Spatial Estimates for Natural Mortality in the Mid-Atlantic

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Natural Mortality in the Mid-Atlantic

The recent sea scallop research track assessment estimated $M = 0.4$ for the Mid-Atlantic but a higher $M = 0.56$ in the most recent years. While these estimates are reasonable spatial averages, it is clear that M has been higher in the southern and inshore Mid-Atlantic in recent years. To investigate spatial variation in M in the Mid-Atlantic, I utilized the Beverton-Holt length-based mortality estimator:

$$Z = \frac{K(L_\infty - \bar{L})}{\bar{L} - L_c}$$

where K and L_∞ are the von Bertanlaffy growth coefficients and $\bar{L}$ is the mean length (shell height) greater than a cutoff value L_c. For these purposes, $L_c = 42.5$ mm. This estimator assumes equilibrium, but it will be approximately correct if many years are used to estimate the mean shell height. For this analysis, I estimated the mean shell heights for the years $2016 - 2024$ from the dredge survey.

Mortality Estimates by SAMS Area

The southern and inshore areas have the highest estimated Zs, despite having little or no fishing during this period. The four northernmost areas (HCS, NYB, LI, BI), all show fairly low Zs, despite some fishing effort. Elephant Trunk is intermediate between these two groups. Proposed Ms for SAMS modeling is also indicated.

SAMS	**MeanSH**	**BHZ**	**FW39** M	**Proposed** M
Vir	49.86	5.99	4.2	6
DMV	74.16	0.97	0.6	0.95
ET	83.31	0.65	0.25	0.5
Inshore	81.70	0.82	0.25	0.8
HCS	85.08	0.50	0.25	0.4
NYB	86.48	0.60	0.25	0.4
LI	92.23	0.45	0.25	0.4
BI	88.76	0.62	0.25	0.4

Comparison of model run with new vs old assumptions

Used "alternative 1" run from Framework 39 as an example. Natural mortality in the Mid-Atlantic was changed according the table in the last slide, and M on Georges Bank and the GOM was increased from 0.2 to 0.27. Additionally, Mid-Atlantic recruitment was reduced by 59%, as was done in the research track.

One year projected biomass was reduced by about 19% in the Mid-Atlantic and 4% on Georges Bank and the GOM compared to the Framework 39 run. These differences are consistent with the observed biases. Long-term, biomass was reduced 56% in the Mid-Atlantic and 27% on Georges Bank and the GOM.

Comparison plot

Dashed lines are FW 39; solid lines use revised M and recruitment. Blue is Georges Bank and red is Mid-Atlantic.