All about my growth: Highlights from the Red seabream population of the Strait of Gibraltar

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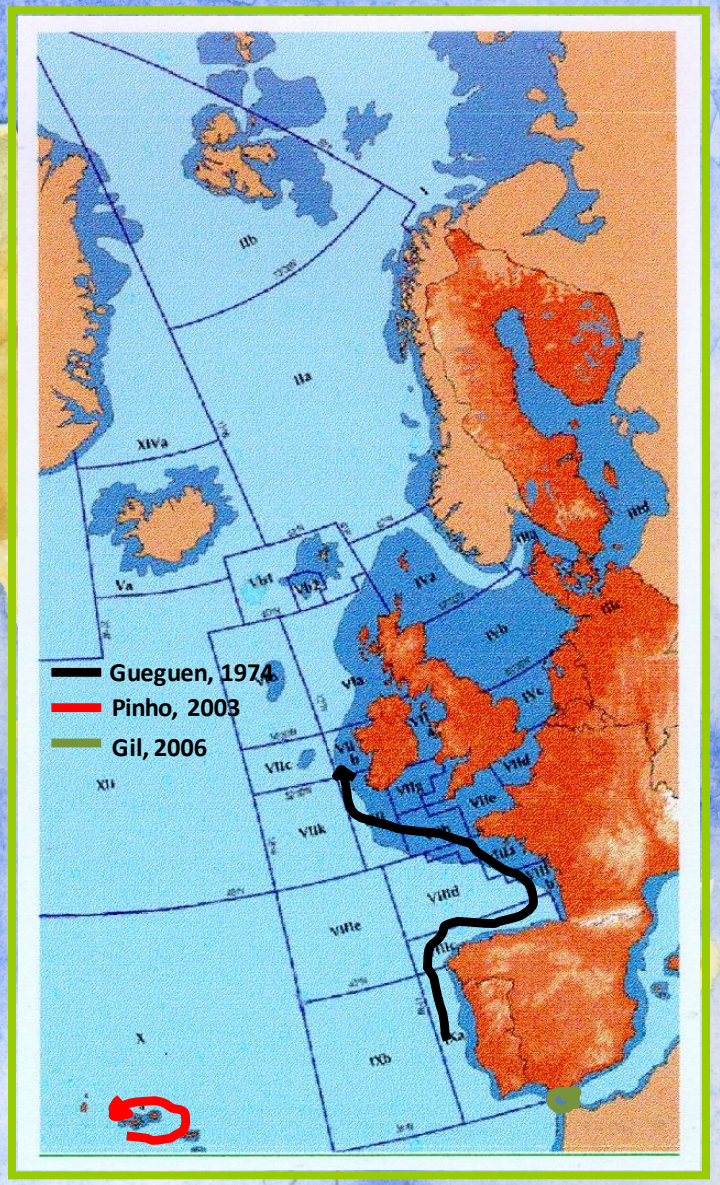
THE MAIN CHARACTER

