South Atlantic SSC - Spanish Mackerel Workgroup

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Meeting Notes

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Growth rate

Changes in the growth parameters are justified in the report and the one-sex growth parameter choice is consistent with reviewer S28 recommendations.
Estimate of variability or adding the raw data would be helpful in this growth curve figure. (SAR Figure 1, pdf 115).
Length at age is notoriously variable (not just in SM). Perhaps good to indicate is more detail as to how this variability is included in the model (variability in growth parameters).

Given how the growth parameters are used in the model, I do not expect a major impact on the assessment relative to potential changes to M and h.

Overview

		S17	**S28**	**S78**
All	K	0.33	0.45	0.6
	Linf	607	595	583
	To	-1.67	-0.5*	-0.5*
Females	K	0.36	0.56	0.62
	Linf	629	529	610
	To	-1.36	-0.5*	-0.5*
Sensitivity		0.32-0.38	none	none
MCB			0.16-0.54	

Possible recommendation:
Since the S78 K and Linf values are considerably different from S28, perhaps sensitivity runs can be done with S28 values.

- *Growth rates may not make much difference in outcome of the revised run so do not include for the re-run → recommend for next assessment.*

Some key text:
SSC review: page 44
SAR S78: page 70
SAR S17: Table 2.14.2

Selectivity

Model approach was a combination of likelihood profiles and minimizing the # of parameters. The choices are well documented and seem reasonable.

Changing selectivities may need some more extensive discussion. If we recommend a change in any of the selectivities, we need to provide a solid scientific basis for that change. Investigating selectivity may require more work than can be done within the rerun of the OA.

Possible recommendation:

Do sensitivity run or model run with asymptotic cast net selectivity (However, I do not think this will change the outcome as much as changes in M and h)

- *Not recommended for the current re-run → recommend for next assessment*

Some key text:
SAR S78: page 74
SSC review minutes: Page 46

Steepness

As in S28, steepness could not be estimated with stability in the S78 model. Steepness values above 0.60 appeared to be equally likely in the likelihood profile. Steepness was fixed at 0.75 for the base run and uncertainty in the parameters was characterized by a truncated normal distribution with 0.6 and 0.9 as the lower and upper bounds respectively.
Sensitivity runs were done for h=0.6 and h=0.9.

A change in steepness is a major change in the assessment model and may need considerable justification. This is likely outside the scope of this OA.

Possible recommendations:
Use a recent average recruitment instead of model-derived recruitment from the stock-recruit relationship. Determine an appropriate MSY proxy and timeseries for average recruitment.
(suggestion by Chesire: page 55 SSC review minutes, but he mentioned possible problems with this run?), and look at what was done for King Mackerel

- *May need more extensive discussion by the entire SSC on determining MSY proxy, and what an appropriate recent time series of recruitment would be.*
- *If SSC decides appropriate for the re-run after discussion, include in final TORs to the SEFSC.*

Some key text:
SSC review minutes: page 48 and 55.
Review presentation: slides 33-36.

2020 catch

TOR:
The input data values for 2020 recreational landing and discard in SEDAR 78 were substantially higher than the rest of the time series with greater uncertainty, which has raised concerns on whether this assessment has sufficiently incorporated the uncertainty of 2020 data. The SEDAR 78 assumed a fixed CV of 0.05 for landings and discards. I would assume this CV also applied to recreational landings and discards. Although the uncertainty of data input has been explored through MCBE, this uncertainty exploration might be constrained by this small CV value. I wonder, what is the MRIP estimated CV value for 2020 data point?

Possible recommendation:
1) Consider a sensitivity run with the most recent 3-year (2018-2020) (geometric) average representing 2020 data point. Alternatively, consider a sensitivity run with the most recent 3-year (2018-2020) (geometric) average weighted by reverse-CV representing 2020 data point. Evaluate and note in the report any particular concerns or problems with the MRIP data collected in 2020.
~~2) Consider a sensitivity run with a larger CV value (e.g., 0.2, 0.3, or 0.4) for 2020 data point.~~

Natural mortality

As was consistent with SEDAR 28, the natural mortality rate (M) was assumed constant over time, but decreasing with age using the Lorenzen (1996) approach with an updated population growth model, scaled to ages 2+. SEDAR 78 used the point estimate M = 0.35 based on Hoenig (1983, fish only) and a maximum age of 12 years.

To carry forward uncertainty in M, new values of M were drawn for each MCB trial from a truncated normal distribution of (range [0.30, 0.42]) with mean equal to the point estimate (M = 0.35) and standard deviation set to provide 95% confidence limits at the bounds. Each realized value of M was used to scale the age-specific Lorenzen M, as in the base run.

In SEDAR 78, there is a concern that M is not estimable and reasonable. Likelihood profiles show that M wants to be higher (>0.5) and then hits bounds, ~~so M is likely much higher than assumed in the base model.~~ From sensitivity runs, the value of M also has a significant effect on stock status.

Table 1. Longevity based M estimators using a maximum age (Amax) of 12 years show M's ranging from approximately 0.35 to 0.50 (below):

Method	Equation	Estimate (+/- 2 years)
Hoenig (1983)	ln (M) = 1.44 - 0.982 * ln(Amax)	0.37 (0.32, 0.44)
Hewitt and Hoenig (2005)	M = 4.22/Amax	0.35 (0.30, 0.42)
Hamel (2015)	M = 4.37/Amax	0.36 (0.31, 0.44)
Then et al (2015)	log(M) = 1.717 - 1.01 log(Amax)	0.45 (0.39, 0.54)
Then et al (2015)	M = 4.899(Amax)^-0.916	0.50 (0.44, 0.59)
Hamel and Cope (2022)	M = 5.4/Amax	0.45 (0.39, 0.54)
Congeners (from Oct SSC report)		0.49-0.54

Table 2. Natural mortality estimates from Scomberomorid congeners globally.

Species	Location	Method	M	Reference
Scomberomorus commerson	Taiwan	Pauly (1980)	0.64	Weng et al. 2021
	South Africa	Pauly (1980), Richter & Zafanov (1977)	0.45 - 0.55	Govander 1995
	Oman Sea	Pauly (1980)	0.36	Motlaugh et al. 2008
	Persian Gulf		0.50	Jayabalan et al. 2011
	Omani		0.35 - 0.77	Al-Hosni & Sadeek 2001
Scomberomorus guttatus	Indonesia	Pauly (1980)	0.53	Dewanti et al. 2020

Scomberomorus sierra	Mexico, Pacific	Taylor (1960)	0.20	Espino-Barr et al. 2012
Scomberomorus cavalla	SE United States		0.34 - 0.42	Johnson et al. 1983
Scomberomorus maculatus	GOM, US	Hoenig (fish)	0.38	SEDAR 28
Scomberom\orus plurilineatus	South Africa	Pauly (1980)	0.45	Chale-Watson et al. 1999

Terms of Reference Recommendations:

1. **Use a more contemporary M estimation method (e.g. Hamel and Cope 2022) to obtain a point estimate. Alternatively, take the average M estimated for congeners within other regions worldwide.**
2. **Consider applying a uniform distribution (non-truncated?) on M with a range of values corresponding to a maximum age +/- 2 with the mean equal to the chosen point estimate when conducting the MCB ensemble uncertainty analysis Monte Carlo draws**

- *Taking average of M values from literature not suitable → previous SSC discussion and conclusions recommended not to use an average.*
- *Consider uncertainty in M from Hamel and Cope 2022 method*