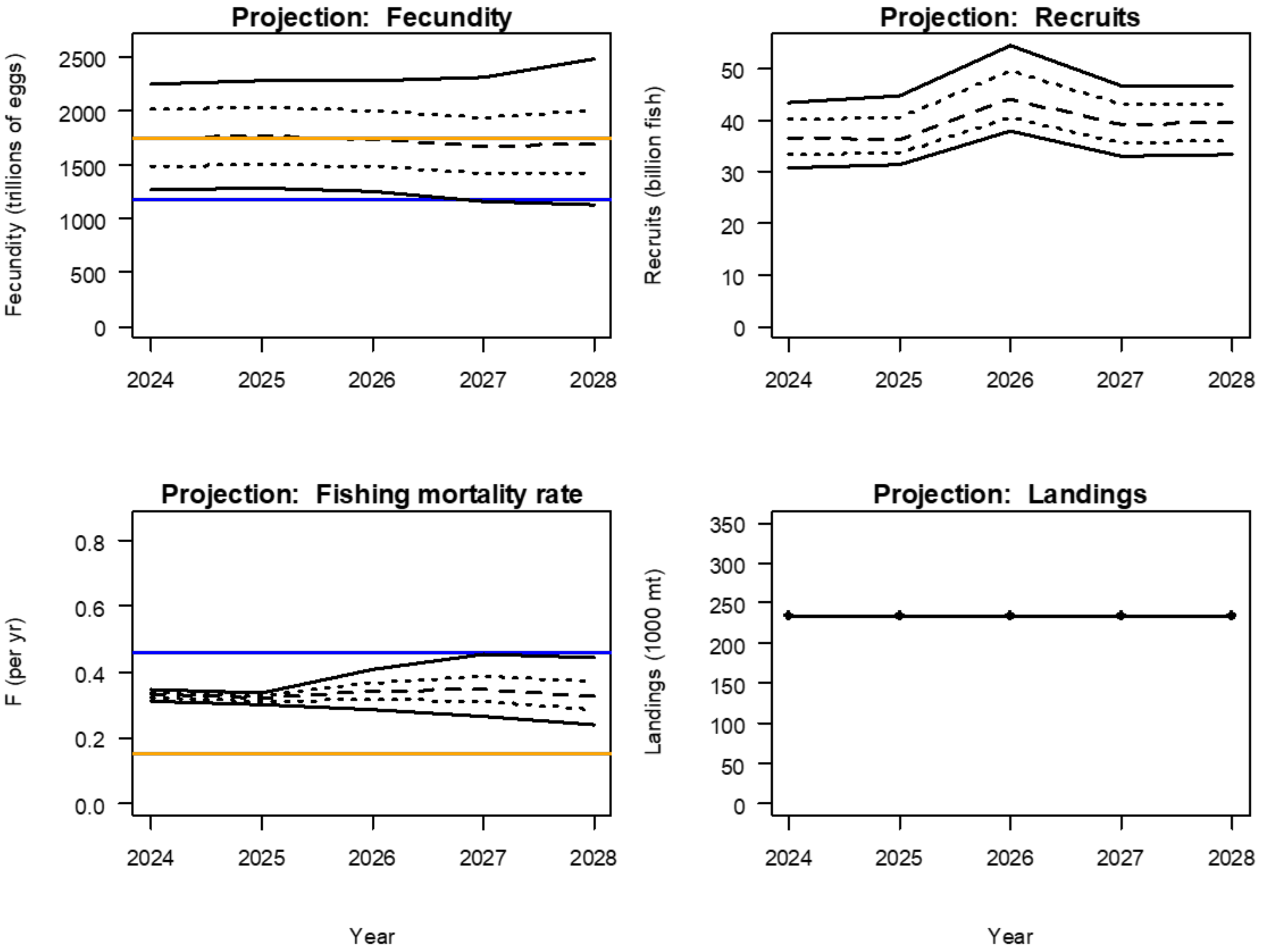
Results: Status Quo TAC

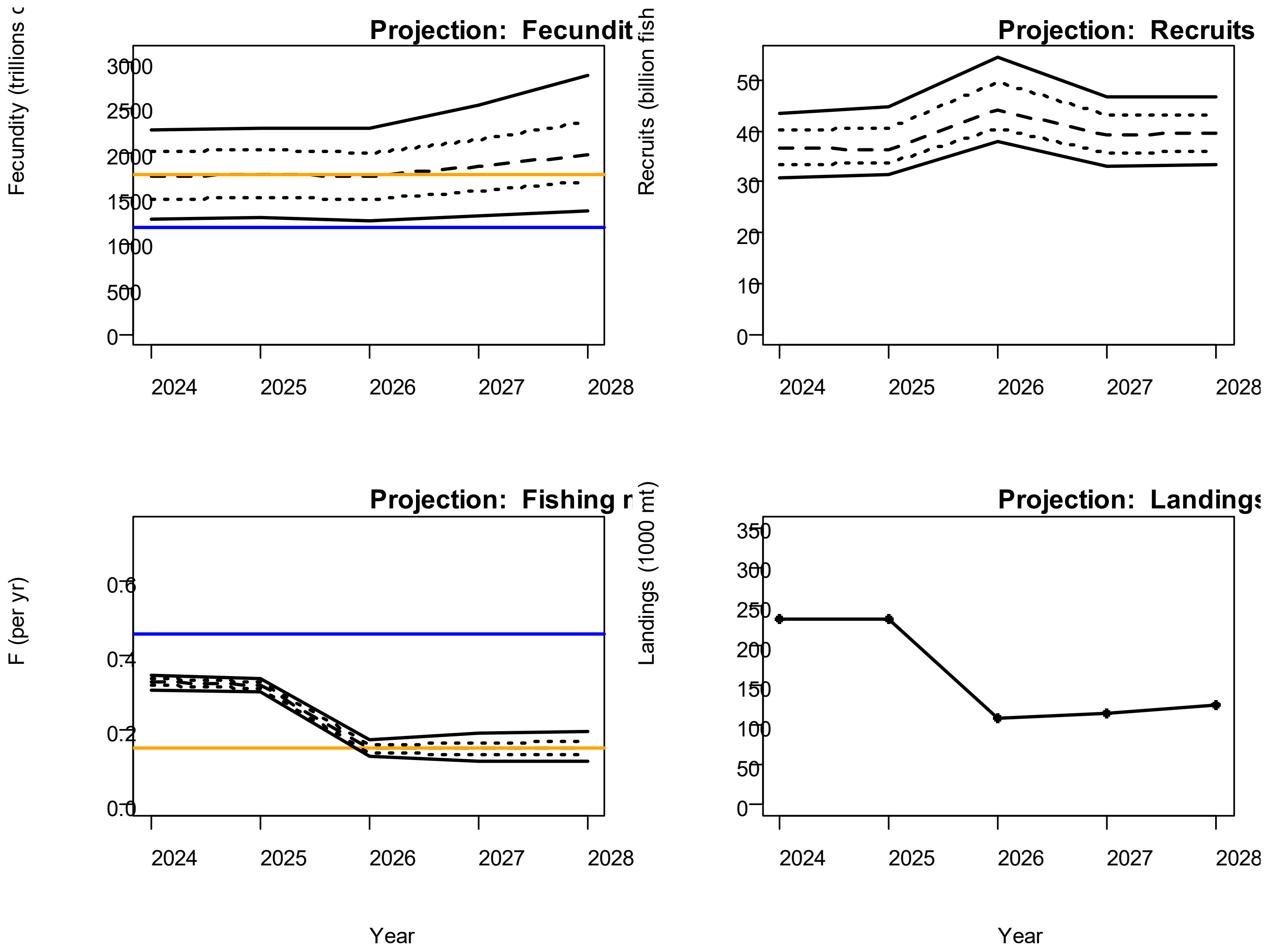
- 100% probability of being above the F target and a 4% chance of exceeding the F threshold by 2028

- 57% probability of being below the fecundity target and