ICCAT GBYP INTERNATIONAL WORKSHO
ON ATLANTIC BLUEFIN TUNA GROWTH
SANTANDER 4-8 FEBRUARY 201

TALLER INTERNACIONAL ICCAT GBYP SOBRE E
CRECIMIENTO DEL ATÚN ROJO DEL ATLÁNTIC
SANTANDER 4-8 FEBRERO 2019

Analysis of the age-length ICCAT database for Atlantic bluefin tuna.

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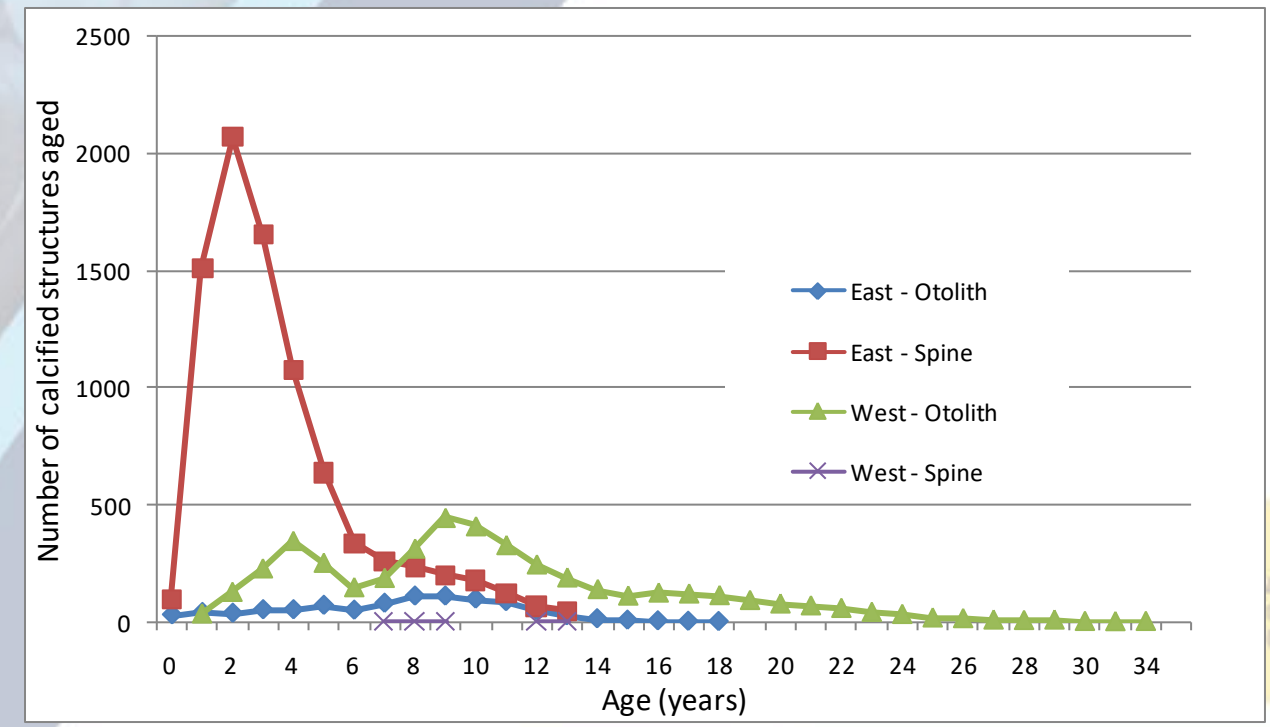
Age-length ICCAT database for Atlantic bluefin tuna

