Applying length-based assessment methods to fisheries resources of the Bay of Biscay and Atlantic Iberian Waters: stock status and parameters sensitivity

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  - pouting (*Trisopterus luscus*),
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  - **Length-based spawning potential ratio (LBSPR) method:** is a length-based model that assesses stock status by **comparing the spawning potential ratio** (proportion of spawning biomass per recruit (SBPR) in an exploited stock with regards to SBPR in an unfished stock) **as measured through the length composition data to that expected in an unfished stock.**

Material and methods

Implementation and sensitivity analysis

Setting	L_∞ value	M/k value
1: Reference setting	L_∞^{LIT}	M/k^{LIT}
2: Underestimated M/k	L_∞^{LIT}	$0.75 \cdot M/k^{LIT}$
3: Overestimated M/k	L_∞^{LIT}	$1.25 \cdot M/k^{LIT}$
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5: Overestimated L_∞	$1.25 \cdot L_\infty^{LIT}$	M/k^{LIT}
6: $M/k = 1.5$	L_∞^{LIT}	1.5

NOTE: L_∞^{LIT} and M/k^{LIT} are the values obtained after a literature review or the analysis of other reliable information about the stock/species.

After applying each method using each of the parameter configurations/settings, **the results of the methods in settings 2-6 are compared with the results provided by the methods in reference setting**, analyzing in this way the effect of underestimation/overestimation of the parameters M/k and L_∞.

Results: first aim

Stock status was assessed using the results of the LBI and LBSPR methods in the reference parameter configuration. A **summary of LBI and LBSPR results** is provided.

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Stocks	LBI stock status	LBSPR stock status	Previous knowledge of stock status	Limitations of LBI and LBSPR
N. norvegicus FU25	MSY ≈ OY ✓ CI ✓ CL ✗	MSY_{BELOW} $Collapse_{ABOVE}$	Catches decreased by 98% and stock area by 63% throughout the time series and there has been a total allowable catch (TAC) zero in the FU since 2017.	- No constant total mortality or recruitment. - Life history parameters are uncertain. - Need a spatial component.
N. norvegicus FU2627	MSY ✓ OY ✓ CI ✓ CL ✓	MSY_{ABOVE} $Collapse_{ABOVE}$	ICES advises zero catch for 2020, 2021 and 2022 based on the extremely low biomass of this stock.	- No constant total mortality or recruitment. - Life history parameters are uncertain. - Need a spatial component.
S. canicula	MSY ≈ OY ✓ CI ✗ CL ✓	MSY_{BELOW} $Collapse_{CLOSE}$	Scientific surveys indicate an increasing biomass trend in the time series.	Length composition data does not represent juvenile specimens.

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E. encrasicolus	MSY ≈ OY ✓ CI ≈ CL ✗	MSY_{BELOW} $Collapse_{ABOVE}$	Indicators showing a good stock status in terms of conservation and exploitation.	- Variability of catch length distribution. - Life history parameters that need to be updated.
P. bogaraveo	MSY ≈ OY ≈ CI ✓ CL ✗	MSY_{BELOW} $Collapse_{ABOVE}$	Stock in overexploitation status below MSY levels.	
T. luscus	MSY ✗ OY ✗ CI ✓ CL ✗	MSY_{BELOW} $Collapse_{CLOSE}$	A negative trend in abundance indices.	No logistic selectivity.
P. pollachius	MSY ✓ OY ≈ CI ✗ CL ✗	MSY_{BELOW} $Collapse_{ABOVE}$	No previous knowledge.	No logistic selectivity.

Results: second aim

The results of the methods in the reference setting are compared to the obtained under overstimation/underestimation of parameters M/k and L_∞ computing the **the annual average of change ratios**, **defined as the mean of the annual ratios of the values of the indicator in the corresponding setting of overestimation or underestimation over the values of the indicator in the reference.**

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Thanks for your attention!

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