an 8% chance of being below the fecundity threshold



Results: 50% Probability

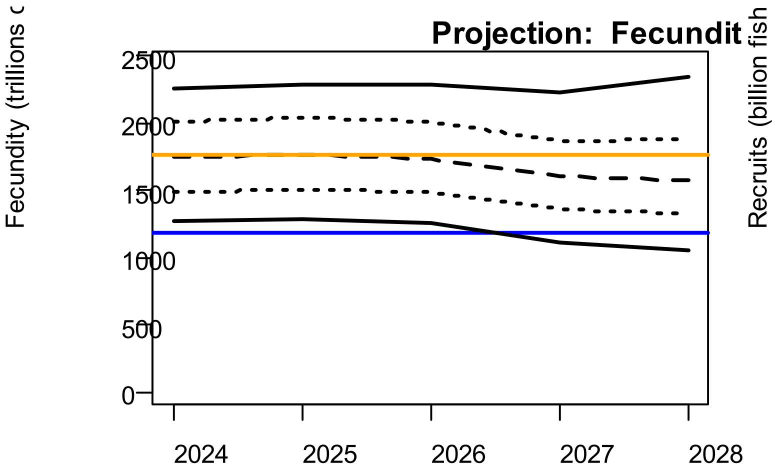
- TAC for 2024-2028 = 108,450mt - 124,800mt
- 50% probability of exceeding the ERP F target and 0% probability of exceeding the F threshold