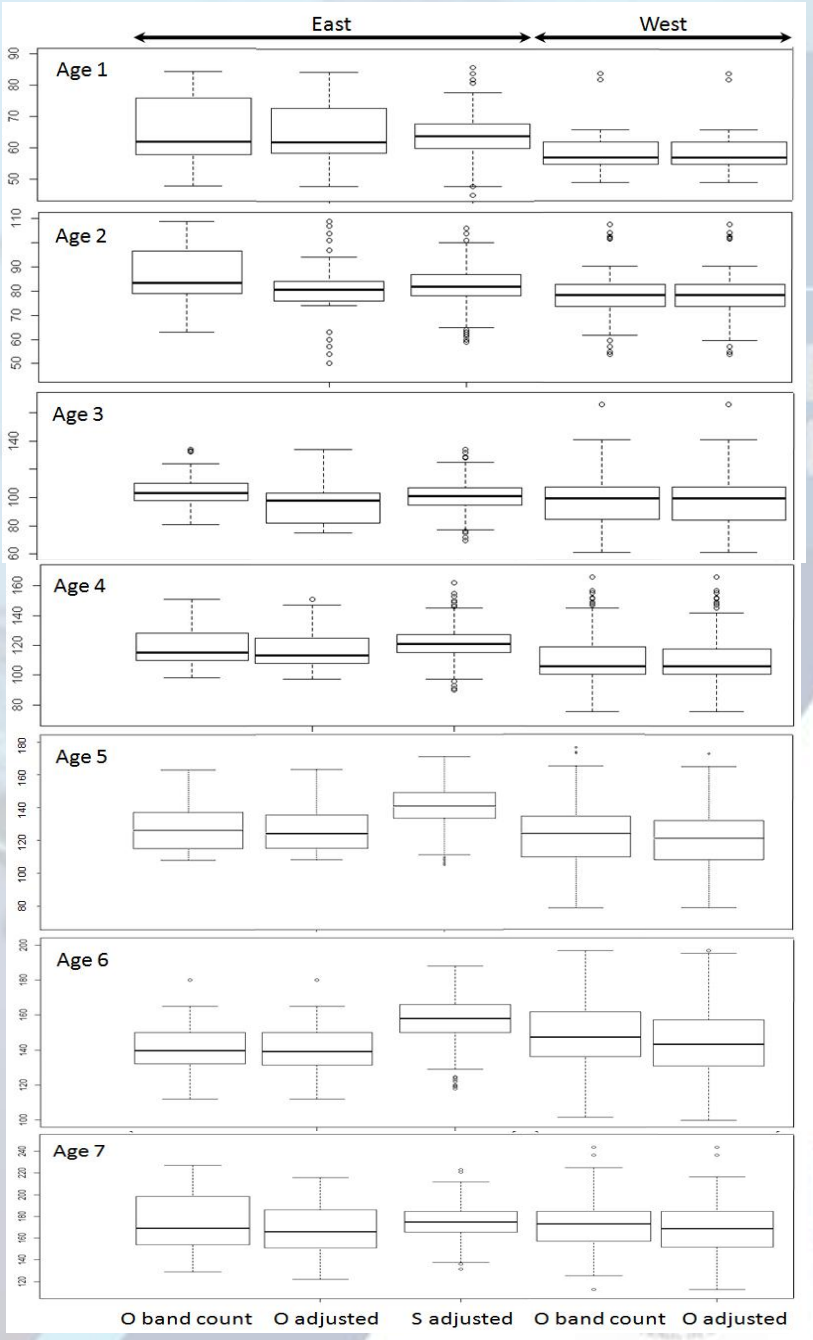
Age data comprised nearly 14000 records, of which 70% are from the Eastern stock.

In the western data practically all the readings come from otoliths, while in the East, they are formed by otoliths and first dorsal fin radius (spine) in a proportion of 10% and 90%, respectively.

For the analysis, all records had the same type of length measurement (straight fork length, SFL).

Eastern age-length data contains predominantly small fish, while western data contains predominantly large fish and better covers the age range over the last decade.