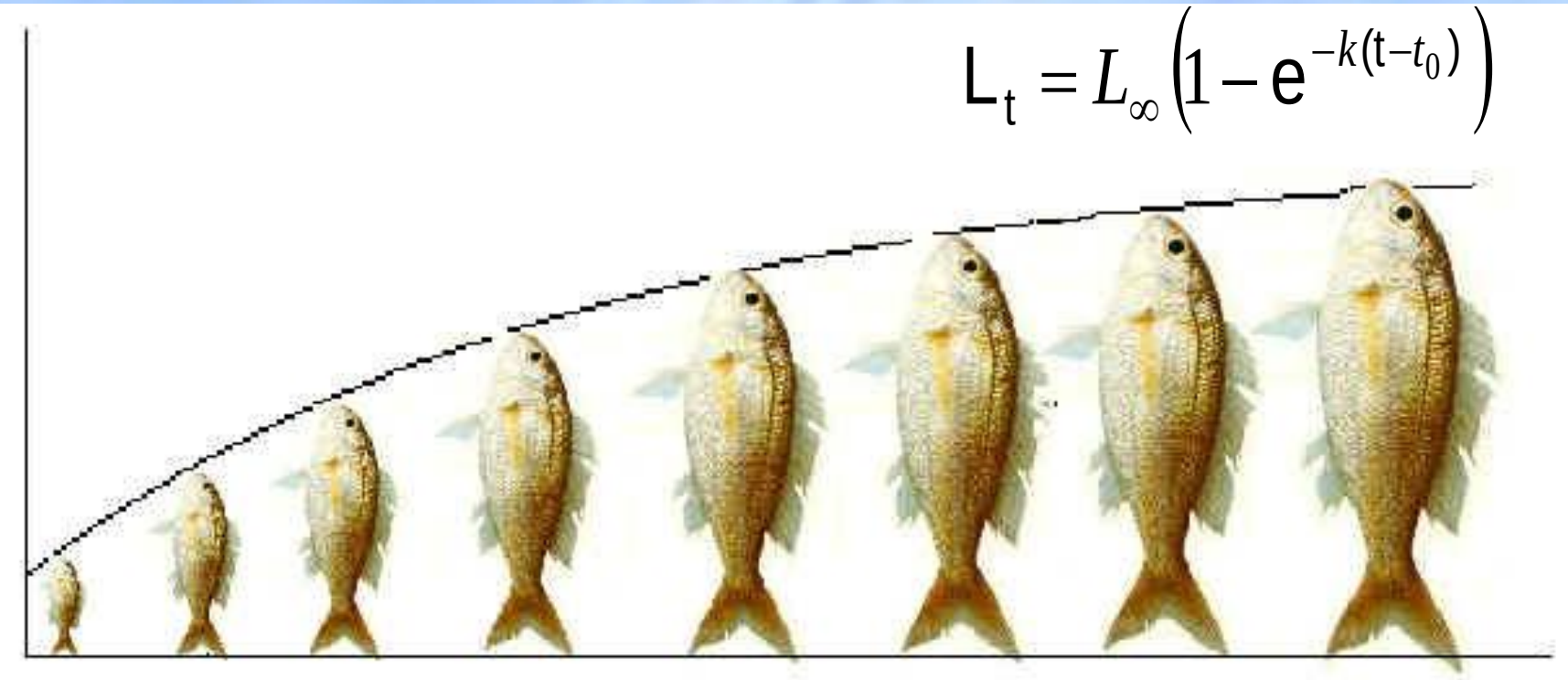
Deepfishman

Taxonomy: *Pagellus bogaraveo*

Superclass GNATHOSTOMATA
Class ACTINOPTERYGII
Subclass NEOPTTERYGII
Division TELEOSTEI
Subdivision EUTELOSTEI
Superorder ACANTHOPTERYGII
Order PERCIFORMES
Family SPARIDAE
Genus *Pagellus* (Valenciennes, 1830)



Why?

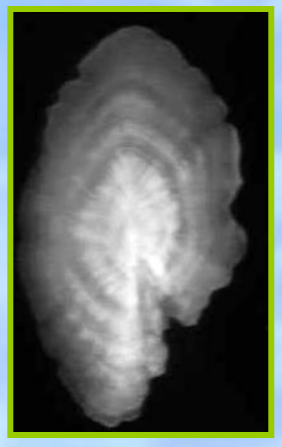


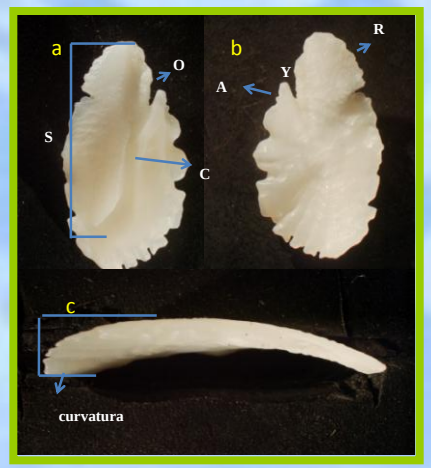
Understanding of its biology

Comparison with other populations (or even other species)

Importance in fisheries assessment (and management)

ITS GROWTH





Red seabream is considered a slow growing species. Gueguen (1969) reported a maximum age of 20 years. In the Azores Islands a maximum age of 15 years was observed in a 56 cm length fish (Krug, 1994).

In the Strait of Gibraltar area, VBGF parameters were estimated from:

-Tag / Recapture experiences

-Otoliths reading

The age estimate from the reading of growth rings with binocular lens is complex, requires a lot of time-consuming and depends on the reader experience. Study of possible differences between different otolith shape by age classes is quite interesting, especially its practical usefulness it might have on the criteria adopted for the estimation of the Red seabream growth in the Strait of Gibraltar.

