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**Update of ongoing work on age and growth of Antarctic toothfish
(*Dissostichus mawsoni*) from Division 58.4.1 by Spain**

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L.J. López-Abellán, M.T.G. Santamaría, R. Sarralde and S. Barreiro



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Update of ongoing work on age and growth of Antarctic toothfish (*Dissostichus mawsoni*) from Division 58.4.1 by Spain

L.J. López-Abellán, M.T.G. Santamaría, R. Sarralde, S. Barreiro

Centro Oceanográfico de Canarias, Instituto Español de Oceanografía

Abstract

We present preliminary results on age and growth of *Dissostichus mawsoni* for the third season (2015/16) of the Spanish research fishing in the 58.4.1 Division obtained for growth rings on otolith readings. It is included the growth parameters estimates by sex. Growth parameters obtained using length-age pair values are: L_{∞} : 208.2, k : 0.074 and t_0 : 0.564 for females; L_{∞} : 173, k : 0.089 and t_0 : -0.1771 for males; and L_{∞} : 226.4, k : 0.05673 and t_0 : -0.745 all combined. Values differ with the previous estimates, and comparisons are made between seasons all seasons together as well as with the parameter values used in the Ross sea assessment.

Introduction

From 2012-13, Spain is conducting fishing research in the 58.4.1 Division in order to get data and biological samples which enable an assessment of Antarctic toothfish in this area at the end of the whole experience. Up to now four surveys have been completed.

The Spanish Institute of Oceanography (IEO) is working on the ageing and growth estimates of Antarctic toothfish since 2015. Thus, this document is a progress of the work presented the last two year (WG-FSA-15/06 and WG-FSA-16/58), following the same methodology. Samples studied were obtained in the course of research experiments conducted by the Spanish flagged vessel *Tronio* in Division 58.4.1 in the fishing season 2015-16. Otoliths from 341 specimens were used in this third approach to ageing individuals of this species in order to construct the age structure of the fished population and to estimate the growth parameters.

For the otolith preparations and ageing we followed the methodology described on the Manual for age determination of Antarctic toothfish (Sutton *et al.*, 2012) as “bake and embed” technique.

Otolith interpretation and age determination

Table 1 includes the numbers of *D. mawsoni* otolith samples collected by Spain, prepared (mounting and sectioning) and aged by fishing season.

Table 1. Numbers of otolith samples of *D. mawsoni* obtained by Spain in the 58.4.1 Division by season.

Season	Collected	Prepared	Aged
2012	-		
2013	696	696	514
2014	1242	600	495
2015	-		
2016	562	363	341
2017	387	-	-
Total	2887	1659	1350

In this third phase on the ageing process of *D. mawsoni* from Division 58.4.1, the protocol adopted consisted of:

- Readings have been made by pairs.
- The work is in progress. Final agreement on the results will be made during the intersessional period.

Growth parameters

A von Bertalanffy growth function based on a least-square fitting approach from length-age pair values had been estimated. Growth parameters by sex and combined are presented in Table 2.

Table 2. Parameters of von Bertalanffy growth fitting by sex and all sex combined, for *D. mawsoni* from Division 58.4.1 and standard error estimations for 2015/16 season and number total of read otoliths

n	Sex	t_0 (y)	k (y^{-1})	L_{∞} (cm)
141	Male	-0.1771	0.08882	173
197	Female	0.564	0.07467	208.2
341	Combined	-0.745	0.05673	226.4
Standard error	Male	1.54	0.03114	20.5
	Female	0.8566	0.01396	13.7
	Combined	0.8562	0.01107	18.95

Figure 1 shows the pair values and age-length curve fitted for males, females and both sex combined for the three season estimates. 2015/16 female estimates of the growth parameters differ significantly from other season results, being L_{∞} bigger than previous estimates for both sexes.