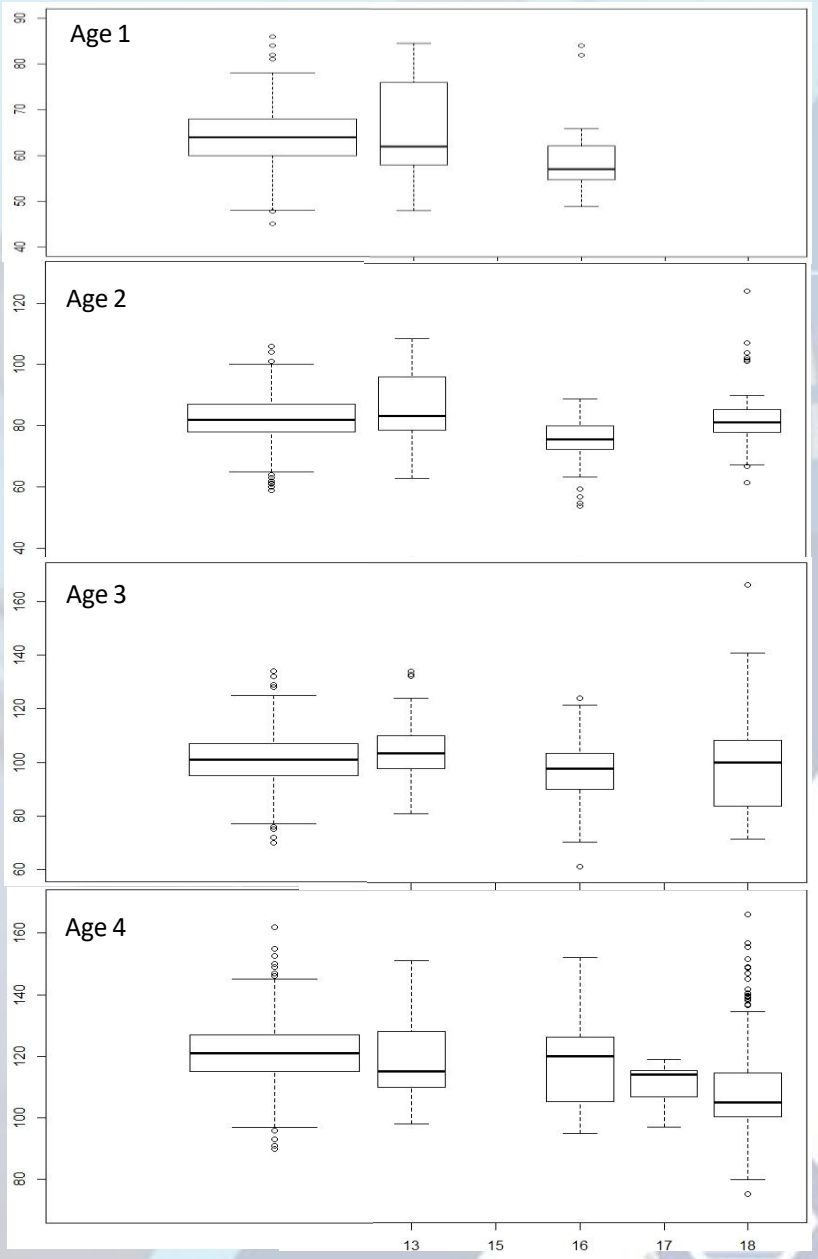
Factors: type of structure (otolith vs. spine), management area (East vs. West), age assignment criteria (bands counting vs. adjusted age, both data were only available for otoliths),

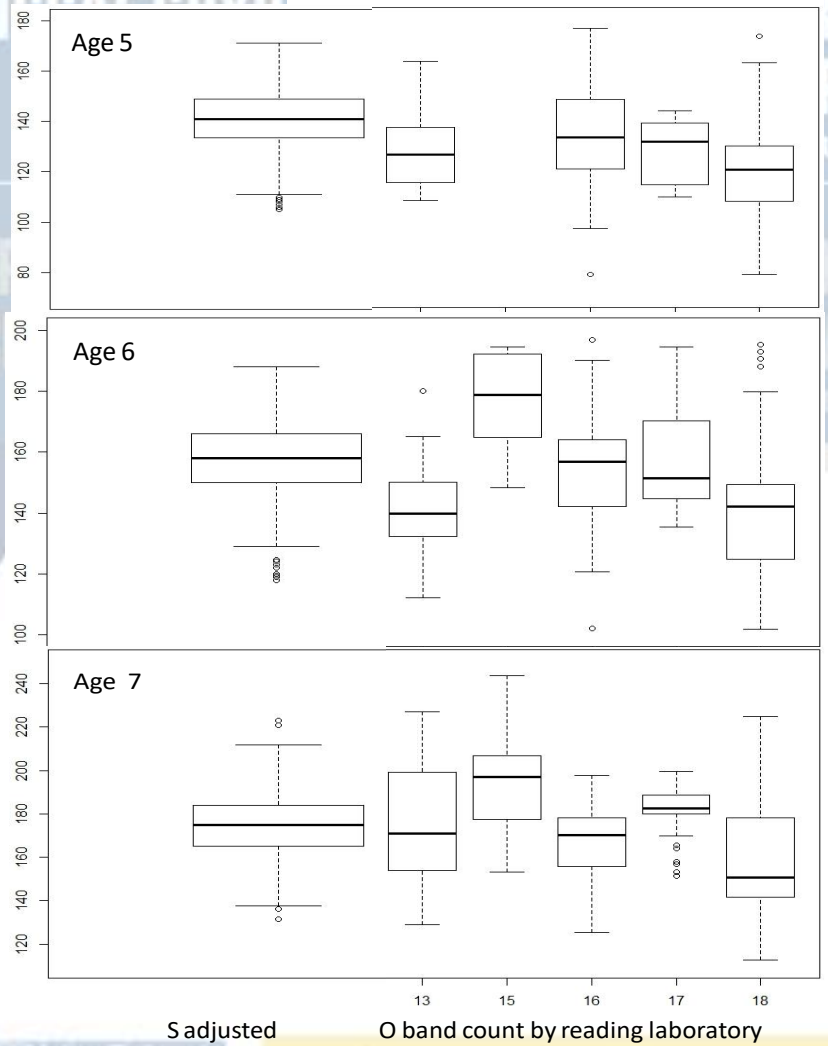
	Eastern stock						Western stock		
	Otolith			Spine			Otolith		
Age	Num.	Aver. mo	SD mo	Num.	Aver. mo	SD mo	Num.	Aver. mo	SD mo
1	41	7.7	1.2	1510	8.5	1.4	35	7.7	0.8
2	38	7.1	1.5	2069	7.9	1.4	128	7.4	1.0
3	53	6.5	1.8	1655	7.9	1.5	229	7.0	1.0
4	53	7.4	2.1	1078	7.8	1.3	347	7.1	1.0
5	72	8.1	1.9	641	7.5	1.4	253	7.2	1.2
6	51	7.9	2.0	338	7.4	1.7	148	6.8	2.3
7	81	7.9	2.0	264	7.4	1.9	188	6.5	2.8

