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SHORT COMMUNICATION

A new maximum size record of striped red mullet *Mullus surmuletus* Linnaeus, 1758 from the coast off Benghazi, Libya (Southern Mediterranean)

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ABSTRACT

A specimen of *Mullus surmuletus* with 33.6 cm in total length and 398.3 g in total weight was captured with trammel nets along with other Striped red mullet fish by fisherman off the coast of Benghazi, Libya (Southern Mediterranean) on November 14, 2022. It had the longest length and heaviest weight ever recorded for a Striped red mullet in the Southern Mediterranean off the coast of Libya.

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Introduction

Libya is regarded as one of the least explored regions of the Mediterranean (Coll et al., 2010; Elbaraasi et al., 2019); its ichthyofauna is poorly known (Quignard & Tomasini, 2000; Elbaraasi et al., 2022); and information on length and weight studies on fish is very limited and scarcely done. Striped red mullet *Mullus surmuletus* (Linnaeus, 1758) is a commercially important Mullidae species. The species is found Northern part of West Africa from Gibraltar to Dakar. Along the coast of Western Europe up to the English Channel; also, in the Mediterranean and Black Seas. (Froese & Pauly, 2023). It can grow up to 40 cm tall and live for up to ten years but the common size range from 10 – 25 cm. It occurs on rough grounds but also found over sand and soft bottoms at depths less than 100 m, usually from 5-60 m. Feeds predominantly on small bottom-living invertebrates such as crustaceans, worms, mollusks (Froese & Pauly, 2023).

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The body *M. surmuletus* is slightly compressed. A pair of barbels under the chin that are longer than the pectoral fins; an opercle without a spine; a less steep snout; small villiform teeth in the lower jaw; the upper jaw is toothless (see remarks); teeth on the roof of the mouth (vomer and palatines). The first minute has 7-8 spines on the dorsal fin; the second minute has I + 8 soft rays and 33-37 scales on the lateral line. Color is reddish, with a darker red longitudinal stripe from the eye to the caudal fin and three yellow-brown lines on the lower sides; first dorsal fin has dark markings (Ben-Tuvia, 1990; Froese & Pauly, 2023).

Length and weights of fishes are very important tool for fisheries science. Furthermore, biologists and ecologists need precise estimates of the maximum size of fish in a population because biological rates and ecological functions are size-dependent (Peters, 1983; Cengiz, 2020). For instance, the relationship between metabolic rate and body size is inverse, whereas the relationship between total food intake and body size is positive. The maximum size of a fish is proportional to its size at hatch, its size at sexual maturity, its maturity, and its longevity (Freedman & Noakes, 2002; van der Veer et al., 2003; Cengiz, 2020). Many fishery models, such as the von Bertlanffy and Gompertz growth models, rely heavily on maximum length or weight (Cengiz et al., 2019). The maximum length and weight of *M. surmuletus* for the coast off Benghazi, Libya, in the southern Mediterranean is presented in this study.

Material and Methods

A single specimen of *M. surmuletus* along with other fish of Striped red mullets was caught with trammel nets by a fisherman on November 14, 2022, off the coast of Benghazi, Libya (Figure 1). Immediately after capture, the fish were kept in ice and transferred to the Aquaculture and Fisheries Laboratory of the Department of Zoology, Faculty of Science, University of Benghazi (Libya). Upon arrival to the lab, fish was photographed, sexed, aged based on growth lines on scales of fish, and some of morphometric and meristic analyses were performed. As a result, the specimen was measured to the nearest cm and weighed to the nearest 0.1 g (see Table 1).

Results and Discussion

A single specimen of *M. surmuletus* with a total length of 33.6 cm and a weight of 398.3 g (Figure 2) was obtained off the coast of Benghazi, Libya. Table 1 also contains some of the specimen's morphometric and meristic data. According to the number of growth lines on the scales, the specimen was female and eight years old. *M. surmuletus* can grow to be 40 cm long and live for up to ten years, but the typical size range is 10 to 25 cm (Froese & Pauly, 2023). However, if a fish population in any ecosystem is overfished, its size will gradually decrease (Cengiz, 2020).

Table 1. Morphometric and meristic data of the large size *Mullus surmuletus* caught off coast of Benghazi (Libya).