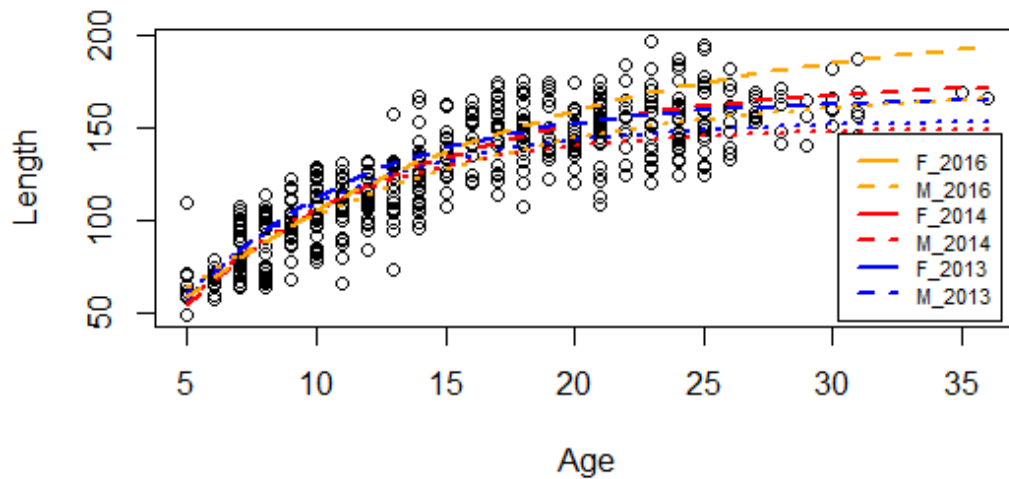
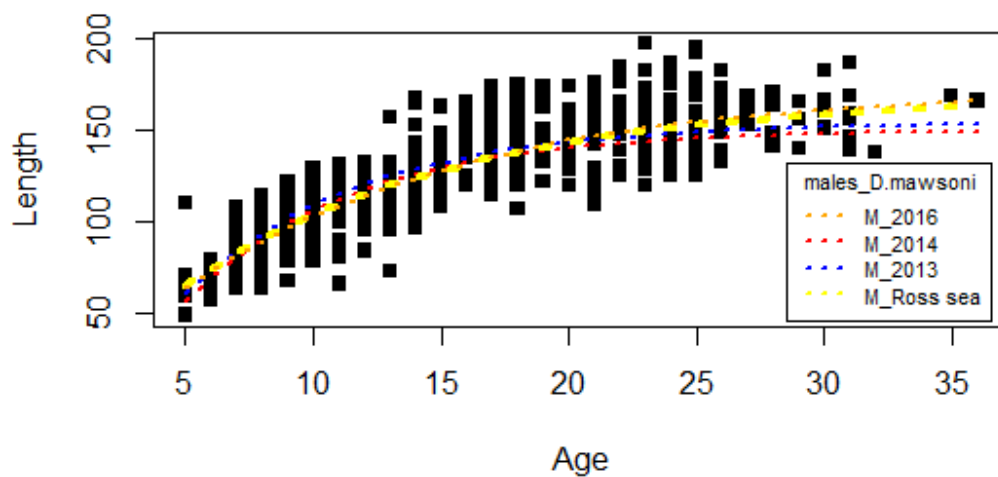


Figure 1.- Values of length-age used to estimate growth parameters and growth curves fitted for males and females by season.

Growth curve comparisons by sex for every season in 58.4.1 division and the Ross sea (CCAMLR, 2015) are shown in Figure 2. Male age-length curve from the 2015/16 season fits almost entirely with the curve from the Ross sea, Figure 2a. In contrast to females estimates where the curve from the 2015/16 season differs the most, Figure 2b.

a)



b)

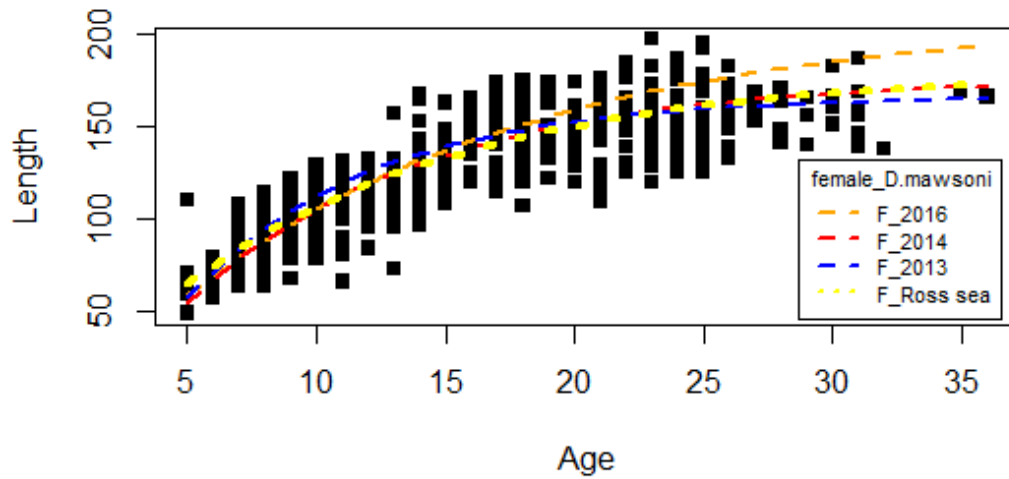


Figure 2.- Values of length-age used to estimate male and female growth parameters and growth curves fitted for males (a) and females (b) by season in division 58.4.1 and the Ross sea.