Number of samples (Num), average month (Aver. mo) and standard deviation month (SD mo) of sampling, separated by age class and management area.

Box plot of straight fork length by age class and management area obtained from calcified structures interpretation. Otolith band counting (O band count), otolith age adjusted (O adjusted) and spine age adjusted (S adjusted).

Factors: type of structure and reading laboratory





Box plot of straight fork length by age class (1 to 7) and reading laboratory obtained from calcified structures interpretation. Spine age adjusted (S adjusted) and otolith band counting (O band count). Numbers on the X axis represent laboratories.

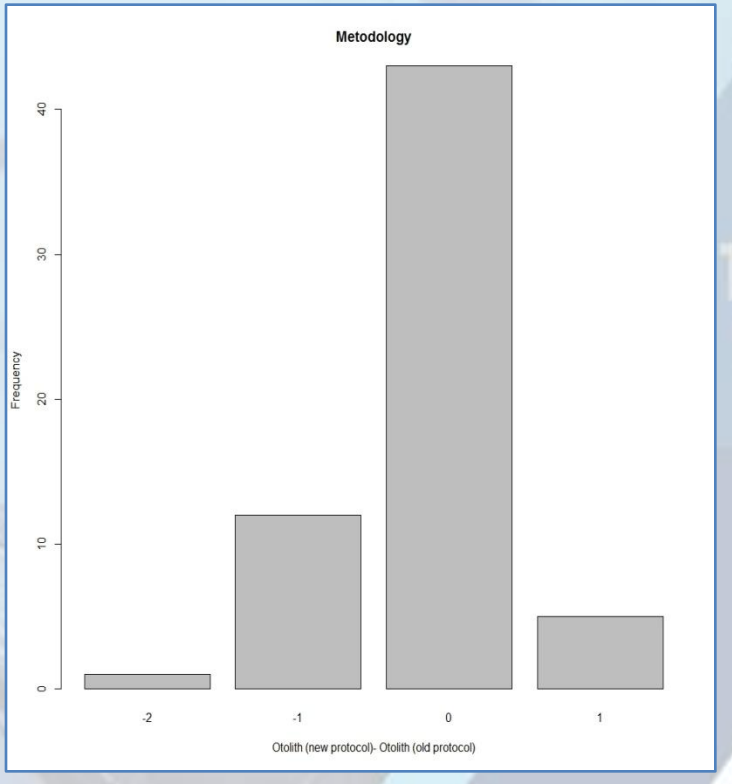
Factors: type of structure and reading laboratory

	Reading laboratory								
	13						15		
	Otolith			Spine			Otolith		
Age	Num.	Aver. mo	SD mo	Num.	Aver. mo	SD mo	Num.	Aver. mo	SD mo
1	41	7.7	1.2	1510	8.5	1.4			
2	38	7.1	1.5	2069	7.9	1.4			
3	53	6.5	1.8	1655	7.9	1.5			
4	53	7.4	2.1	1078	7.8	1.3			
5	72	8.1	1.9	641	7.5	1.4			
6	51	7.9	2.0	338	7.4	1.7	6	9.2	0.8
7	83	7.9	2.0	266	7.4	1.9	34	9.0	0.7

