

M.R. Navarro\* (1), R. Domínguez-Petit (2), J. Landa (1), C. Hernández (1)

(1) Centro Oceanográfico de Santander (IEO, CSIC). Promontorio San Martín S/N. 39004 Santander. Spain.

(2) Centro Oceanográfico de Vigo (IEO, CSIC). Subida a Radio Faro, 50. 36390 Vigo. Spain.

\*Email: charo.navarro@ieo.es

## INTRODUCTION



Atlantic chub mackerel (*Scomber colias*) is a middle size pelagic species distributed on both sides of the Atlantic Ocean. Landings of this species have increased recently in the Iberian Peninsula, likely associated to the increase of its abundance and expansion northwards, probably related to an increment of the sea temperature.

The aim of this study is to improve the knowledge of the reproductive biology of the Atlantic chub mackerel and to present updated information on spawning period and maturity ogives that can be used for analytical stock assessment in ICES and its management.

## M&M

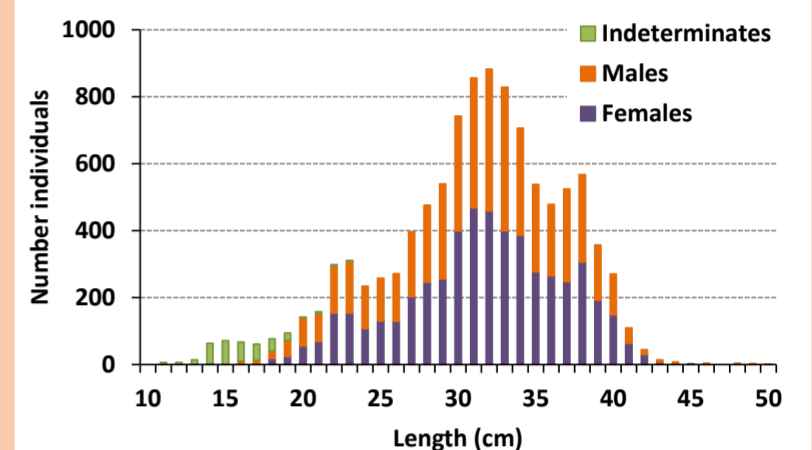
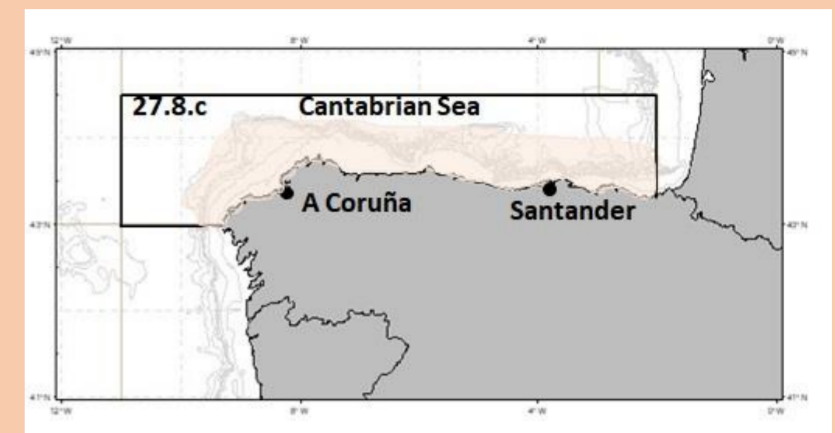
A total of 10835 *S. colias* from Cantabrian Sea (ICES Div. 27.8.c) with a length range of 11-50 cm, were collected and sampled between 2011 and 2020 from both, commercial landings (7405 specimens) in Spanish fish markets and IEO scientific pelagic and demersal surveys (3430 specimens), delivered in spring and autumn respectively.

**Spawning period** was determined from the analysis of the monthly variation of the percentage of active females (macroscopic maturity stages 3, 4 and 5; Walsh et al., 1990) and the mean gonado- and hepatosomatic indices (GSI/HIS):

$$GSI = Wo/Wg \times 100; \quad HIS = WL/Wg \times 100$$

Wo: ovary weight (g); Wg: gutted weight (g) and WL: liver weight (g)