TAG-RECAPTURE

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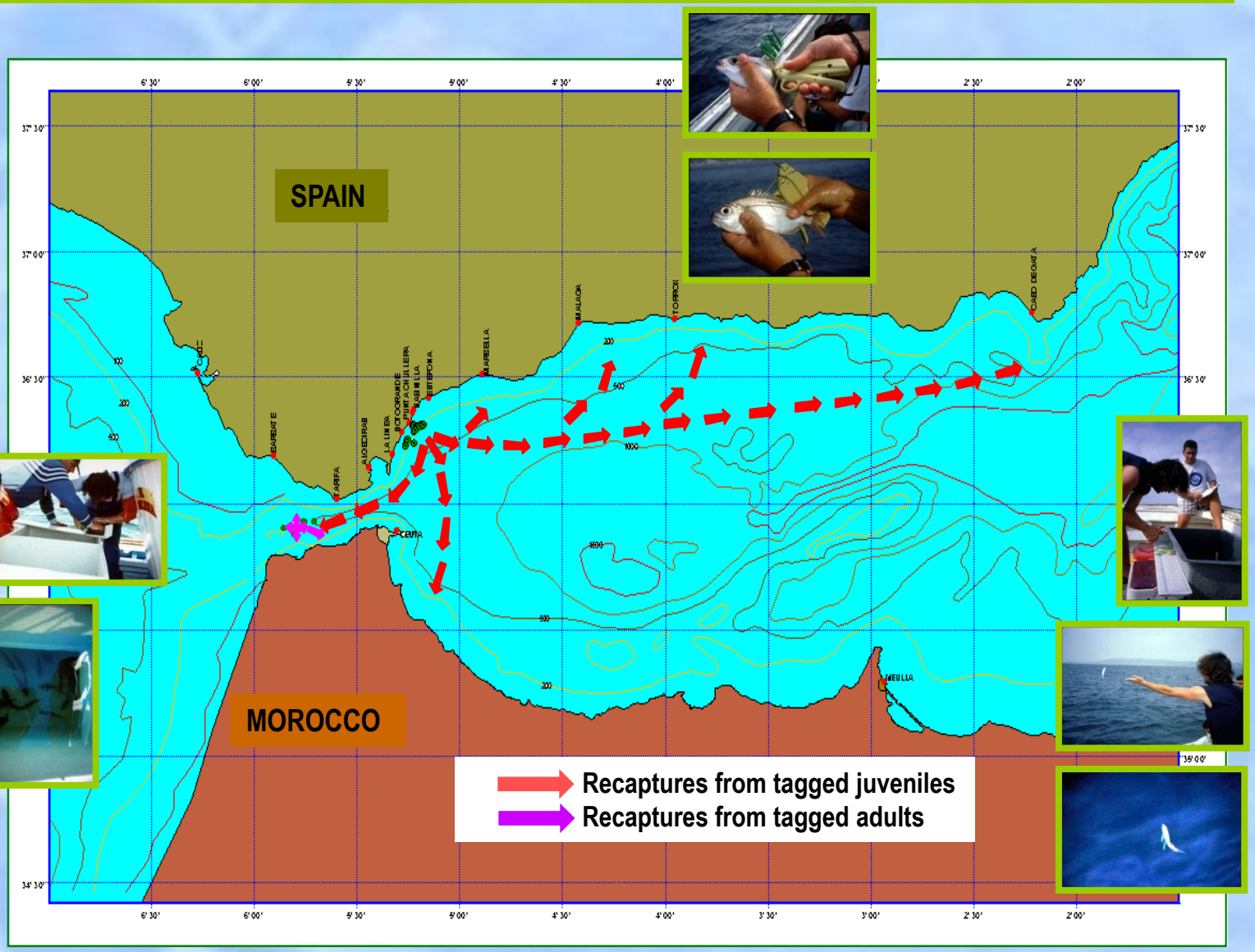

2 different experiences and areas: Juveniles (traps) and adults (hooks).