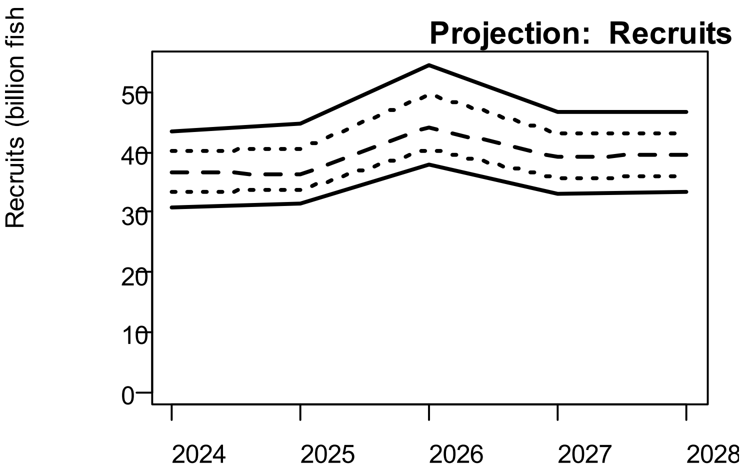


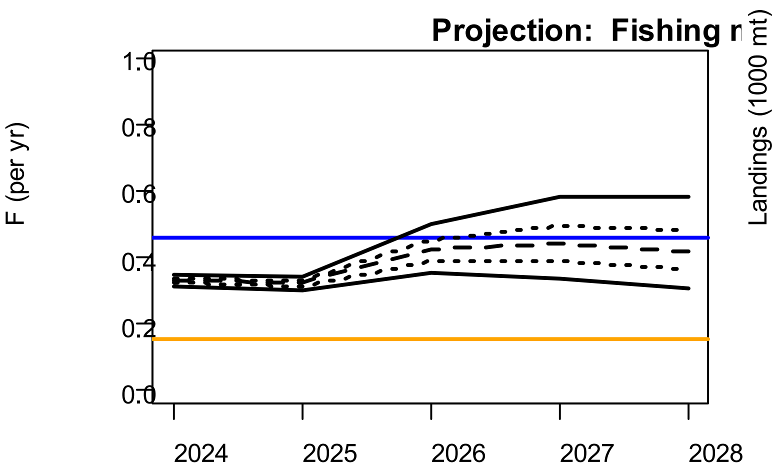
Results: 20% Increase

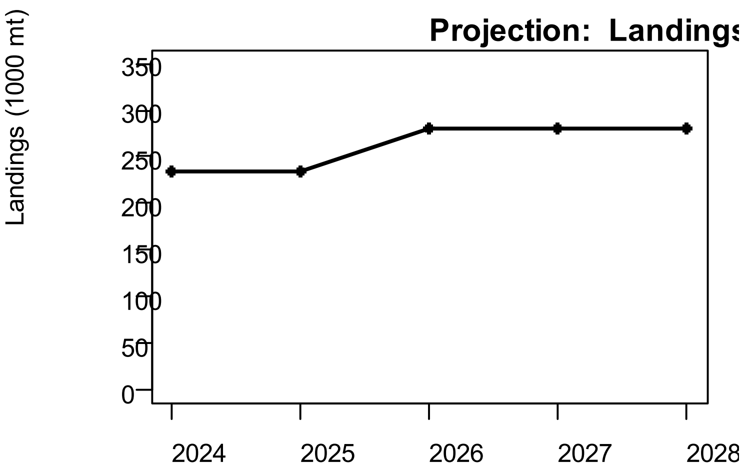
- 100% probability of being above the ERP F target, 32% probability of being above the ERP F threshold in 2028

- 66% probability of being below the fecundity target, 13% probability of being below the fecundity threshold









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Results

Probability of exceeding the ERP F Target	TAC for 2026-2028	2026 TAC	2027 TAC	2028 TAC
40%	106,100	106,100	111,800	120,900
45%	107,400	107,400	113,500	123,000
50%	**108,450**	**108,450**	**115,300**	**124,800**
55%	109,700	109,700	117,000	127,200
60%	111,000	111,000	119,200	129,700

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Results

TAC (Status quo -/+)	Probability of Exceeding the ERP Target			Probability of Exceeding the ERP Threshold		
	2026	2027	2028	2026	2027	2028
186,840 (-20%)	100%	100%	100%	0%	0%	0%
198,518 (-15%)	100%	100%	100%	0%	0%	0%
210,195 (-10%)	100%	100%	100%	0%	1%	1%
221,872 (-5%)	100%	100%	100%	0%	1%	1%
233,550 (0%)	**100%**	**100%**	**100%**	**1%**	**4%**	**4%**
245,228 (+5%)	100%	100%	100%	1%	10%	8%
256,905 (+10%)	100%	100%	100%	4%	18%	14%
268,583 (+15%)	100%	100%	100%	11%	29%	23%
280,260 (+20%)	**100%**	**100%**	**100%**	**22%**	**41%**	**32%**