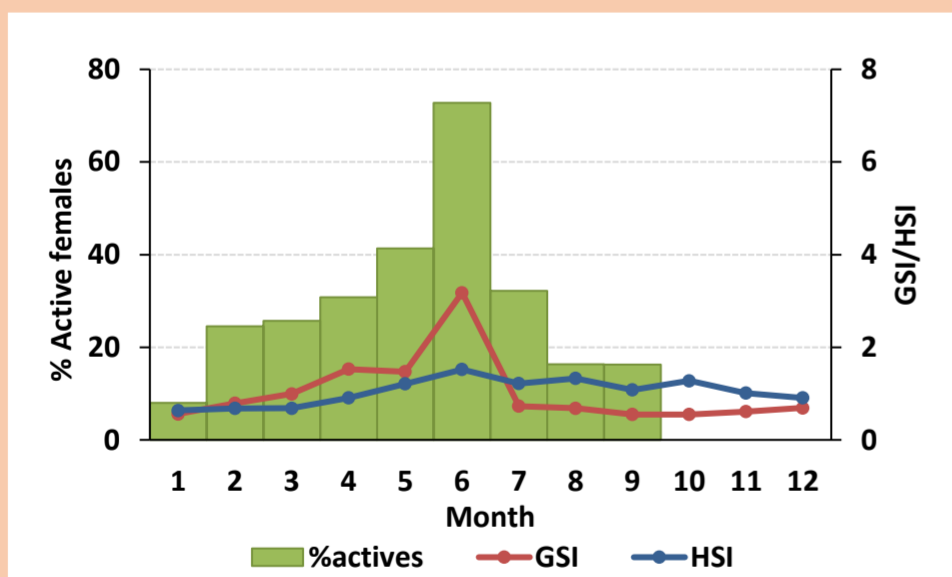
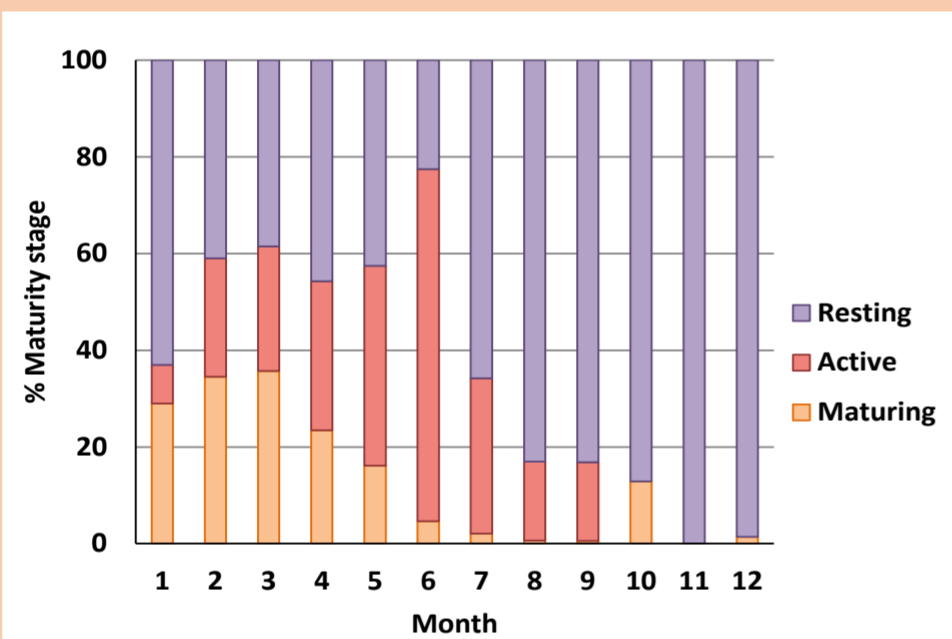
**Maturity ogives** at length and age were estimated with the sizeMat R package (<https://cran.r-project.org/web/packages/sizeMat/vignettes/sizeMat.html>).



## RESULTS

### Spawning period

#### FEMALES



Prevalence of **actively spawning** females from February (24.6%) to July (32.2%), peaking in June (72.8%).

GSI shows the same pattern, ranging 0.73 to 3.18.

