

## MORPHOLOGICAL CHARACTERISTICS OF *GAIDROPSARUS MEDITERRANEUS* (LINNAEUS, 1758) FROM THE ROMANIAN BLACK SEA COAST IN THE YEAR 2023

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### ABSTRACT

The aim of this study is to provide an overview of the *Gaidropsarus mediterraneus* (Linnaeus, 1758) species growth pattern from the Romanian Black Sea Coast, in the year 2023. This has been accomplished by studying the length-weight relationship, an important parameter, which helps to know the growth pattern of fish populations, Fulton's condition factor ( $k_c$ ) (useful index for monitoring feeding intensity) from 180 shore rockling individuals caught by pots. Average lengths and weights were  $24.4 \pm 2.6$  cm and  $101.46 \pm 38.11$  g, respectively, the minimum and maximum values were 18.3 and 33.8 cm, 36 and 319 g in weight. The value of exponent  $b$  in the equation is 3.197, indicating that the increasing weight is allometrically positive and mean value of the Fulton was  $0.68 \pm 0.08$ , with the minimum and maximum values of 0.47 to 0.90. The obtained results can have useful effects on the stock management of this fish species.

**Keywords:** shore rockling, length-weight relationship, Fulton's condition factor, stock management

### INTRODUCTION

Considering the extremely low availability of information on the species *Gaidropsarus mediterraneus* – the shore rockling, in the specialized literature at the level of the Black Sea basin, we believe that it is of great interest to present the information resulting from this study.

In Romania, the species was described by Bănărescu, 1964, as a benthic species that inhabits the rocky areas and those covered by vegetation from the shore to depths of 40 m.

The body shape is elongated, anteriorly rounded, posteriorly laterally flattened and covered with very small cycloid scales, except for the lips and tip of the snout (Fig. 1). On the chin it has a well-developed whisker, the nostrils show a tentacle each, the complete lateral line, barely visible, describes a bend near the anus. It has a yellow-brown back, chestnut or even reddish-brown, depending on the habitat; the sides and abdomen lighter, yellowish or even white, spotted all over, along the lateral line can be observed about 30 whitish spots (Bănărescu, 1964; Radu *et al.*, 2008; Niță V. *et al.* 2022).

The shore rockling is distributed in the Eastern part of Atlantic from Scandinavia to the Strait of Gibraltar (Svetovidov, 1986), in the Mediterranean Sea, the Adriatic Sea, in the Aegean Sea and the Black Sea (Svetovidov, 1986; Francesco *et al.*, 2014; Capapé *et al.* 2021).



Fig. 1. *Gaidropsarus mediterraneus* – the shore rockling (original photo, NIMRD 2023)

Despite its wide distribution in the Black Sea, knowledge about this species is still scarce because it is considered as a by-catch species by fishermen, probably due to its low economic interest.

The assessment of a fish species main population parameters is often based on the characteristics of each individual in that population. Typical data include their length and weight (Anderson & Neumann, 1996). These parameters summarized with statistics can lead to an estimation of the population knowledge (Froese, 2006). By combining these statistics, we can provide estimates of growth rates (Isely & Grabowski, 2007). In addition, length and weight data can show us the condition of fish in a population (Pope & Kruse, 2007).

