Age Estimation of Silver Roughy, *Hoplostethus mediterraneus* (Pisces; Thachichthyidae) from Central Mediterranean Sea

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Sustainable fisheries depends upon accurate population assessments. Reliable ages are important for stock assessments. Estimated age ranges often change with different otolith preparation methods. In silver roughy (*Hoplostethus mediterraneus*) a critical evaluation of age determination methods has not been undertaken. Therefore, we examined three different otolith preparation methods in silver roughy. Our estimated ages were different depending upon the otolith preparation method and growth zone interpretation.

Materials and Methods

- 76 otoliths were collected from the central Mediterranean Sea.
- Whole otoliths read on the distal surface at 12X (Figure 1).
- Otolith transverse thin sections read at 25X (Figure 2).
- Otolith transverse thin sections read at 40X (Figure 3).

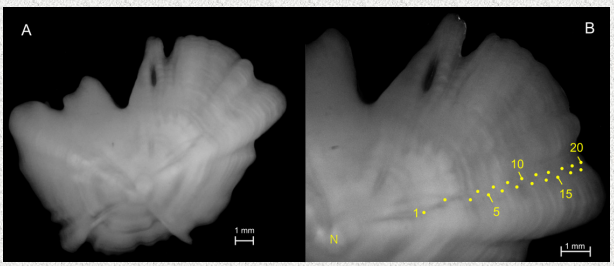

Fig. 1 (A) Whole otolith (8X), and (B) (12X) showing a total count of 20 presumed annual increments. Fish total length= 260 mm.

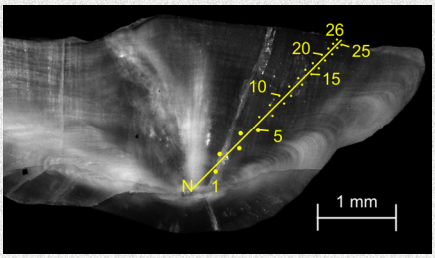

Fig. 2 Otolith traverse thin section (25X) showing a total count of 26 presumed annual increments. Fish total length= 260 mm.

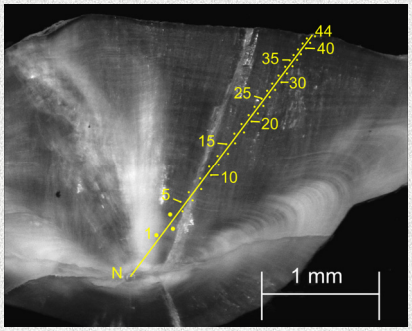

Fig. 3 Otolith traverse thin section (40X) showing a total count of 44 presumed annual increments. Fish total length= 260 mm.

Results

- Low precision among methods (Table 1).
- Whole otolith surfaces generated the youngest age estimates (Tables 2 and 3).
- Thin sections generated the oldest ages (Tables 2 and 3).
- Higher magnification of thin sections generated older estimated ages (Table 4).

Table 1. Precision statistics and age ranges (years) of surface ages at 12X versus thin section ages at 25X and 40X.

Thin section Magnification	25X	40X
APE	11.48%	20.72%
CV	25.3%	44.0%
Agreement	1.3%	0.0%
Mean age (sd)	11.44 (4.25)	14.04 (5.71)
Minimum age	3	2
Maximum age	26	44

Table 2. Comparisons of age estimates from surface 12X and thin section 25X.

	Surface 12X (years)																				Total
Thin section 25X (years)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
1																					
2																					
3																					
4																					
5																					
6			1	1																	2
7					1	1															2
8				1	3	4															8
9				1	4	3	2	2	1												13
10						1	1	1			1										4
11								2		2		1									5
12							3	1		1											6
13						1	2		1	2	2										8
14						1		1			1				1						4
15								1	1												2
16									1		4			2							7
17										1				1	1						3
18														1							1
19												1									1
20											1					1			1		3
21																1					1
22																					
23														1			2				3
24														1			1				2
25																					
26																			1		1
Total			1	3	8	11	6	10	5	5	10	2		6	2	2	3		1	1	76

Table 3. Comparisons of age estimates from surface 12X and thin section 40X.

23																					
24										1							1				2
25									1		1										2
26								1			1										2
27							1	1								1					3
28								1			2										3
29																					
30											1										1
31																1					1
32																					0
33															1						1
34																1					1
35								1													1
36																					
37																					
38																					
39																1					1
40																					
41																					
42																					
43																					
44																			1		1
Total		1	3	8	11	6	10	5	5	10	2		6	2	2	3		1	1		76

Table 4. Comparisons of age estimates from thin section 25X and thin section 40X.

23																					
24										1		1									2
25											1	1									2
26									1						1						2
27									2					1							3
28									1	1		1									3
29																					
30														1							1
31															1						1
32																					
33										1											1
34												1									1
35									1												1
36																					
37																					
38																					
39														1							1
40																					
41																					
42																					
43																					
44																		1		1	
Total	2	2	8	13	4	5	6	8	3	2	8	3	1	1	3	1		3	2	1	76

Conclusions

- The estimated age was dependant on the age reading method and the magnification of the otolith thin section.
- The older age ranges from the magnified thin sections demonstrated the need for age validation to determine which method is the best.
- Future work on silver roughy will focus on radiometric age validation with the disequilibria of Pb-210/Ra-226.

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