

Spawning season, size and age at first maturity of the Atlantic chub mackerel (*Scomber colias*) off Madeira Island

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INTRODUCTION

The pelagic chub mackerel, *Scomber colias* Gmelin, 1789 (Fig.1) is one of the main fisheries resources of Madeira Archipelago. It is traditionally caught by a small and coastal purse-seine fleet that operates around the islands. Despite its fishing importance, there is little information on the biology of this species in this area. Most information regarding the biology of this species comes from studies conducted in other parts of the world. This study provides information on some reproductive aspects of the chub mackerel in this area.



Figure 1 - Photo of a specimen of Atlantic chub mackerel, *Scomber colias* Gmelin 1789, caught off Madeira Island.

MATERIAL AND METHODS

Monthly samples of chub mackerel were collected from the landings made by purse-seiners, between January 2002 and December 2005. Sex and maturity were assigned by visually inspecting the gonads of 1998 males (17.4-46.0 cm total length, TL; 0-5 yr), 2108 females (18.0-41.2 cm TL; 0-4 yr) and 99 undetermined (13.0-26.8 cm TL; 0 yr) using a five stages macroscopic maturity scale (Fig.2) adapted from Holden & Raitt (1974).

Characterization of this species' spawning season was made by analyzing the monthly percentage of maturation stages the evolution of the mean monthly gonadosomatic index (GSI =Gonad weight/Total weight x 100) and the evolution of the monthly hepatosomatic index (HSI=Liver

weight/Total weight x 100) during the studied period.

Length and age maturity ogives by sex were fitted to observed data collected during the first semester (spawning season) and pooled together for the four years study period. Stages of maturity 2 to 5 were considered mature (adults). Logistical ogives were fitted using non-linear least squares method. The percentage of matures at age were calculated using age-length key data available.

| Maturity | Females | Males |
|--------------------------------------|---------|-------|
| 1 - Immature | | |
| 2 - Recovering | | |
| 3 - Ripening (Pre-spawning) | | |
| 4 - Ripe (Spawning) | | |
| 5 - Spent (Pos-spawning and resting) | | |

Figure 2 - Photo scale of the five maturity stages used in this study for females and males of *S. colias*. (paper clip length = 28 mm)