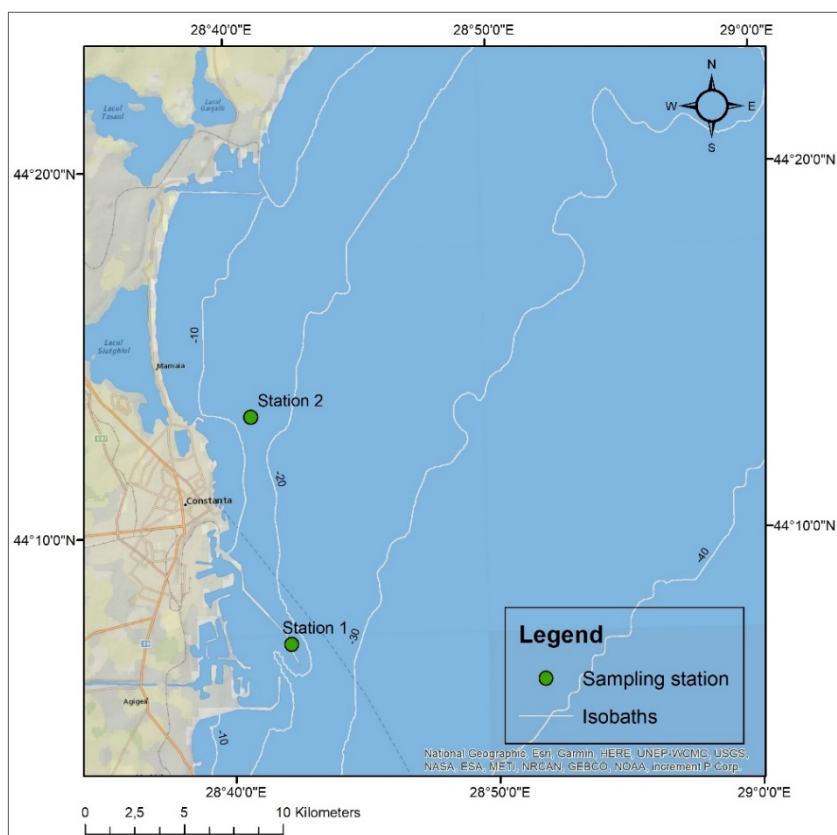
Stock assessment is an important component of fisheries management, and the wise use of appropriate indices will be an important component of fish population assessments. This leads to an enrichment of the knowledge of the biology of the species, which can be used in making the best decisions regarding biodiversity management.

## MATERIALS AND METHODS

The biological material was collected during research surveys organized along the Black Sea coast, in the year 2023 in winter (February) and autumn (November) seasons. This biological material required for the study originates from the goby cage fishery, the present species representing a by catch species in this type of fishery. For sampling, we used 70 pots (models sold in specialized stores) with the following constructive technical characteristics: total length 550 mm, diameter 250 mm and side of the eye 10 mm (Tiganov *et al.*, 2023). These were installed by NIMRD researchers in 2 different areas as shown in Figure 2. The first one is close to the north dike of the Constanta harbour (44°07'02.48"N/ 28°42'11.63"E) and the second one is in Mamaia Bay, close to the Pescarie area (44°13'16.02"N/ 28 40°48.80"E).

Since the installation of the pots in the sea is done in a longline system, two lavas of 35 cages equipped with anchors at the ends were made (Fig. 3).

Because goby pots are a baited trap type of gear, goby penetration into the gear was encouraged by adding chicken necks or backs prior to launching the gear into the water (Fig. 3).



**Fig. 2.** Sampling stations represented on the map (Dragoș Niculescu, NIMRD 2024)



**Fig. 3.** Cages for data sampling (original photos, NIMRD 2023)

To study the biological parameters, the methodology and techniques we used for collection, verification, processing and analysis are generally accepted for the Black Sea and in accordance with international methodology (Zaharia *et al.*, 2013). Biometric measurements were taken for total length (TL), was measured to the nearest 0.1 cm, being defined as the distance from the tip of the snout to the tip of the caudal lobes, and body weight (Gt) to the nearest 0.1 g. The instruments used were the ichthyometer

to measure the length, and an electronic scale was used to determine the weight (Fig. 4 and Fig. 5).



**Fig 4.** Measurement of the total length of a sample of shore rockling in laboratory (original photo, NIMRD 2023)



**Fig 5.** Measurement of the total weight of a sample of shore rockling in laboratory (original photo, NIMRD 2023)

After taking biometric measurements and weighing the individuals, the Fulton index (K) was calculated (Beverton, Holt, 1957). It is calculated according to the following formula:

$$K = (g/l^3) \times 100$$

where:

g = weight in grams

l = standard length in cm

All the data were statistically analysed in order to identify the relevant information which could provide an overview of the growth parameters for shore rockling species.

