



Atlantic States Marine Fisheries Commission

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MEMORANDUM

June 22, 2016

To: Atlantic Menhaden Management Board
From: Atlantic Menhaden Technical Committee
RE: Projection Runs for 2017 Fishery Specifications

Projections

Monte Carlo Bootstrap (MCB) runs of the base run of the Beaufort Assessment Model (BAM) were used as the basis for the projections (see Appendix D of 2015 assessment for projection methodology). Projections were run for four years (2014-2017). The duration of projections was short-term in order to maintain at least one age class present in the terminal year of the assessment within the projections.

Actual landings for the four fleets, north and south reduction and bait, for 2014 and 2015 were the same in all runs and were 171,900 mt in 2014 and 188,800 in 2015. Constant landings for 2016 to 2017 were allocated to the bait and reduction fishery in the northern and southern regions using the proportions established in Amendment 2 and used by the state of Virginia. Landings for 2016 were assumed to be the same as landings from 2015 as the TAC will not change, and landings for 2017 were explored via the scenarios described below.

The TC explored nine separate projection runs as requested by the Board. The projections explored a range of TAC levels from status quo to catch levels up to 40% higher than the current TAC, as well as runs looking at several probability levels of the fishing mortality rate being below F target. Specifically, projections were run using the following TAC scenarios:

- 1) 187,880 mt = current TAC (status quo)
- 2) 197,274 mt = if Board implemented a 5% increase to the current TAC
- 3) 206,668 mt = if Board implemented a 10% increase to the current TAC
- 4) 225,456 mt = if Board implemented a 20% increase to the current TAC
- 5) 244,244 mt = if Board implemented a 30% increase to the current TAC
- 6) 263,032 mt = if Board implemented a 40% increase to the current TAC
- 7) TAC that has a 50% probability of being below F target in 2017
- 8) TAC that has a 55% probability of being below F target in 2017
- 9) TAC that has a 60% probability of being below F target in 2017

Projections 1-6

Results in the table below indicate a percent risk of exceeding the F_{target} (Table 2) or the $F_{\text{threshold}}$ (Table 3) under the various projected TAC levels for 2017.

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Table 2. Percent risk of exceeding the F_{target} for a given TAC scenario.

	TAC (mt)	2017
Percent Risk of exceeding F_{target}	187,880	13%
	197,274	17.5%
	206,668	20.5%
	225,456	27.5%
	244,244	38%
	263,032	48.5%

Table 3. Percent risk of exceeding the $F_{\text{threshold}}$ for a given TAC scenario.

	TAC (mt)	2017
Percent Risk of exceeding $F_{\text{threshold}}$ (Overfishing)	187,880	0%
	197,274	0%
	206,668	0%
	225,456	0%
	244,244	0%
	263,032	0%

Projection 7

The TAC that resulted in a 50% probability of being below the F_{target} in 2017 was 267,500 mt (Table 4).

Table 4. Percent risk of a 267,500 mt TAC exceeding F_{target} or $F_{\text{threshold}}$ in 2017.

	2017
Percent risk of exceeding F_{target}	50%
Percent Risk of exceeding $F_{\text{threshold}}$	0%

Projection 8

The TAC that resulted in a 55% probability of being below the F_{target} in 2017 was 259,500 mt (Table 5).

Table 5. Percent risk of a 259,500 mt TAC exceeding F_{target} or $F_{\text{threshold}}$ in 2017.

	2017
Percent risk of exceeding F_{target}	45%
Percent Risk of exceeding $F_{\text{threshold}}$	0%

Projection 9

The TAC that resulted in a 60% probability of being below the F_{target} in 2017 was 250,100 mt (Table 6).

Table 6. Percent risk of a 250,100 mt TAC exceeding F_{target} or $F_{\text{threshold}}$ in 2017.

	2017
Percent risk of exceeding F_{target}	40%
Percent Risk of exceeding $F_{\text{threshold}}$	0%

Figures 3-11 show panels of fecundity, recruits, fishing mortality, and landings for each TAC scenario explored.

Tables 7 and 8 show the allocation of the different projection run TACs by state/jurisdiction using Amendment 2 allocation.

Uncertainty in Projections

Projections should be interpreted in light of the model assumptions and key aspects of the data. Some major considerations are the following:

- In general, projections of fish stocks are highly uncertain, particularly over the long-term (e.g., beyond three years). The projection for any year should be considered a range of values rather than a single point.
- Although the projections include many major sources of uncertainty, they do not include structural (model) uncertainty. That is, projection results are conditional on one set of functional forms used to describe population dynamics, selectivity, recruitment, etc.
- Fisheries were assumed to continue fishing at their estimated current proportions of total effort (for bait and reduction fisheries), using the estimated current selectivity patterns. New management regulations that alter those proportions or selectivities would likely affect projection results.
- All of the projections assume that the probability of the size of a recruitment event in any projection year is equivalent to the probability of such recruitment being observed during the years modeled in the 2014 benchmark assessment. If future recruitment is characterized by runs of large or small year classes, possibly due to environmental or ecological conditions, stock trajectories may be affected. At this juncture, the Board may wish to consider this as an important factor by way of their risk tolerance when deciding on which of the projection runs to base their 2017 TAC, as the recruitment stream has important impacts to future population size. Figures 3 – 11 show the potential range in the various outputs including recruitment, so the Board can visualize how different assumptions might impact performance of the projections under different levels of risk tolerance.
- Projections apply the Baranov catch equation to relate F and landings using a one-year time step, as in the assessment. The catch equation implicitly assumes that mortality occurs throughout the year. This assumption is violated when seasonal closures are in effect, introducing additional and unquantified uncertainty into the projection results.