RESULTS

MATURITY STAGES

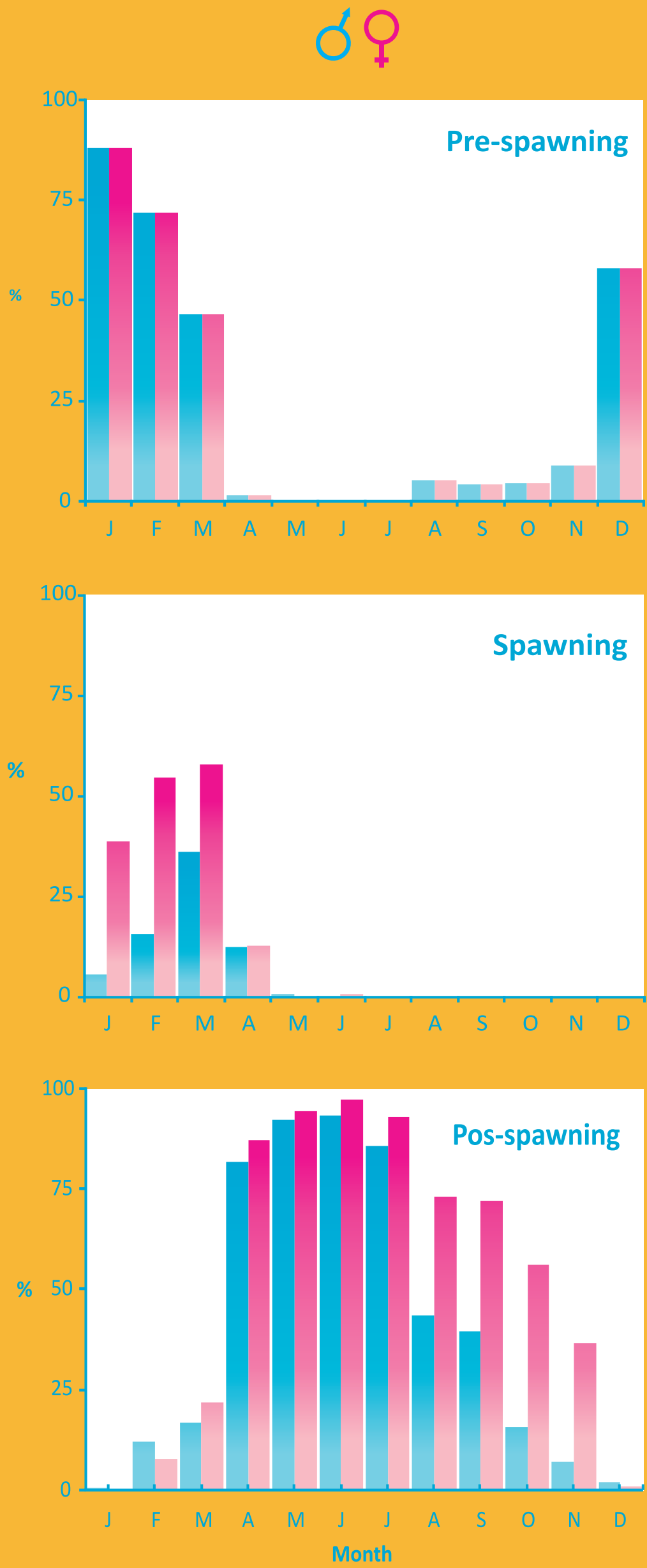


Figure 3 - Monthly percentage of females and males *S. colias* with gonads in maturity stages 3 (pre-spawning), 4 (spawning) and 5 (Post-spawning) observed in the period 2002-2005.

SPAWNING SEASON

The analysis of monthly gonadosomatic indices and maturity stages proportions showed that gonad development starts slowly in July-August and increases in October-December, for males and females (Figs 3 and 4).

The hepatosomatic index reached the highest values in March (1,46%) for females and in June for males (1,36%). Our data suggests that the chub mackerel spawning season takes place between January and April peaking in February-March.

MATURITY OGIVES

Size and age at first maturity (Figs 5 and 6) were estimated to be 22.12 cm of total length at 1.05 yr of age for males and 21.55 cm TL at 0.82 yr for females.

| | | |
|----------|---|---------|
| Lm50 | | Tm50 |
| 22.12 cm | ♂ | 1.05 yr |
| 21.55 cm | ♀ | 0.82 yr |