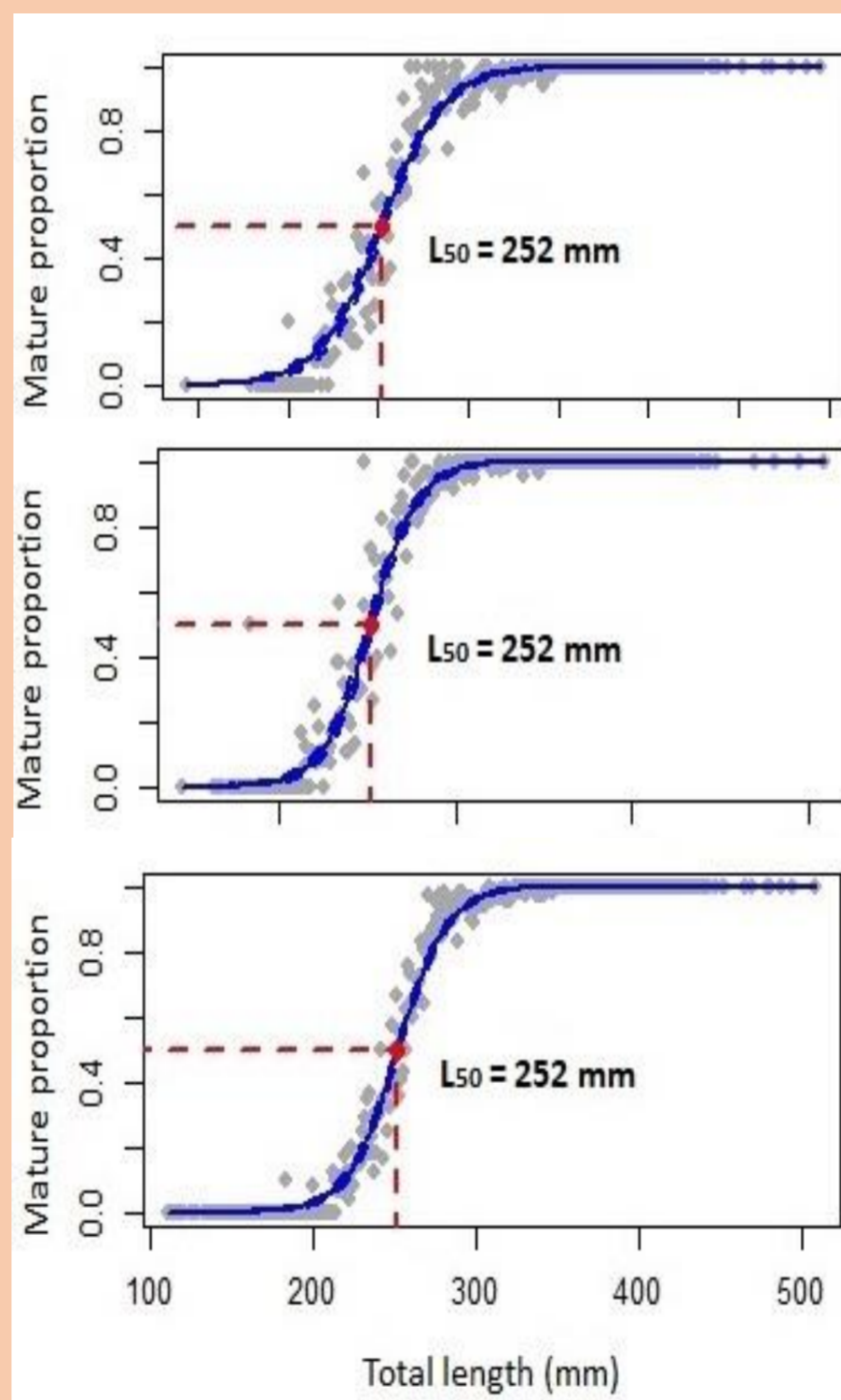
HIS increased from January (0.64) to June (1.52) and then decreased until December (0.91).

L50 for females, males and both sexes combined were 25.2 cm (total length), while A50 was 1.5 years old for females and 1.6 years old for males and both sex combined.