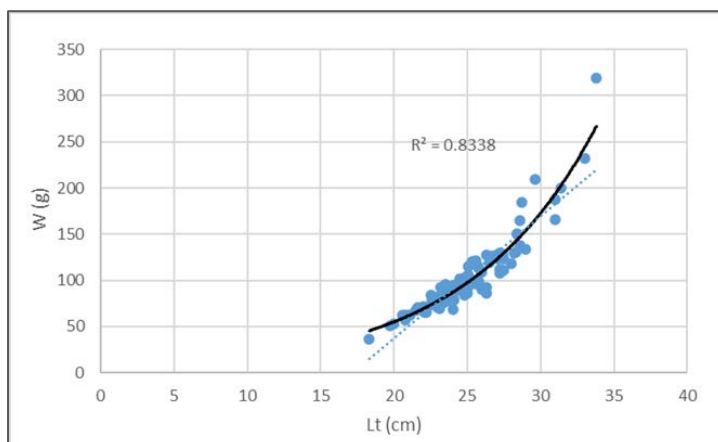
## RESULTS AND DISCUSSION

Analysing the obtained data resulted that average lengths and weights were  $24.4 \pm 2.6$  cm and  $101.46 \pm 38.11$  g, respectively, the minimum and maximum values were 18.3 and 33.8 cm, 36 and 319 g in weight.

The length-weight relationship is used to determine the maintenance status of the fish and the type of growth (isometric or allometric). A coefficient  $b = 3$  signifies

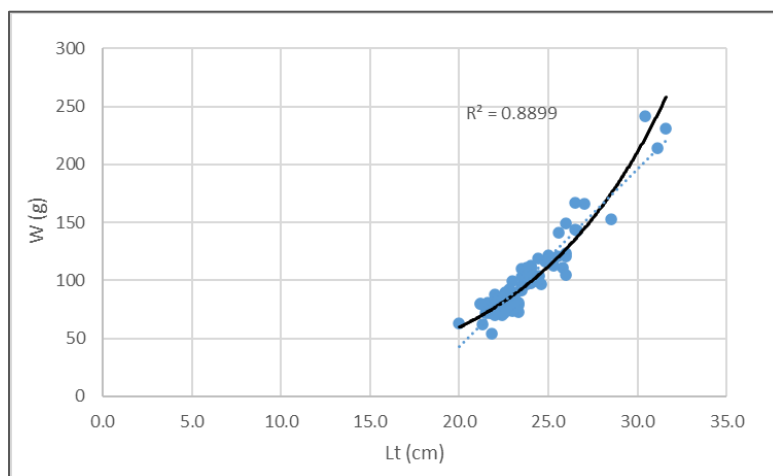
linear isometric growth of the fish (length and weight increase proportionally) (Ricker, 1975).

Regarding the length-weight relationship obtained by analysing the data from the first station was observed a linear isometric growth (Fig. 6).



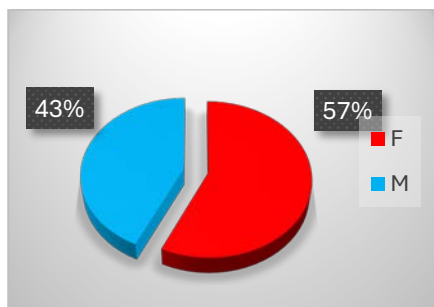
**Fig. 6.** Length-weight correlation for the species analysed from station 1

And, with small differences, the obtained information was similar for both stations (Fig. 7). However, applying the significance test were obtained different  $p$  values:  $p = 0.003$  for length and the  $p = 0.721$  for weight. Most probably because the individuals collected from the Station 1 were in reproduction season.

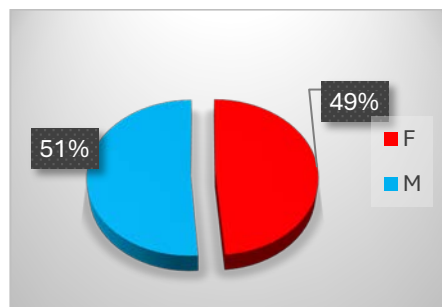


**Fig. 7.** Length-weight correlation for the species analysed from station 2

In relation to the gender distribution of the analysed individuals, females predominated in the first station and males in the second one, but the differences were very small (Fig. 8 and Fig. 9).