TAG-RECAPTURE

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Juveniles

Adults

Survey	Days	Tags	Recaptures	Mean length (cm)	Mean weight (gr)	Recaptures rate (%)
Estepona 97	9	1591	117	20	121	7.35
Barbate 98	8	351	2	15	51	0.57
Sotogrande 98	8	1432	18	19	100	1.26
Tarifa 01	13	979	180	34	585	18.18
Tarifa 02	15	625	33	35	681	5.28
Tarifa 04	9	942	37	30	411	3.93
Tarifa 06	10	1225	109	32	505	8.9
Conil 06	4	279	30	33	594	10.75
Conil 08	5	450	15	30	428	3.33
Total	**89**	**7875**	**541**	**28**	**386**	**6.62**

541 recaptures till August 2012

>1 year

338 samples for k estimates

>10 years

>11 years

MAIN OUTPUTS

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Area	Methodology	t_0	*k*	Linf	Phi´ value	Autor
Cantabrian Sea	Direct	-1.02	0.127	53.86	2.57	Ramos, 1967
Bay of Biscay	Direct	-2.92	0.092	56.80	2.47	Gueguen, 1969
Cantabrian Sea	Direct	-0.53	0.209	51.56	2.79	Sánchez, 1983
Azores	Direct	-0.91	0.118	58.89	2.61	Krug (1982-1985), 1994
Azores	Direct	-0.39	0.121	64.18	2.70	Krug (1987-1991), 1994
Azores	Direct	-1.08	0.135	56.67	2.64	Menezes *et al* ., 2001
Azores	Direct	-1.29	0.102	62.24	2.60	Pinho, 2003
Strait of Gibraltar	Direct	-0.67	0.169	58.00*	2.76	Sobrino y Gil (1997-2000), 2001
Strait of Gibraltar	Direct	-0.57	0.157	62.00*	2.78	Gil *et al* .(2003-2009), 2010
Strait of Gibraltar	Direct[1]	0.00*	0.067	62.00*	2.41	Gil *et al* .(T-R[1]), 2012
Strait of Gibraltar	Direct[2]	0.00*	0.062	62.00*	2.38	Gil *et al* .(T-R[2]), 2012
Strait of Gibraltar	Direct[3]	0.00*	0.147	62.00*	2.75	Gil *et al* .(T-R[3]), 2012
Strait of Gibraltar	Direct[4]	0.00*	0.066	62.00*	2.40	Gil *et al* .(T-R[4]), 2012

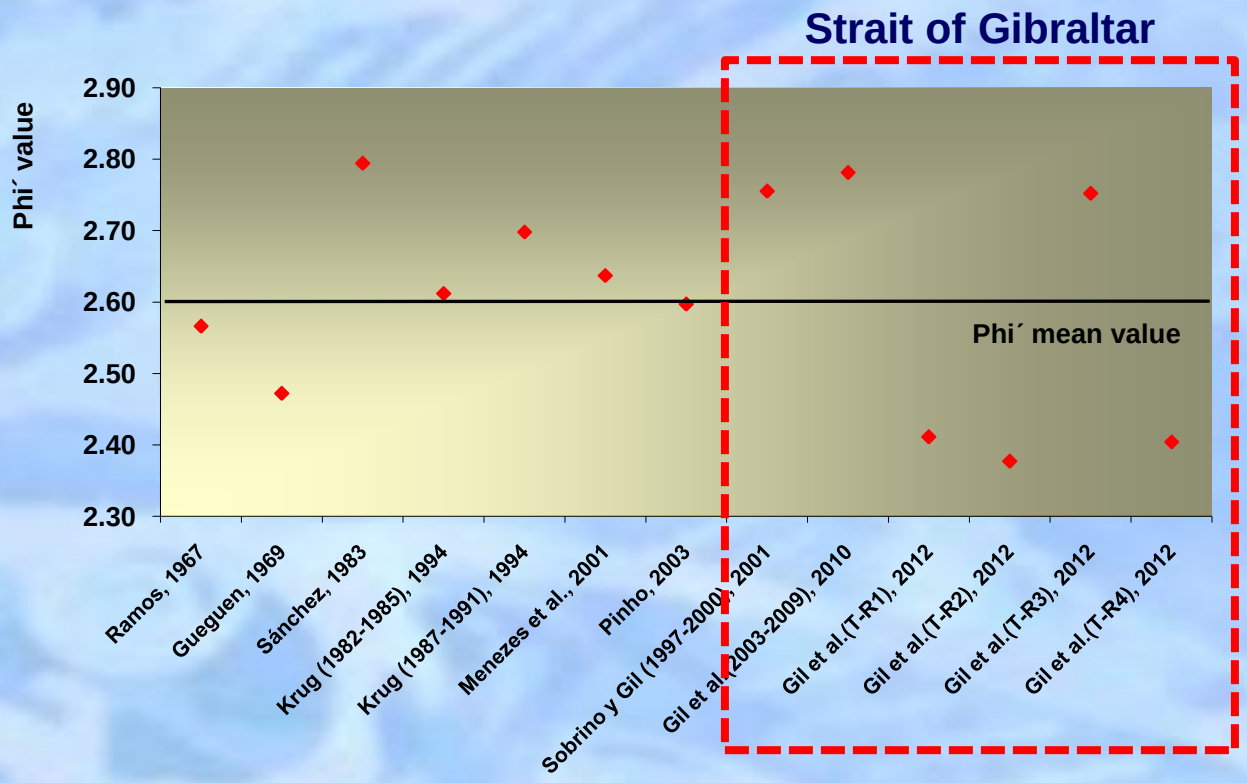
[1] Gulland-Holt, [2] Munro, [3] Fabens and [4] Appledorn