	16			17			18		
	Otolith			Otolith			Otolith		
Age	Num.	Aver. mo	SD mo	Num.	Aver. mo	SD mo	Num.	Aver. mo	SD mo
1	35	7.7	0.8						
2	84	7.6	1.0				44	7.0	1.0
3	48	7.2	0.9				181	6.9	1.0
4	44	6.9	0.8	9	8.6	1.2	294	7.1	1.0
5	40	6.4	1.5	13	8.6	1.0	200	7.2	1.0
6	47	4.8	2.6	15	8.3	1.0	80	7.4	1.5
7	77	4.2	2.6	40	7.9	1.2	35	7.6	2.1

Number of samples (Num), average month (Aver. mo) and standard deviation month (SD mo) of sampling, separated by age class and reading laboratory.

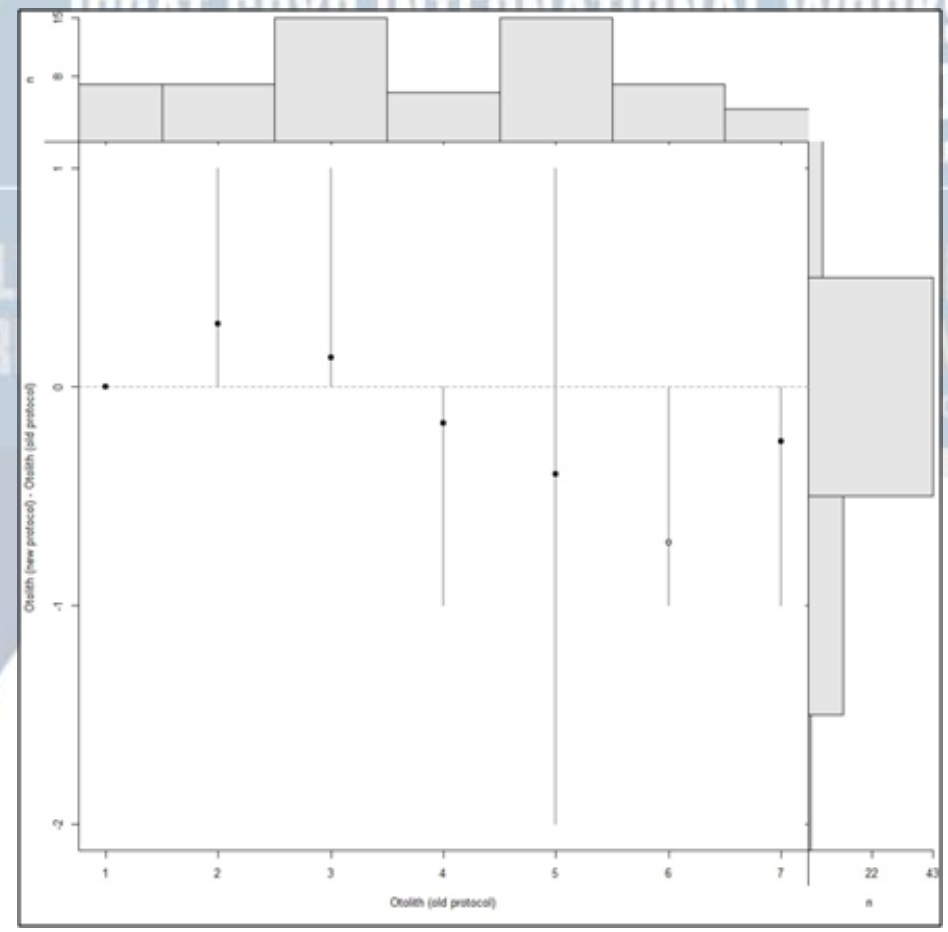
Factor: reading protocol (old vs. reviewed)



Histogram of differences between reading protocols: 2014 (old) and 2019 (new).

	Reading prot. compar.		
	Otolith		
Age	Num.	Aver. mo	SD mo
1	7	7.1	0.4
2	5	6.8	1.6
3	17	6.6	1.9
4	12	6.3	2.9
5	13	7.1	1.8
6	4	7.5	2.4
7	3	6.3	0.6

Number of samples (Num), average month (Aver. mo) and standard deviation month (SD mo) of sampling used for the ageing protocol comparison.



Age bias graph (bottom) between reading protocols: 2014 (old) and 2019 (new).

Findings showed that the there are two possible causes for age overestimation in the otolith age-length data:

The current age adjustment criterion and

A reading bias in age estimations from some laboratories. This last bias seems caused by the false growth bands that appear in the otoliths of juvenile bluefin tuna.