Parameters	Value (cm)
Morphometric Measurements	
Total length	33.60
Forked length	28.00
Standard length	25.50
Head length	7.00
Predorsal length	9.60
Preanal length	17.90
Eye diameter	1.60
Length of first dorsal fin base	3.60
Length of second dorsal fin base	4.00
Length of pelvic fin	2.50
Length of pectoral fin	5.70
Weight (gr)	398.3
Meristic Counts	
First dorsal fin	8 spines
Second dorsal fin	I + 8 rays
Scales in lateral line	37

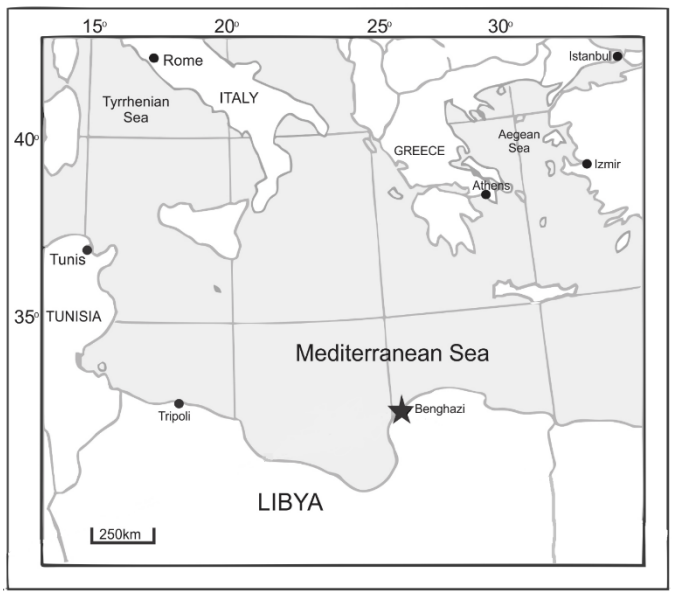

Figure 1. Map showing where the specimen of *Mullus surmuletus* was collected off coast of Benghazi (Libya).

Table 2. The maximum lengths for *Mullus surmuletus* recorded in different areas (TL, Total Length; FL, Fork Length).

Area	References	Length (cm)	Length Type
Aegean Sea, Greece	Papaconstantinou et al. (1993)	24.40	FL
Evvoikos, Greece	Petrakis & Stergiou (1995)	20.10	TL
Majorca Islands (N.W.Med.)	Reňones et al. (1995)	32.00	TL
East Adriatic, Croatia	Dulčić & Kraljević (1996)	30.90	TL
Balear Islands, Spain	Merella et al. (1997)	16.70	TL
Canary Islands	Pajuelo et al. (1997)	33.00	TL
Eastern Mediterranean	Labropoulou et al. (1997)	23.00	TL
Alexandria coasts, Egypt	Abdallah (2002)	20.80	TL
Aegean Sea	Moutopoulos & Stergiou (2002)	32.00	TL
Spain (East coasts)	Valle et al. (2003)	25.40	SL
Babadilli Bay (Mediterranean)	Cicek et al. (2006)	22.20	TL
East Adriatic, Croatia	Dulčić & Glamuzina (2006)	28.50	TL
Aegean Sea (North)	Karakulak et al. (2006)	29.90	TL
Izmir Bay	Ozaydın & Taskavak (2007)	21.90	FL
Izmir Bay	Ilhan et al. (2009)	22.60	TL
Benghazi, Libya	This study	33.60	TL

Consequently, individuals that are not subject to overfishing may attain this length. Growth may be affected by nutrient availability, feeding, light regime, oxygen, salinity, temperature, pollutants, current velocity, nutrient concentration, predator density, intra-specific social interactions, and genetics. (Helfman et al., 2009; Acarli et al., 2018). As a result of these findings, it is reasonable to conclude that regional differences in maximum length and weight are influenced by ecological factors and overfishing pressure (Cengiz et al., 2019).

Figure 2. Striped red mullet *Mullus surmuletus* (TL: 33.6 cm, W: 398.3 g) caught on 14 November 2022 off coast of Benghazi (Libya).

Furthermore, the maximum length of the species was previously reported as 33.00 cm (TL) in the Canary Islands (Pajuelo et al., 1997). Nevertheless, several maximum length reports have also been documented for different locations by several authors (Table 2). For instance, Dulčić & Kraljević (1996) noted that the maximum total length was 30.9 cm (TL) in the East Adriatic coast of Croatia. Moutopoulos & Stergiou (2002) documented that the maximum total length was 32.0 cm for the Aegean Sea. Abdallah (2002) reported the maximum total length as 20.80 cm in the Alexandria coasts, Egypt. Ozaydın & Taskavak (2007) found the maximum fork length as 21.90 cm for Izmir Bay, Turkey. The present paper, however, reports the maximum length not only for the Libyan coast of Benghazi but also for the south Mediterranean Sea.