* Fixed (from the largest observed sample)

** Assumed

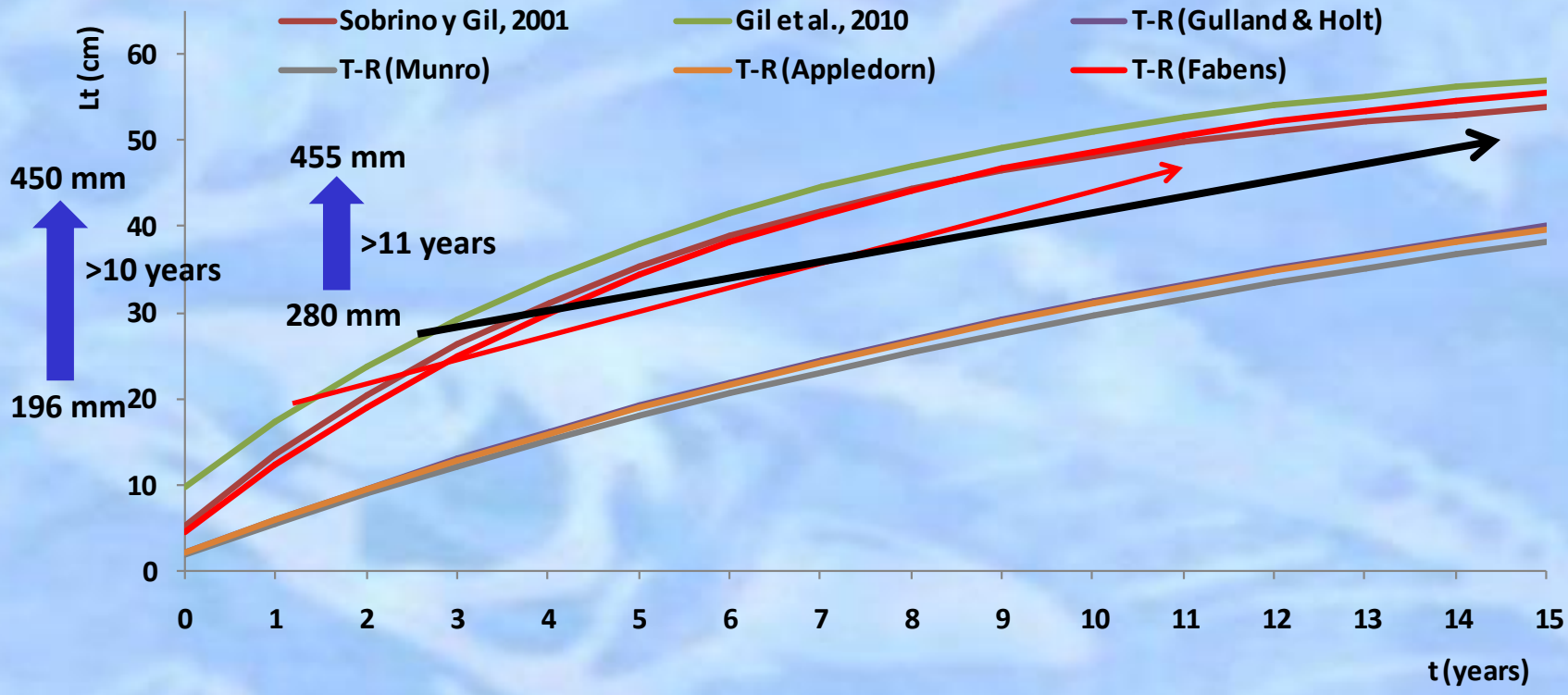
Similar growth patterns can be assumed for the red seabream in all the areas. This assumption does not denote a single stock: Growth patterns are similar but not the same!