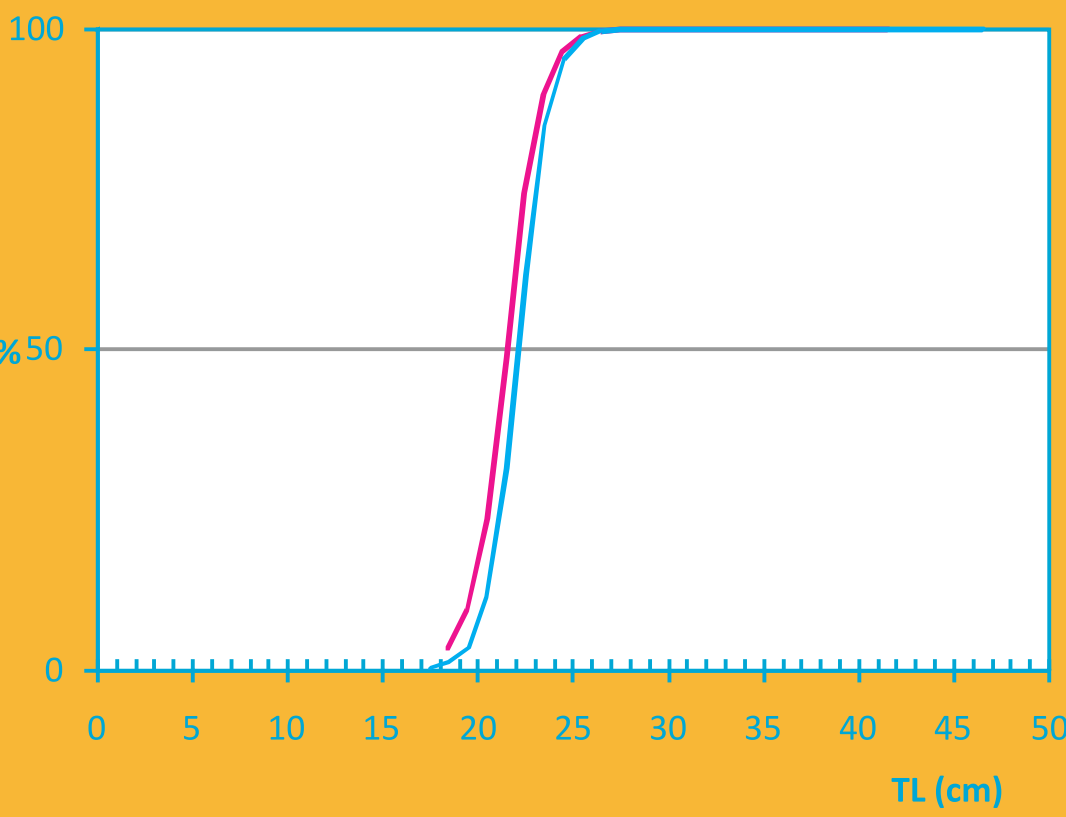


Figure 5 - Length maturity ogives obtained for females and males of *S. colias*.

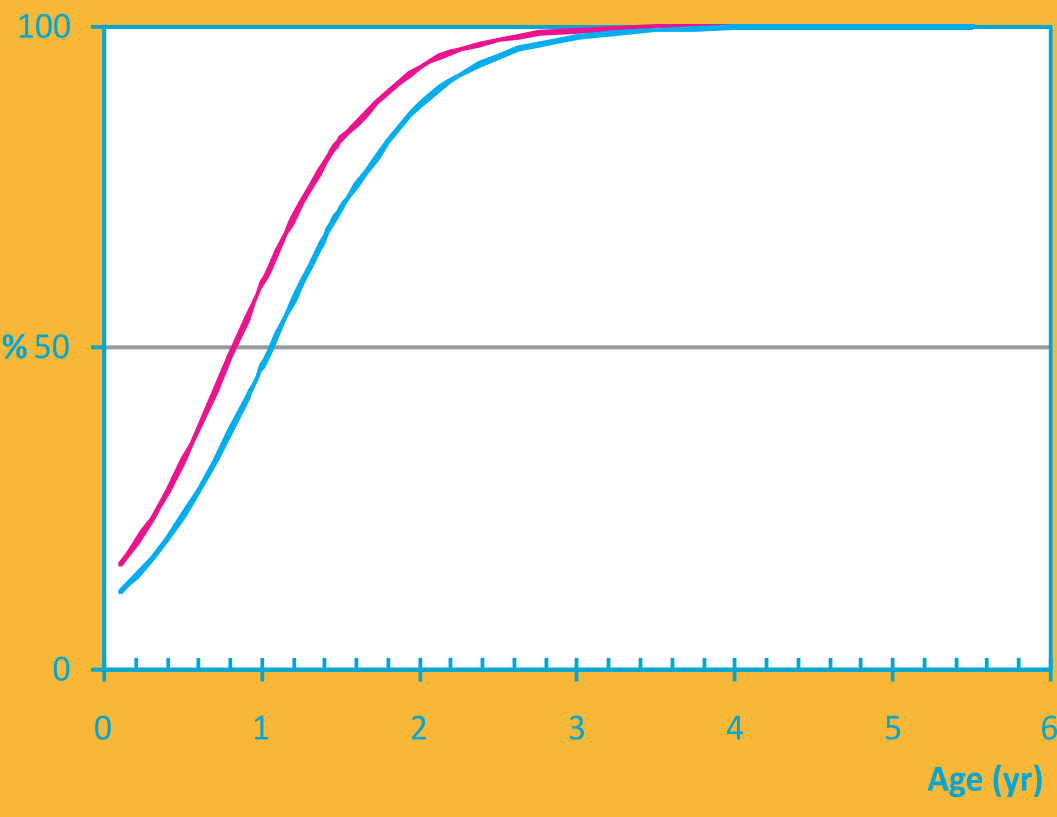


Figure 6 - Age maturity ogives obtained for females and males of *S. colias*.

