MID-ATLANTIC
FISHERY MANAGEMENT COUNCIL

Mackerel Rebuilding v2

October 2021

Council Emerg. Action Request

- 15,512 metric tons (MT) in 2021/2022 while rebuilding is being reconsidered

  - NMFS proceeding…has broad discretion for implementing
    - "In-season adjustment" for 2021
    - "Emergency action" to cover all of 2022
    - Facilitating effort on rebuilding 2.0

  - Low landings so far since Council request

Previous Council Direction

- Consider 50%, 60%, and 75% probabilities of rebuilding mackerel in ten years
  - NMFS staff: January 1, 2023 implementation date feasible…
  - rebuilding target date = June 1, 2032.
- Also include standard P* calculation – should rebuild in less than 10 years
- Use 15,512 MT for assumed 2021 catch
- Requested additional input about recruitment…
  - To Dr. Rago…

Scientific and Statistical Committee Report of September 7-8, 2021 Meeting

to

Mid-Atlantic Fishery Management Council
October 6, 2021
tab 8

Atlantic Mackerel—Background

- Continuation of discussions from July
- Implementation of Council guidance from August:
  - Rebuilding time period of 10 years
  - Success probabilities of 50, 60, and 75%.
  - Evaluation of rebuilding using the P* method
- <u>The dilemma of rebuilding</u>
- Recruitments since 2009 have been below the median with the exception of the 2015-year class BUT <u>causes</u> are unknown {Low Stock size, Poor environment, BOTH}
  - If current low levels of recruitment persist, then lower catches and longer rebuilding
  - If recruitment is low due to low stock size, then reducing F initially to increase stock size may accelerate population growth over time and lead to progressively higher yields.
  - If low recent recruitment is simply bad luck, then the stock may recover more quickly and catch reductions will be less severe.
  - **Hence the trajectory of recovery relies on factors that cannot currently be distinguished**.

Atlantic Mackerel—Initial Conditions

- All of the projections begin with the assessment model's terminal year distribution of population sizes
- Assume catches for 2020 to 2022 are: 18,038 mt, 15,512 mt, 15,512 mt, respectively.
- Rebuilding policies are assumed to begin in 2023.
- Future recruitment hypotheses:
  - Independent of stock size; long term recruitment, 1975 onward [**H_1**: no change]
  - Independent of stock size; short-term (2009 onward) [**H_2**: environmental change]
  - Dependent on stock size [**H_3**: low stock➔low recruitment]

TOR #1 What are best assumptions for recruitment?

- Does not find support for the use of unconstrained recruitment estimates drawing from the entire 1975-present time series.
- Recognizes that rebuilding plans are re-evaluated every two years, and the Council will likely require an adaptive approach that responds to survey and biological data.
- Offers two recruitment assumptions as defensible and supported by the data:
  - Two-phase approach that explicitly incorporates the entire time series (1975 onwards), with the empirical odds of being in different phases and alternatively, (Faster rebuilding if true)
  - Use of the most recent recruitments (2009- onwards). (Slower rebuilding if true)

Tradeoffs	Two Phase Approach	Recruitment 2009 Onward
Benefits	Allows for recovery of recruitment	Reflects empirical evidence
	Positive impacts of rebuilding SSB	Scaling of catches to current conditions
	Implicit Stock Recruitment relation	
Costs	R Stages with SSB cut points unlikely	Calls into question long-term SSB target
	Unexpected effects on rebuilding	
	Not a product of review process	

TOR #2 Provide OFL CV and recruitment assumption recommendations for evaluation under standard P risk policy?*

- Recommends CV=150% (see Attachment 4 of SSC report)
  - Uncertainty in natural mortality
  - High likelihood of unknown ecosystem factors affecting Recruitment, SSB, Fishing mortality and projections
  - High uncertainty between stock size and recruitment
- Expressed strong confidence in assessment model and most data inputs

TOR #3 What are the most significant sources of scientific uncertainty?

- Time period for recruitment stanzas
- Conversion of egg survey results to Spawning Stock Biomass
- Spatial distribution of Atlantic Mackerel
- Trawl survey representation of abundance and age structure
- Assumed fixed natural mortality
- Recreational landings and discards
- Missing catch from Canadian bait and recreational fisheries (2,000 to 5,000 mt)

TOR #4 What ecosystem factors are and should be considered for consideration under rebuilding?

- SAW 64 did not explicitly account for predation mortality
  - Low incidence in diets of fish sampled in NEFSC bottom trawl surveys
  - Predation by highly migratory species, sharks, marine mammals and birds are unknown.
- Other working papers for SAW 64 considered habitat changes, changes in availability and changes to fishery. These informed model identification process
- Ecosystem criterion were considered for OFL CV determination
  - See attachment 4

TOR #5 Research recommendations

- Supports all recommendations from SAW 64
- **Continue US component of Atlantic Mackerel Egg Survey**
- Continue collaboration with fishing industry and Canadian scientists
- Evaluate time and age-variant M and M2 (predation mortality)
- Evaluate propagation of error in conversion of egg densities to SSB
- Evaluate US Recreational fishery data quality and assessment sensitivity

Staff Recommendations

- When the next/last set of projections are run for March 2022 SSC meeting and before action, use latest info
  - If 2021/22 catches look lower, projections rise somewhat

- Trim to 4 options...(plus status quo)
  - Based on SSC input, resulting projections, staff to staff discussions… *Reasonable range*
  - If recruitment does not return to typical (1975+) in a few years, SSB will not rebuild as projected in options 2-4
    - Projected biomass run a few years ago didn't materialize
  - 10-year approaches except for standard P*

Rebuilding Options

- 1: Persistent lower recruitment. Rebuilds in 10 years if minimal catch for all 10 years.

Others assume low recruitment until over ½ target Biomass (B), then "typical recruitment" 1975-current

- 2: Standard P* risk policy. Probably 6-8 year rebuilding, catches start around 4,000 MT in 2023
- 3: 60% chance rebuilding, start around 7,000 MT
- 4: 50% chance rebuilding, start around 8,600 MT

Staff Recommendations

- Additional options seem either illegal, unfeasible, or redundant → considered but rejected
- Once range set, staff will work with Monitoring Committee to fill out management measures for each
- Will include closure mechanisms, trip limits, mesh requirement, RH/S cap**s**, recreational measures.
- Rec measures:
  - EEZ closure, seasonal EEZ closures, size??
- State request? (50% reduction)
- HMS outreach?

Council Guidance today

- Four rebuilding options OK?
  - Using updated 2021/22 catches OK?
- Management measures OK?
  - Size limit?
- State request?
- HMS outreach?
- Committee/AP meetings?

RH/S Cap Update

- Just added MA indices
- Various 2020 data gaps, indices end in different years
- Like previous years, some up, some down.
- Econ-Spatial analysis will be revisited for specific months
- Will revisit update generally leading up to mackerel 2.0 rebuilding action and RH/S cap setting