MAIN OUTPUTS



Different phi´values for Red seabream: from 2.38 (Strait of Gibraltar) till 2.79 (Cantabrian Sea) with a mean value of 2.60 (Azores). Strait of Gibraltar mean values are 2.58 or 2.76.

GROWTH CURVES

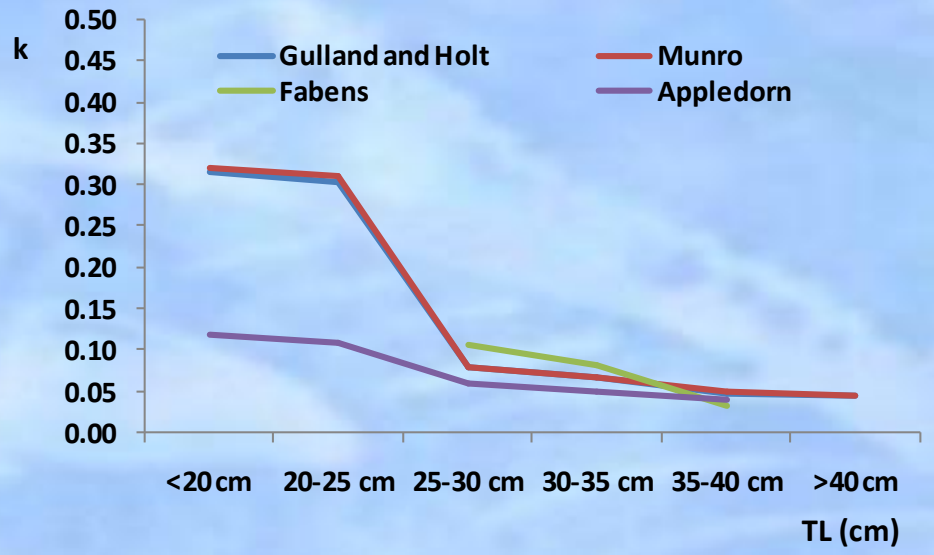


Validation of estimated combined ALK from tag-recaptures experiences: VBGF shapes and longest recaptures (more than 10 years at sea)