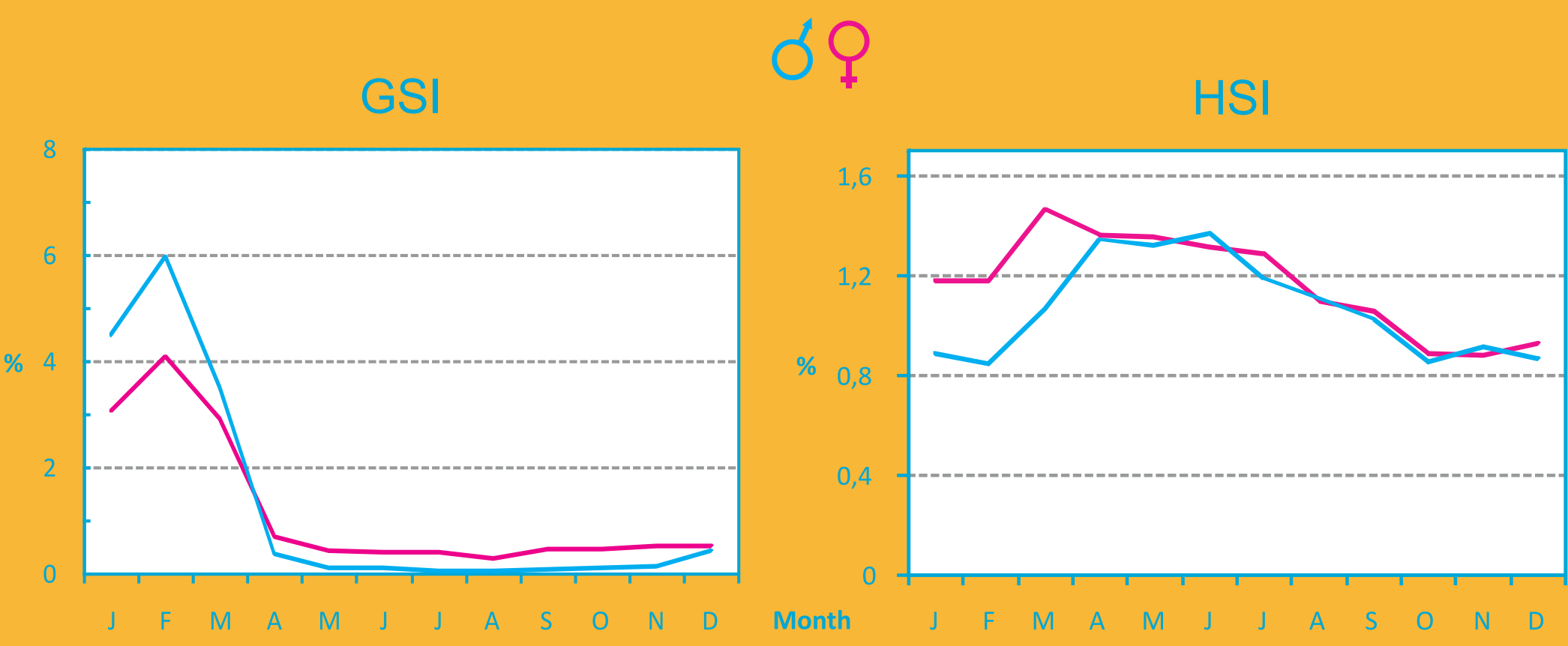


Figure 4 - Monthly evolution of the gonadosomatic and hepatosomatic indices obtained for females and males of *S. colias*, in the period 2002-2005.

RECOMMENDATION

The macroscopic scale of sexual maturity used in the present study should be validated. Therefore, it would be essential to perform a comprehensive histological study of the chub mackerel gonads development cycle.

REFERENCES

Holden, M.J. & D.F.S. Raitt, 1974. Manual of fisheries science. Part 2. Methods of resource investigation and their application. FAO Fish.Tech.Pap. 115: Rev.1:214 p.

ACKNOWLEDGEMENTS

We are grateful to the DSIP technicians and to our colleague Ana Rita Pinto for their valuable help in this study, and also to Marco Gonçalves for the poster design.