

Megrim (*Lepidorhombus whiffiagonis*) weight-length relationships in northern Bay of Biscay and Celtic Seas

J. Landa^{1*}, M. Korta², A. Iriondo³, J. Fontenla⁴, M. Reparaz⁵, L. Rodríguez-Fernández⁴, I. Loureiro¹, A. Gómez⁴, E. Abad⁴, I. Bruno⁴
 *Email: jorge.landa@ieo.es

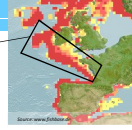


Bay of Biscay
 IEO International Symposium on Oceanography of the Bay of Biscay
 AZTI, Pasaja, Spain
 AZTI, Sukarrieta, Spain
 Centro Oceanográfico Vigo (IEO, CSIC), Spain
 Centro Oceanográfico A Coruña (EO, CSIC), Spain

Relevance of the study

Species
 Megrim: flatfish inhabits fine sand bottoms ~100-700m
 Fishing importance in Europe: ~16,000 tons in Atlantic (~16 M€) by year
 Atlantic stocks status annually assessed (in ICES) and managed

Area
 "Northern Bay of Biscay & Celtic Seas" stock (ICES 7.b-k & 8.a,b,d)
 The main fishing stock of megrim: represent ~75% of its landings in Atlantic



Aim
 - Weight-length relationships
 - Weights conversion factors
 allow
 - predicting weights of individuals from their length or other weights
 - estimating stock biomass

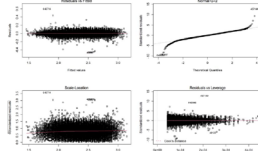
Sampling

Period: 19 years (2001-2019)
Specimen data collected:
 - Lt: total length (cm)
 - Wt: total weight (g)
 - Wg: gutted weight (g)
 Wt & Wg were obtained in 61% of the samples. In the other cases, only Wt or Wg was obtained, depending on the ways of landing and commercialization of megrim.
Sampling size:
 - Northern Bay of Biscay (8.abd): 5736 from AZTI
 - 22528 specimens
 - Celtic Seas (7.b-k): 16792 (10404 from IEO & 6388 from AZTI)
Sampling sources:
 - Mainly from commercial catches (97% of specimens) and a research survey in Porcupine bank (3%)

Data analysis

Exploratory analysis

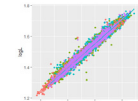
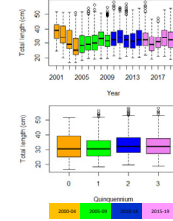
Regression assumption fulfilled:
 - Data linearity
 - Normality of residuals
 - Homoscedasticity
 - Independence of residuals error terms



Final models

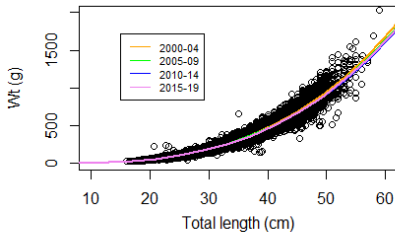
The temporal factor, relevant for stock assessment process, was considered in the models. The "five-year period (quinquennium)" showed a more adequate sample representativeness than the "year".

- Wt-Lt (power model): $\log Wt \sim \log Lt \times \text{quinquennium}$
- Wg-Lt (power model): $\log Wg \sim \log Lt \times \text{quinquennium}$
- Wt-Wg (linear model): $Wt \sim Wg \times \text{quinquennium}$



RESULTS

Total weight-length relationship

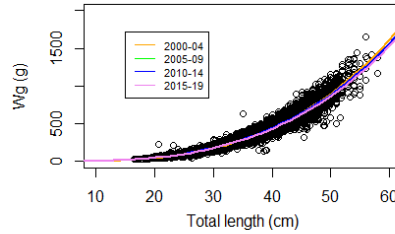


Period	Coefficients		n
	a	b	
2000-04	0.0041	3.1558	3276
2005-09	0.0049	3.1082	8245
2010-14	0.0054	3.0775	4385
2015-19	0.0050	3.1012	5481

Significant differences between quinquennia were found

Selected the parameters of the most recent quinquennium

Gutted weight-length relationship

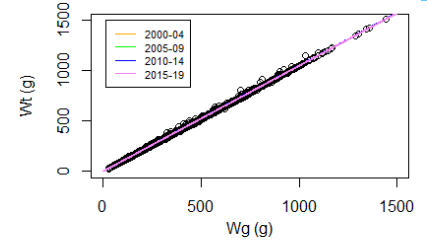


Period	Coefficients		n
	a	b	
2000-04	0.0034	3.1906	2141
2005-09	0.0043	3.1267	7409
2010-14	0.0048	3.0979	8221
2015-19	0.0046	3.1033	4757