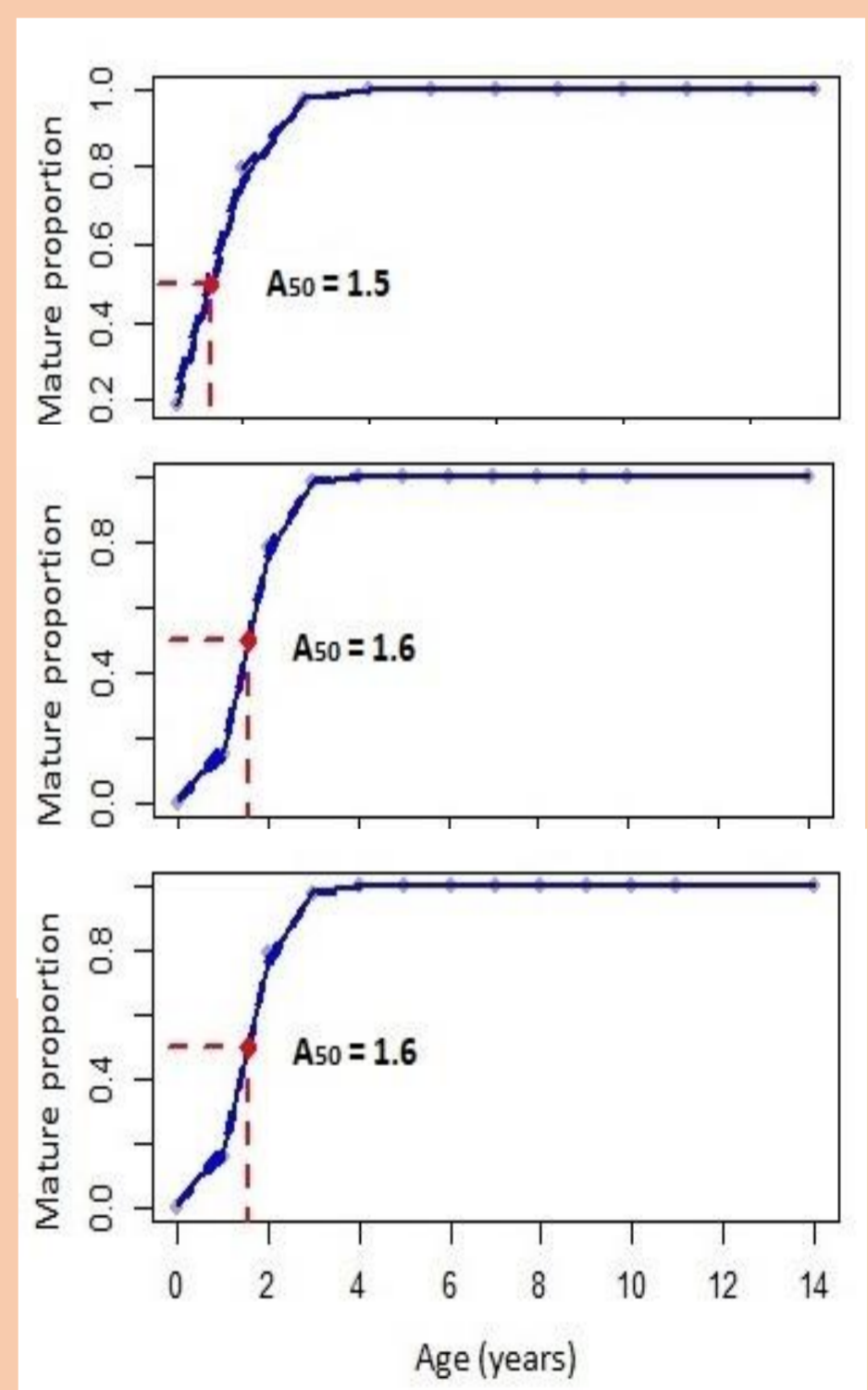
#### FEMALES

#### MALES

#### SEX COMBINED



### Ogives



	L50 (cm)	Length range (cm)	N <sub>L</sub>	A50 (years)	Age range (years)	N <sub>A</sub>
Females	25.2	14-49	5199	1.5	1-11	4020
Males	25.2	14-50	4936	1.6	0-14	3899
Sex combined	25.2	14-50	10135	1.6	0-14	7919

## CONCLUSIONS

The **spawning period** of *S. colias* in the Cantabrian Sea (ICES Division 27.8.c) takes place from **February to July** with a clear peak of activity in June.

**L50** and **A50** in females and males are very similar (25.2 cm and around 1.5 years, respectively), hence the ogive of both **sex combined can be used in the assessment**.

## ACKNOWLEDGEMENTS

This study was supported by the EU 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 Spanish Institute of Oceanography (IEO) (BIOPEL, PELASSES, EREME and ERDEM projects).

We thank Clara Dueñas, Ana Antolínez, Begoña Castro, Urbano Autón, María Jesús Llevot, María Reparaz and Antonio Solla for their help in the biological samplings in the IEO laboratories of Santander and A Coruña, and the PELACUS and DEMERSALES surveys. Thanks to Begoña Villamor as leader of the biological data of commercial landings of pelagic species and Pablo Carrera, Antonio Punzón and Izaskun Preciado, as leaders of the PELACUS and DEMERSALES surveys. We also thank Fran Velasco for his help with the map. This study is included in the Doctoral Thesis of María Rosario Navarro delivered within the PhD program of Coastal Engineering, Hydrobiology and Management of Aquatic Systems "IH2O" from the University of Cantabria (Spain).

## REFERENCES

- Torreon-Magallanes, J. 2020. Package "sizeMat" v.1.1.2. Estimate size at sexual maturity. Repository CRAN. <https://cran.r-project.org/web/packages/sizeMat/vignettes/sizeMat.html>
- Walsh, M.; Hopkins, P.; Witthames, P.R.; Greer Walker, M.; Watson, J. 1990. Estimation of total potential fecundity and atresia in the western mackerel stock in 1989. ICES CM 1990/H:31.