In fish life history research and fisheries science, maximum length and weight are crucial parameters. These measurements are necessary for population dynamics and stock assessment studies. Consequently, recording such data may be advantageous for scientific databases pertaining to the study of life histories and fisheries. This discovery will be crucial for the management of fisheries.

Conclusion

This paper reported a new size record of striped red mullet *Mullus surmuletus* along the Libyan coast of Benghazi, southern Mediterranean. This finding expends the knowledge of the biology and ecology of this species. Furthermore, this finding will help fisheries scientists for future studies on its populations and may also help to enforce regulations on commercial fisheries concerning landing size restrictions.

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Compliance With Ethical Standards

Authors' Contributions

MS: Collected the data, Wrote the first draft of the manuscript.
HJ: Collected the data.
HE: Designed the study, wrote the manuscript, Performed and managed.
All authors read and approved the final manuscript.

Conflict of Interest

The authors declare that there is no conflict of interest.

Ethical Approval

For this type of study, formal consent is not required.

Data Availability Statements

All data generated or analysed during this study are included in this published article.

References

Abdallah, M. (2002). Length-weight relationship of fishes caught by trawl of Alexandria, Egypt. *NAGA ICLARM Q*, *25*(1), 19-20.

Acarli, D., Kale, S., & Çakır, K. (2018). A new maximum length for the garfish, *Belone belone* (Linnaeus, 1761) in the coast of Gökçeada Island (Aegean Sea. Turkey). *Cahiers de Biologie Marine*, *59*, 385-389. https://doi.org/10.21411/CBM.A.55A28635

Ben-Tuvia, A. (1990). Mullidae. In Quéro, J. C., Hureau, J. C., Karrer, C., Post, A., & Saldanha, L. (Eds.), *Check-list of the fishes of the eastern tropical Atlantic (CLOFETA) vol. II* (pp. 827-829). UNESCO, Portugal.

Cengiz, Ö. (2020). A study on maximum length record of saddled seabream (*Oblada melanura* Linnaeus, 1758) caught off Gökçeada Island (Northern Aegean Sea, Turkey). *Marine Science and Technology Bulletin*, *9*(1), 58-61. https://doi.org/10.33714/masteb.691478

Cengiz, Ö., Kızılkaya, B., & Paruğ, Ş. Ş. (2019). Maximum size record of brown meagre (*Sciaena umbra* Linnaeus, 1758) for Aegean Sea. *KSU Journal of Agriculture and Nature*, *22*(4), 659-663. https://doi.org/10.18016/ksutarimdoga.vi.515704

Cicek, E., Avsar D., Yeldan H., & Ozutok M. (2006). Length–weight relationships for 31 teleost fish caught by bottom trawl net in the Babadillilimanı Bight (Northeastern Mediterranean). *Journal of Applied Ichthyology*, *22*(4), 290-292. https://doi.org/10.1111/j.1439-0426.2006.00755.x

Coll, M., Piroddi, C., Steenbeek, J., Kaschner, K., Ben Rais Lasram, F., Aguzzi, J., et al. (2010). The biodiversity of the Mediterranean Sea: Estimates, patterns and threats. *PLoS ONE*, *5*(8), e11842. https://doi.org/10.1371/journal.pone.0011842

Dulčić, J., & Glamuzina, B. (2006). Length-weight relationships for selected fish species from three eastern Adriatic estuarine systems (Croatia). *Journal of Applied Ichthyology*, *22*(4), 254-256. https://doi.org/10.1111/j.1439-0426.2006.00633.x

Dulčić, J., & Kraljević, M. (1996). Weight-length relationships for 40 fish species in the eastern Adriatic (Croatian waters). *Fisheries Research*, *28*(3), 243-251. https://doi.org/10.1016/0165-7836(96)00513-9

Elbaraasi, H., Mohamed, M. A., Elsilini, O., Jenjan, H., Corinaldesi, C., Buschi, E., & Azzurro, E. (2022) The Yucatan molly *Poecilia velifera* (Regan, 1914) (Cyprinodontiformes: Poeciliidae): an invasive species in the Mediterranean lagoon of Ayn Zayanah (Benghazi, Libya). *BioInvasions Records, 11*(2), 537–546, https://doi.org/10.3391/bir.2022.11.2.26

Elbaraasi, H., Elabar, B., Elaabidi, S., Bashir, A., Elsilini, O., Shakman, E., & Azzurro, E. (2019). Updated checklist of bony fishes along the Libyan coasts (Southern Mediterranean Sea). *Mediterranean Marine Science*, *20*(1), 90-105. https://doi.org/10.12681/mms.15570

Freedman, J. A., & Noakes, D. L. G. (2002). Why are there no really big bony fishes? A point-of-view on maximum body size in teleosts and elasmobranches. *Reviews in Fish Biology and Fisheries*, *12*, 403-416. https://doi.org/10.1023/A:1025365210414

Froese, R., & Pauly, D. (Eds.) (2023). FishBase. World Wide Web electronic publication. Retrieved on January 31, 2023 from http://www.fishbase.org.