Significant differences between quinquennia were found

Selected the parameters of the most recent quinquennium

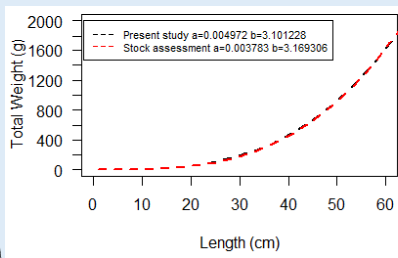
Weight conversion factor



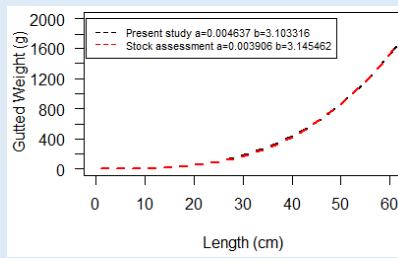
Period	Coefficients		n
	a	b	
2000-04	1.04900	1895	
2005-09	1.04900	5186	
2010-14	1.04895	2860	
2015-19	1.04786	3725	
2000-19	1.04900	13666	

Selected the parameters of the overall time-series due to poor representation of sizes in last quinquennium

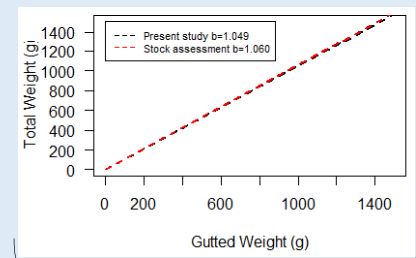
New parameters for the stock assessment and comparison with those currently used (from BIOSDEF project, Pereda et al., 1998)



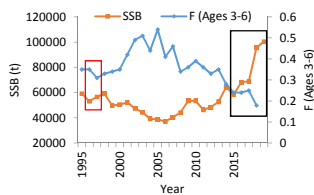
Differences of ~1-5% between both studies in the main commercial sizes (25-45 cm), both for Wt and Wg



Differences of 1% between both studies in the main commercial sizes (25-45 cm)



Study period for the new parameters for stock assessment
 Study period for the parameters currently used in stock assessment



The stock assessment results of megrim (ICES, 2020) show a variation in the biomass of the stock (with a gradual increase since 2006), inversely related to the fishing pressure shift. That may have an influence on the temporal shifts in the W-Lt relationships here obtained.

CONCLUSIONS

- This study provides **new biological parameters** in the **main fishing stock** of megrim and the **main fishery areas** for Spanish fleets catching megrim, necessary for an accurate annual stock assessment process and stock management of megrim.
- The **large sample size** and time-series, and the **collaboration AZTI-IEO** collecting complementary data from the stock, has allowed obtaining **robust weight-length relationships** and weight conversion factors, and preliminary analysis of its temporal variation.
- These new parameters are **available** to be used in the **next stock assessment** in ICES (benchmak-2021/WGBIE-2022) and it is recommended that they replace the ones used so far, which are outdated.
- A periodic update of the parameters more frequently is recommended.
- Continue monitoring these parameters is of interest for analyzing possible long-term shifts due to the fisheries pressure or environmental variations.

Acknowledgements

This study has been co-funded by the European Union through the European Maritime and Fisheries Fund (EMFF) within the National Program of collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries Policy and by the IEO.

We thank M. Quinzán, F. Fernández, A. Mc Aleer and other colleagues for their collaboration in the samplings at laboratory and on the "Porcupine 2017" IBTS survey, conducted by the IEO and coordinated by F. Velasco and F. Baldó. Thanks also to the crew.

References

- ICES. 2020. Working Group for the Bay of Biscay and the Iberian Waters Ecoregion (WGBIE). ICES Scientific Reports. 2:49. 845 pp.
- Pereda, P., Afonso, M.H., Azevedo, M., Dawson, W., Duarte, R., Dupouy, H., Franco, J., Godinho, M.L., Landa, J., Loureiro, I., Lucio, P., Macara, H., Mahé, J.C., Pérez, N., Piñeiro, C., Sainza, M., Santurtún, M., Trujillo, V. 1998. Final Report: "Biological studies of demersal fish (BIOSDEF)" UE DG XIV 95/038.