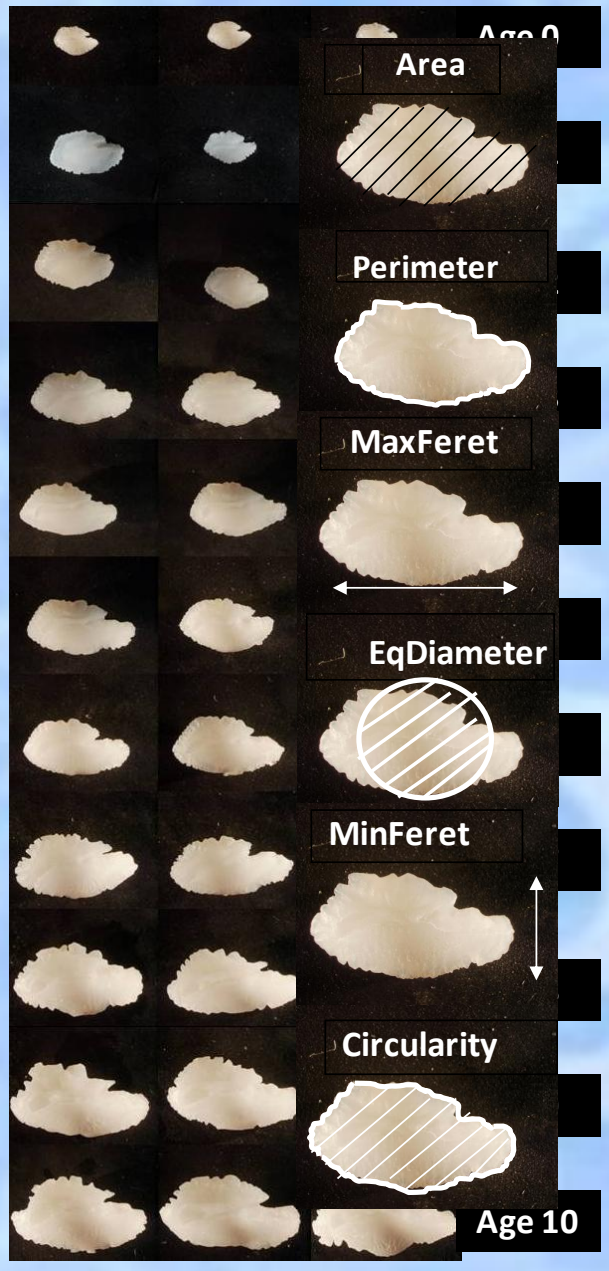
MAIN OUTPUTS

Size range	Gulland and Holt	Munro	Fabens	Appledorn
<20 cm	0.32	0.32	12.33	0.12
20-25 cm	0.30	0.31		0.11
25-30 cm	0.08	0.08	0.11	0.06
30-35 cm	0.07	0.07	0.08	0.05
35-40 cm	0.05	0.05	0.03	0.04
>40 cm	0.04	0.04		

Different k estimates as a function of tag samples sizes. The largest the lower in accordance with the proposed VBGF.



OTOLITH SHAPE



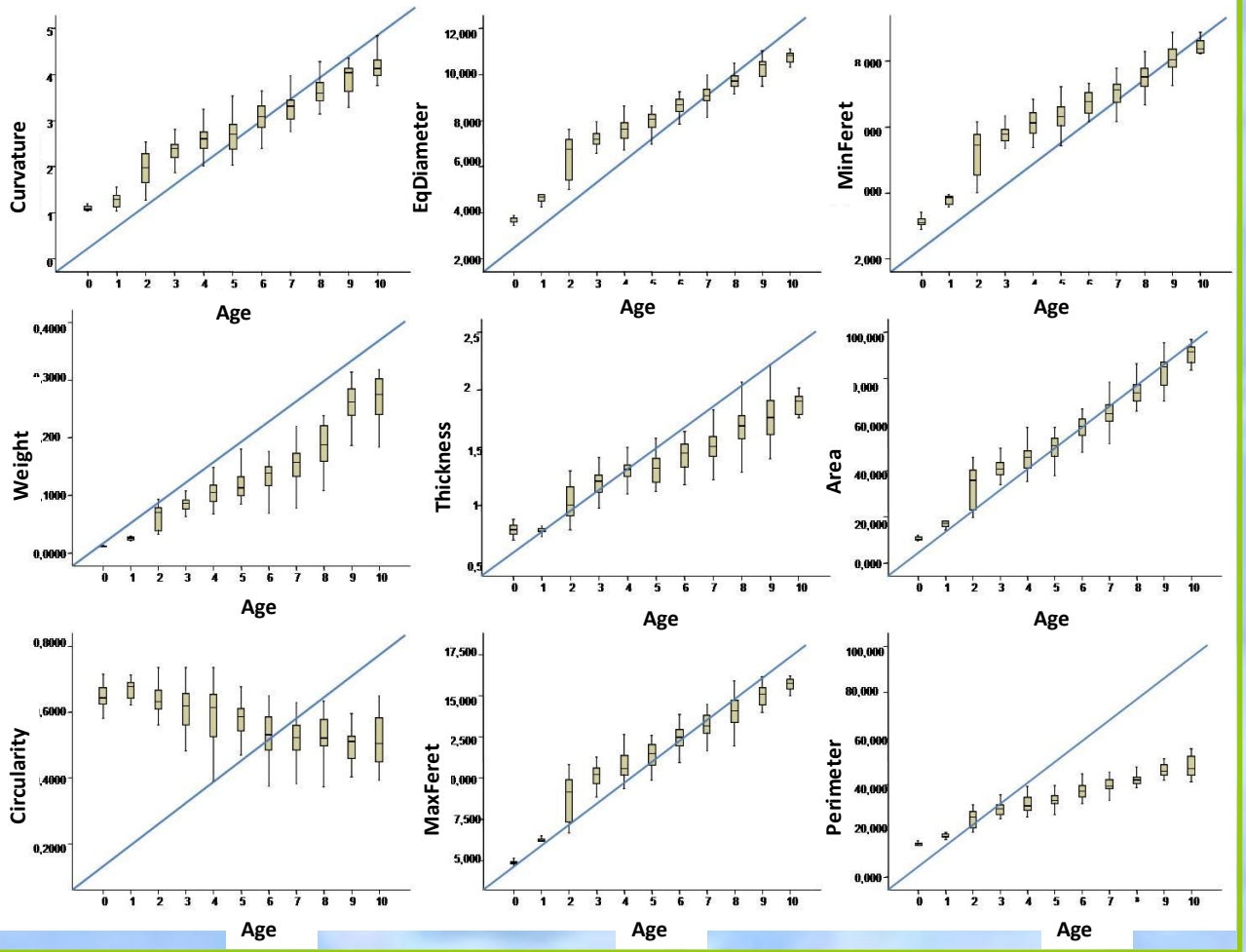
The age estimate from the reading of growth rings with binocular lens is complex, requires a lot of time-consuming and depends on the reader experience.