Helfman, G. S., Collette, B. B., Facey, D. E., & Bowen, B. W. (2009). *The diversity of fishes: Biology, evolution, and ecology*. Wiley-Blackwell.

Ilhan, D., Akalin, U. S., Özaydin, O., Tosunoglu, Z., & Gurbet, R. (2009). Growth and reproduction of striped red mullet (*Mullus surmuletus* L., 1758) in İzmir Bay. *E.U. Journal of Fisheries & Aquatic Sciences*, *26*(1), 01–05.

Karakulak, F. S, Erk, H., & Bilgin, B. (2006). Length-weight relationships for 47 coastal species from the Northern Aegean Sea, Turkey. *Journal of Applied Ichthyology*, *22*(4), 274–278. https://doi.org/10.1111/j.1439-0426.2006.00736.x

Labropoulou, M., Machias, A., Tsimenides, N., & Eleftheriou, A. (1997). Feeding habits and ontogenetic diet stripped red mullet, *Mullus surmuletus* Linnaeus, 1758. *Fisheries Research*, *31*(3), 257-267. https://doi.org/10.1016/S0165-7836(97)00017-9

Merella, P., Quetglas, A., Alemany, F., & Carbonell, A. (1997). Length-weight relationship of fishes and cephalopods from the Balearic Islands (Western Mediterranean). *Naga, ICLARM Q*, *20*(3/4), 66-68.

Moutopoulos, D. K., & Stergiou, K. I. (2002). Length-weight and length-length relationships of fish species from the Aegean Sea, Greece. *Journal of Applied Ichthyology*, *18*(3), 200-203. https://doi.org/10.1046/j.1439-0426.2002.00281.x

Ozaydin, O., & Taskavak, E. (2007). Length-weight relationships for 47 fish species from Izmir Bay (eastern Aegean Sea, Turkey). *Acta Adriatica*, *47*(2), 211-216.

Pajuelo, J.G., Lorenzo, J. M., Ramos, A. G., & Mendez-Villamil, M. (1997). Biology of the red mullet *Mullus surmuletus* (Mullidae) off the Canary Islands, Central-East Atlantic. *South African Journal of Marine Science*, *18*(1), 265-272. https://doi.org/10.2989/025776197784160956

Papaconstantinou, C., Caragitsou, E., Vassipoulou, V., Petrakis, G., Mytilineou, C. H., Fourtouni, A., Tursini, A., Polito, C. Y., Giagnisi, M., D'onghia, G., Siapatis, A., Matarese, A., Economou, A., & Papageorgiou, E. (1993). Investigation of the abundance and distribution of demersal stocks of primary importance to the Greek fishery in the North Aegean Sea, Greece. National Centre for Marine Research, Athens, Hellas, Technical Report, 316 p.

Peters, R. H. (1983). *The ecological implications of body size*. Cambridge University Press.

Petrakis, G., & Stergiou, K. I. (1995). Weight length relationships for 33 fish species in Greek waters. *Fisheries Research*, *21*(3-4), 465-469. https://doi.org/10.1016/0165-7836(94)00294-7

Quignard, J. P., & Tomasini, J. A. (2000). Mediterranean fish biodiversity. *Biologia Marina Mediterranea*, *7*(3), 1–66.

Renones, O., Massuti, E., & Morales-Nin, B. (1995). Life history of the red mullet *Mullus surmuletus* from the bottom-trawl fishery off the Island of Majorca (north-west Mediterranean). *Marine Biology*, *123*, 411-419. https://doi.org/10.1007/BF00349219

Valle, C. J., Bayle, T., & Ramos, A. A. (2003). Weight-length relationships for selected fish species of the western Mediterranean Sea. *Journal of Applied Ichthyology*, *19*, 261-262.

van der Veer, H. W., Kooijman, S. A. L. M., & van der Meer, J. (2003). Body size scaling relationships in flatfish as predicted by Dynamic Energy Budgets (DEB theory): Implications for recruitment. *Journal of Sea Research*, *50*(2-3), 257-272. https://doi.org/10.1016/j.seares.2003.05.001