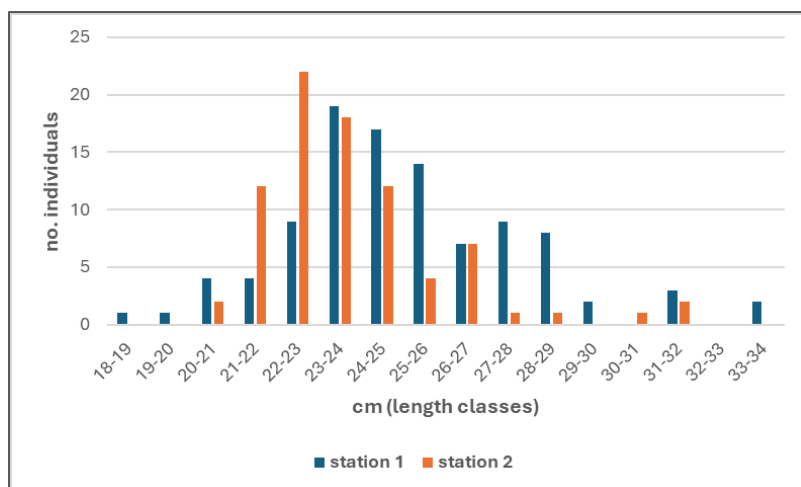


**Fig. 8.** Sex ratio of individuals from station 1



**Fig. 9.** Sex ratio of individuals from station 2

The common specimens identified in the Black Sea basin are over 20 cm long (Radu *et al.*, 2008; Van *et al.*, 2019). In this study the predominated individuals were between 22 – 26 cm (Fig. 10).



**Fig. 10.** The analysed individuals distributed on length classes

Regarding the growth parameters  $a$  and  $b$ , their values may indicate variation due to sex, season, year, location, length range and affected by gonad development and factors such as nutritional condition, temperature and salinity (Froese, 2006).

The data from the present study are in accordance with those identified in other Black Sea countries (Table 1).

**Table 1.** Growth parameters values among Black Sea countries

a	b	r <sup>2</sup>	Region	References
0.0068	3.010	0.99	Marmara Sea (Tr)	Keskin et al., 2010
0.0030	3.012	0.79	Marmara Sea (Tr)	Deniz et al., 2011
0.0012	3.616	-	Black Sea (Tr)	Kasapoglu et al., 2013
0.0029	3.2851	0.98	S-E Black Sea (Tr)	Van et al., 2019
0.0013	3.5400	0.97	E Black Sea (Tr)	Onay & Dalgic, 2021
0.0061	3.0329	0.97	S Black Sea (Tr)	Dagtekin et al., 2022
0.0299	3.1970	0.86	Black Sea (Ro)	present study

The value of exponent  $b$  in the equation is 3.1970, indicating that the increasing weight is allometrically positive. The mean value of the Fulton was  $0.68 \pm 0.08$ , with the minimum and maximum values of 0.47 to 0.90, meaning that the individuals feed in optimal parameters (Beverton, Holt, 1957). The obtained results can have useful effects on the stock management of this fish species. Only in concern of  $r^2$  value in this study was a small decrease compared to other results obtained in the same area. The closer the value of  $r^2$  is to 1, the closer the correlation between the analysed values is (Fowler *et al.*, 1998).

## CONCLUSIONS

Analysing the statistics it was observed that the common lengths and weights for the shore rockling individuals were between  $24.4 \pm 2.6$  cm and  $101.46 \pm 38.11$  g. Also, the predominated individuals were between 22 – 26 cm, values which are comparable with others reported from Black Sea basin countries.

Regarding the length-weight relationship obtained from the data analysis at each station, a linear isometric growth was observed. Additionally, the growth parameters  $a$  and  $b$  from the current study align with those reported by other Black Sea countries, indicating favourable environmental conditions for the development of this species in the area analysed.

Considering the lack of data on the species *Gaidropsarus mediterraneus* growth parameters available for the Romanian coastal area, this study is a first step in the development of new research directions concerning the sustainable fishery management for described species.

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