5th International Conference on Environmental Design and Health, ICED2024
Sustainability / Pollution / Energy / Cities-Buildings / Transportation / Erosion / Climate Change / Policy / Social Acceptance / Health Issues
18-20 October 2024, Athens, Greece

OTOLITH BASED GROWTH AND EXPLOITATION OF *BOOPS BOOPS* IN THE CENTRAL ALGERIA

S. Amira*, Z. Alioua, K. Harchouche
*Fisheries Laboratory, Faculty of Biological Sciences, University of Sciences and Technology Houari Boumediene (USTHB), BP. 32, El-Alia Bab-Ezzouar 16111, Algiers, Algeria.
(*amira.soumias@gmail.com*)

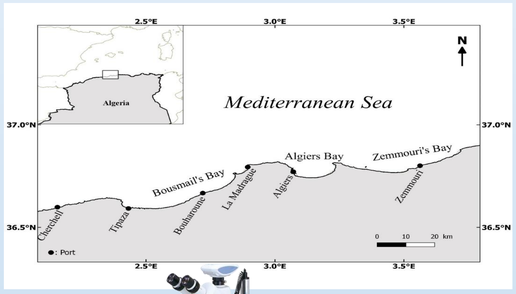
Introduction

Determining fish age is fundamental in growth studies which is useful for analysing population dynamics. Establishing appropriate aging procedures and growth models are important steps for estimating reliable growth curves and for developing proper stock assessments measures (Chang et al. 2022)
Sparidea species are valuable fisheries resource of semi-pelagic ecosystems with high commercial value. Amongst all species of this family, *Boops boops* is one of the main target fish in the commercial catches in the Algerian coast targeted by artisanal fisheries.
The aim of this study was to estimate age, growth and mortalities of *Boops boops* in the central Algerian coast

Methodology

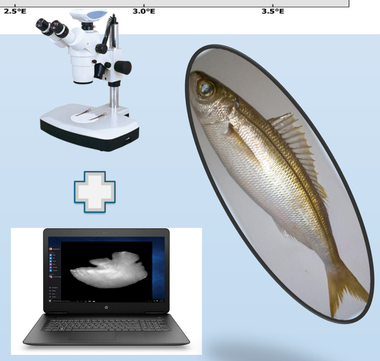
Study area

A total of 2378 individuals of *B. boops* were monthly sampled between December 2013 and June 2015, from commercial fisheries on the central Algerian coast . from Ténès (36°34'44" N; 1°18'16" E) in the west to Dellys (36°54'48" N; 3°54'51" E) in the east including three bays (e.g. Zemmouri, Algiers, Bou-Ismail)



Analysis of age structures

Assigning an age to a fish involves the following elements:
•The fish's birth date (after establishing the spawning period).
•The capture date.
•The number of growth rings (broad and narrow zones).
•The onset of growth slowdown during unfavorable periods (set on January 1st).
The age is given in years, knowing that the first broad and opaque growth zone forms in six months



Growth parameters and linear growth

In the present work, different methods are used to determine the growth parameters from size structures.

The Powell-Wetherall method for the determination of L∞ and Z/K (Mortality/k)

Application of the Beverton and Holt equation (1956)

$$Z = K\left(\frac{(L_\infty - Lm)}{(Lm - L')}\right)$$

Lm: mean length of fish of length L' and above.
L' corresponds to the length beyond which all fish are fully exploited.

The Pauly and Munro method for estimating K

$$\mathrm{Log}_{10} K = Ø'_m - 2\mathrm{Log}_{10} L\infty \qquad K = 10^{Ø'm - 2\mathrm{Log}_{10} L\infty}$$

The Pauly equation for estimating the t0

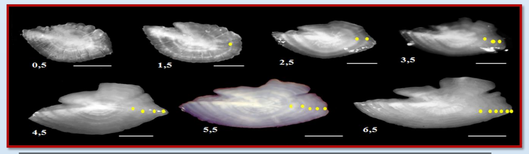
$$\mathrm{Log}_{10}(-t_0) = -0{,}3922 - 0{,}2752\ \mathrm{Log}_{10} L_\infty - 1{,}038\ \mathrm{Log}_{10} K$$

Results & discussion

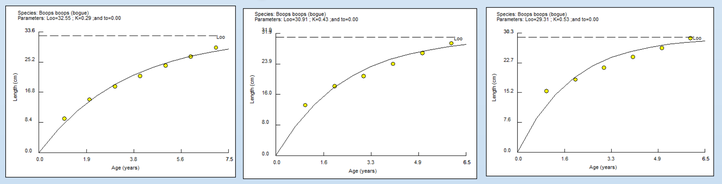
Otolith analysis and age validation

The age-length key obtained by direct reading of otoliths shows six age groups for both sexes separately and seven for the entire population.