Sensitivity Runs

- Using the lower landings estimates for 2024 and 2025 did not have a significant impact on the TACs

50% Probability of exceeding the ERP F Target	TAC for 2026-2028	2026 TAC	2027 TAC	2028 TAC
Base Run	108,450	108,450	115,300	124,800
2024 Landings, 2025 TAC	109,500	109,500	115,500	124,800
2024 Landings, 2025 = 80% of TAC	112,600	112,600	116,600	124,900

Sources of Uncertainty

- Single-species model
  - Some uncertainty around key parameters like M, fecundity, and recruitment is included, but this approach doesn’t capture the full range of potential uncertainty
  - Projections assume no changes in fishing effort, no changes to the timing or make-up of the fishery
  - No structural model uncertainty in projections
  - Retrospective pattern present, but not significant enough to warrant adjustment

Sources of Uncertainty

- ERP model: Projections do not incorporate any uncertainty around the ERP target and threshold values
  - ERP model is sensitive to the relationship between spiny dogfish and striped bass
  - Uncertainty about future ecosystem conditions: ERPs currently defined based on current (~2023) population levels for other species in the ERP model

ERP Definitions

- Results reflect the current definition of the ERPs
- If the Board redefined the ERP target and threshold, the values of the reference points and the associated TACs could change

Questions

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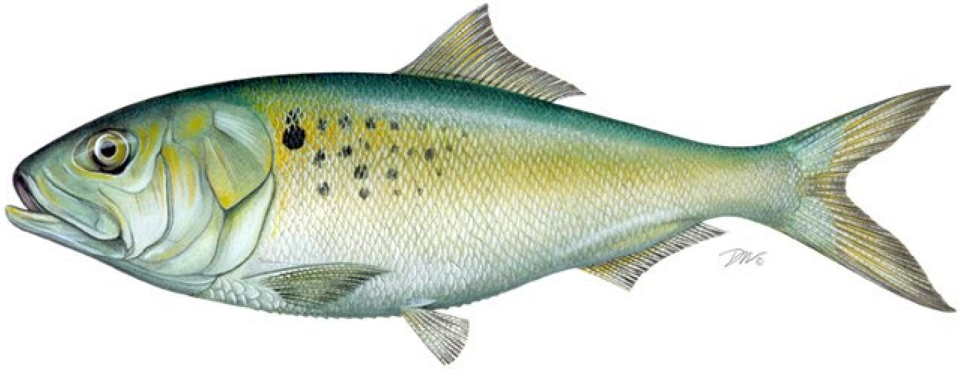
30% and 40% Reduction

TAC	Probability of Exceeding the ERP F Target			Probability of Exceeding the ERP F Threshold		
	2026	2027	2028	2026	2027	2028
163,485mt (-30%)	100%	100%	97%	0%	0%	0%
140,130mt (-40%)	99%	93%	79%	0%	0%	0%

TAC	Probability of falling below the ERP FEC Target			Probability of falling below the ERP FEC Threshold		
	2026	2027	2028	2026	2027	2028
163,485 mt (-30%)	52%	49%	40%	2%	3%	2%
140,130 mt (-40%)	52%	46%	35%	2%	2%	1%

Atlantic Menhaden Plan Development Team Update

October 28, 2025



Background

- Motion passed at the August Meeting:
  - Move to task a Plan Development Team to develop options for distributing harvest of the Chesapeake Bay reduction cap more evenly throughout the Chesapeake Bay reduction season in order to mitigate potential effort bottlenecks that may be impacting other Bay small scale fisheries as well as the Bay ecosystem. The intent is for a draft document to come to the board at the 2026 Winter Meeting.

PDT Membership

- Nichole Ares (RI)
- Caitlin Craig (NY)
- Jeff Brust (NJ)
- Harry Rickabaugh (MD)
- Brooke Lowman (VA)

Questions?

TC Tasking

- Relative to Research Recommendation 1, I move to task the TC to evaluate information available from NOAA's Ecosystem Dynamics and Assessment Branch and Chesapeake Bay Office, and the Woods Hole Oceanographic Institution, to evaluate the possible effect of cold water on the Continental Shelf on menhaden migration and migratory patterns, particularly in relation to the timing of osprey arrival, nesting, and breeding.
- I move to task the TC to consider what role water temperature, dissolved oxygen levels, shoreline hardening, and other environmental factors play in the local abundance of menhaden and other forage species in the Chesapeake Bay.