A compilation of all readings made from the three estimated seasons by sex has been made, resulting in the following growth parameters from the Table 3. The parameter estimates are better fitted.

Table 3. Parameters of von Bertalanffy growth fitting by sex and all sex combined, for *D. mawsoni* from Division 58.4.1 and standard error estimations for the three seasons 2012/13, 2013/14 and 2015/16.

N	Sex	t_0 (y)	k (y^{-1})	L_{∞} (cm)
575	Male	0.974	0.1212	159.9
761	Female	0.406	0.08668	189.5
Standard error	Male	0.3567	0.009371	3.184
	Female	0.388	0.006822	4.512

A growth curve comparisons by sex of all aged otoliths in 58.4.1 division by sex and the growth curve used in the Ross sea assessment are show in Figure 3.

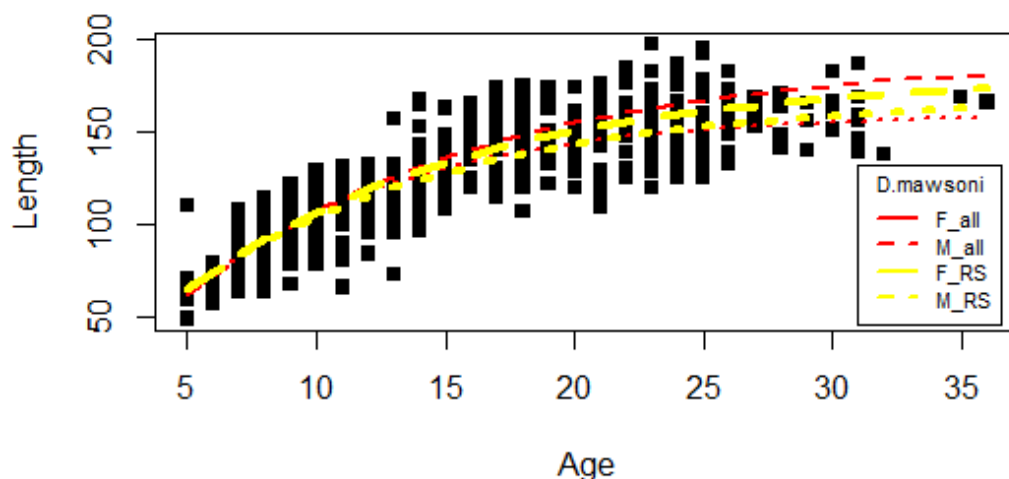


Figure 3.- Values of length-age used to estimate male and female growth parameters and growth curves fitted by sex for all seasons compiled in division 58.4.1 and the Ross sea.

Work in progress

The annually age estimation from the Antarctic toothfish samples will continue and progress reports will be reported to WG-FSA.

An otolith reference set will be distributed between members to harmonize the different readings.

Coordination between readers of Republic of Korea, Australia and Spain will be made intersessionally.

It is planned to finish the readings for the 2016/17 and also the expected sampling for the upcoming season 2017/18 by the FSA-2018 and to be able to provide an age-length key for use in the Antarctic toothfish assessment for Divisions 58.4.1 and 58.4.2.

References

La Mesa, M. (2007). The utility of otolith microstructure in determining the timing and position of the first annulus in juvenile Antarctic toothfish (*Dissostichus mawsoni*) from the South Shetland Islands. *Polar Biol.* 30: 1219-1226.

López-Abellán, L.J, M. Santamaría, R. Sarralde and S. Barreiro (2015). Contribution to knowledge on age and growth of Antarctic toothfish (*Dissostichus mawsoni*) from Division 58.4.1. WG-FSA-15/06

López-Abellán, L.J, M. Santamaría, R. Sarralde and S. Barreiro (2015). Update of ongoing work on age and growth of Antarctic toothfish (*Dissostichus mawsoni*) (2013-14 season) from Division 58.4.1 by Spain. WG-FSA-16/58.

Sutton, C.P., P.L. Horn., S.J. Parker (2012). Manual for age determination of Antarctic toothfish, *Dissostichus mawsoni* V2. Document WG-FSA-12/43 Rev. 1. CCAMLR, Hobart: 30 pp.

CCAMLR fisheries report 2015: Fisheries report for exploratory fisheries in Subarea 88.1. CCAMLR, 2015.