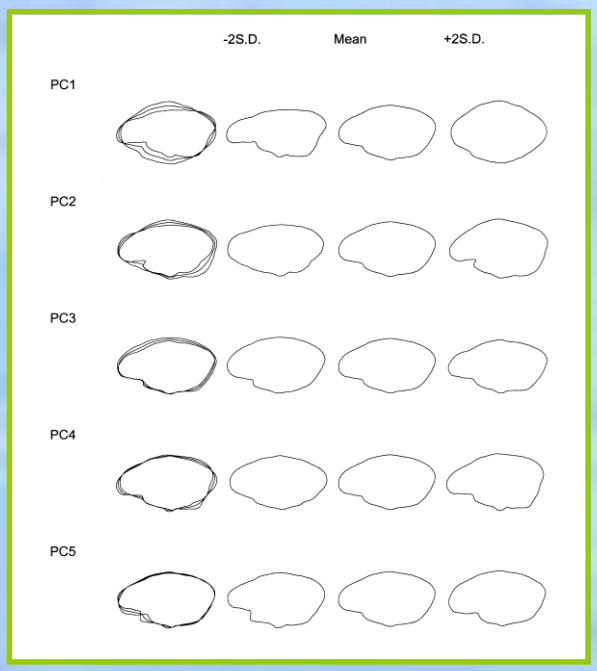
235 otoliths (from 3+ agreed readings) were used in morphometrics, but only 156 can be used in Discriminant Analysis (the first ages have not a normal distribution).

-Morphometrics variables taken in account are: weigth (precision scale), thickness and curvature (gauge) and others by image analysis as: Area, Maxferet, MinFeret, EqDiameter, Circularity. For digital image capture and its analysis has been used NIS-Elements AR 3.2 NIKON Software.

-Morphological variables were created transforming the 20 Fourier harmonics in Principal Components which could describe morphological variations.

OTOLITH SHAPE





RSB otoliths from the Strait of Gibraltar: Morphological variation by PCA from Fourier Analysis results.

Almost all the variables present an asymptotic increasing of the values with age (as VBGF). Circularity was the only exception. Classification system (regression function) using only one morphometric variable does not seem the most appropriate.

OTOLITH SHAPE

Age	Predicted belonging group						
	4	5	6	7	8	9	10
4	**66,7**	23,3	10,0	0,0	0,0	0,0	0,0
5	17,2	**69,0**	13,8	0,0	0,0	0,0	0,0
6	0,0	17,2	**51,7**	31,0	0,0	0,0	0,0
7	0,0	3,4	31,0	**44,8**	17,2	3,4	0,0
8	0,0	0,0	0,0	17,4	**65,2**	8,7	8,7
9	0,0	0,0	0,0	0,0	8,3	**75,0**	16,7
10	0,0	0,0	0,0	0,0	0,0	20,0	**80,0**

The Discriminant Analysis combining morphometric and morphological variables obtained the highest percentage of reclassification success (85.3%).

Changes in the otolith shape could be related with the growth rate, so that might strongly influenced by environmental component. Therefore, future work should be done including the analysis of such influence through interannual variations.

FUTURE CHALLENGES

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Further work needed:

PGCCDBS recommend a small scale otolith exchange between the two Research Institutes that are currently ageing this species (DOP-Azores, Portugal and IEO- Cadiz, Spain).

WKAMDEEP – Workshop on Age Estimation Methods of Deep Water Species (Esporles, Spain: 22 – 26 October 2012).