	Females						Males						Total population						
LT-Age	1,5	2,5	3,5	4,5	5,5	6,5	1,5	2,5	3,5	4,5	5,5	6,5	0,5	1,5	2,5	3,5	4,5	5,5	6,5
LT moy (cm)	13,2	18,2	20,8	24,0	26,8	29,4	15,6	18,5	21,5	24,3	26,5	29,0	9,5	14,8	18,4	21,3	24,2	26,8	29,3
Growth rate	5,0	2,7	3,2	2,8	2,6		2,9	2,9	2,9	2,2	2,5		5,3	3,6	2,9	2,9	2,6	2,5	



Détermination of Growth parameters

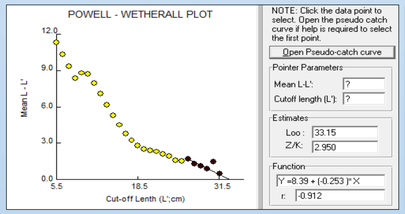


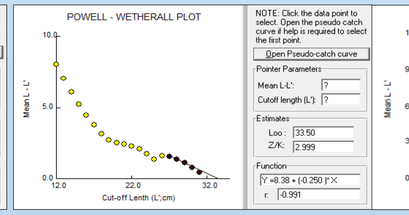
Parameters / Gender	L_∞ (cm)	K (years^{-1})	t_0 (year) (Pauly, 1980)
Total	32,55	0,29	-0,56
Females	30,91	0,43	-0,41
Males	29,31	0,53	-0,31

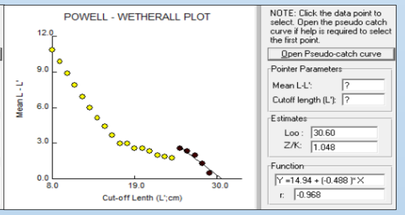
Equations of von Bertalanffy

Total: $L_t = 32{,}55\ (1-e^{-0{,}29(t+0{,}56)})$
Females: $L_t = 30{,}91\ (1-e^{-0{,}43(t+0{,}41)})$
Males: $L_t = 29{,}31\ (1-e^{-0{,}53(t+0{,}31)})$

Analysis of size structures



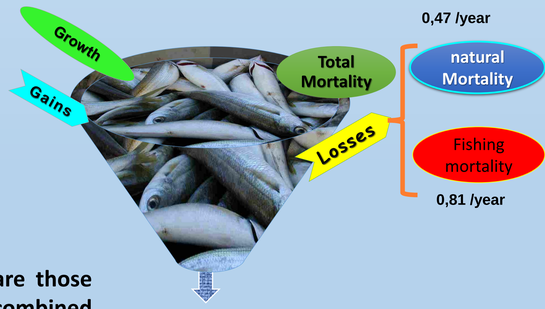




Parameters / Gender	L_∞ (cm)	K (years^{-1})	t_0 (years)
Total	33,15	0,17	-0,95
Females	33,5	0,17	-0,97
Males	30,6	0,20	-0,82

Equations of von Bertalanffy

Total: $L_t = 33{,}15\ (1-e^{-0{,}17(t+0{,}95)})$
Females: $L_t = 33{,}50\ (1-e^{-0{,}17(t+0{,}97)})$
Males: $L_t = 30{,}60\ (1-e^{-0{,}20(t+0{,}82)})$



The equations chosen for estimating the exploitation *of B. boops* are those obtained from the analysis of age structures for separate sexes and combined sexes, which provide sizes even closer to those observed.

Stock exploitable E = 0,63

Conclusion

63% of fish stocks are exploited due to strong overfishing and anthropogenic pressures that affect this species, leading to the decline of its stock if no management strategies are implemented. However, the application of rational management measures to avoid a possible collapse is necessary on the central Algerian coast to ensure available stocks in the future