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## SHORT COMMUNICATION

### Occurrence of a Shoal of Bull Ray *Aetomylaeus bovinus* (Myliobatidae) Around a Sea-Cage Farm in İskenderun Bay (Türkiye, NE Mediterranean Sea)

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Management

**Abstract:** In this study, a shoal of bull rays, *Aetomylaeus bovinus* (E. Geoffroy Saint-Hilaire, 1817), around a sea-cage fish farm in İskenderun Bay, Turkey is reported. Such an aggregation is probably due to ontogenetic shift but may also be a factor of reproductive process as some pregnant females were observed. The number of individuals recorded, in all more than 25, shows that the species is still present in the area but needs a conservation plan due to its *k*-selected life-histories and potential for extinction.

#### Anahtar kelimeler:

Kıkırdaklı balıklar  
Toplanma  
Balık çiftlikleri  
Ontogenetik değişim  
Üreme süreci  
Yönetim

#### İskenderun Körfezi'nde (Türkiye, Kuzey-Doğu Akdeniz) Balık Çiftliği Etrafında *Aetomylaeus bovinus* (Myliobatidae) Sürüsünün Varlığı

**Öz:** Bu makalede Türkiye sularında İskenderun Körfezi'nden bir balık çiftliği çevresinde *Aetomylaeus bovinus* (E. Geoffroy Saint-Hilaire, 1817) sürüsü rapor edilmektedir. Bu tür bir toplanma muhtemelen ontogenetik yer değiştirmeden kaynaklanmaktadır; ancak aynı zamanda bu sürüde bazı hamile dişilerin ortaya çıkması nedeniyle üreme sürecinden de kaynaklanmaktadır. 25'ten fazla kaydedilen örnek sayısı, türün bölgede hala mevcut olduğunu, ancak *k*-seçilmiş yaşam öyküleri nedeniyle olası bir yok oluştan korunmak için bir yönetim planına ihtiyaç duyulduğunu göstermektedir.

## Introduction

The bull ray, *Aetomylaeus bovinus* (E. Geoffroy Saint-Hilaire, 1817) is a benthopelagic species known in tropical and warm temperate waters of the eastern Atlantic, off Portugal, and south the Straits of Gibraltar from Morocco, continuously to the coast of South Africa, including Madeira and Canary Islands (Wintner, 2006).

*Aetomylaeus bovinus* is present in the Mediterranean Sea, but the species is more often caught from southern areas such as the Maghreb shore (Capapé, 1989) and the Egyptian coast (El Sayed et al., 2017). Eastward, the species is recorded from the northern Adriatic (Dulčić et al., 2008) and the eastern Ionian Sea (Zogaris and Dussling, 2010). Additionally, *A. bovinus* is recorded in the Levant Basin (Golani, 1996; Ali, 2018; Bariche and Fricke, 2020).

Akyol et al. (2017) listed a large distribution in different areas of the Turkish waters, considering that *A. bovinus* is not uncommon in the region. This opinion was further supported by the fact that in early May 2022, two specimens have been sighted at a depth of 3 m; a sign of aggregation at >24 °C sea surface temperature (SST).

## Material and Methods

Soon after observing 2 individuals, on 1 June 2022, at least 25 specimens of *A. bovinus* were observed and photographed around a sea-cage fish farm rearing European sea bass, *Dicentrarchus labrax* (Linnaeus, 1758) and gilthead seabream, *Sparus aurata* (Linnaeus, 1758). The fish farm was located off Arsuz coast, İskenderun Bay, 36°35.28 N and 36°07.24 E, at a depth of 50 m (Figure 1). Some of the observed specimens were tailless. All specimens were carefully examined and identified as

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*A. bovinus* via combination of main morphological characters, following Capapé and Quignard (1975) and Mc Eachran and Capapé (1984) as follows: pectoral fins large and strongly falcate discontinued under eye, lobe under

snout quite separate, snout pointed, dorsal fin beginning behind tips of pelvic fins, colour greyish to greenish (Figure 2).



**Figure 1.** Map indicating the sampling site (red dot) in the NE Mediterranean Sea



**Figure 2.** A large number of bull rays ( $n: >25$ ), *Aetomylaeus bovinus* individuals swimming around the sea-cages (June 2022) in the NE Mediterranean Sea (photographed by C. Kurt)

## Results and Discussion

To get more details about this shoal, we interviewed the diver, a member of the fish farm staff, who spotted the fish. SST was 24 °C. Bull rays aggregated around the diver during a dive for the removal of the dead fish at the bottom of the sea-cage. Bull rays were feeding on dead fish and they displayed no interest in pellet feed. The fish rubbed against each other on the surface and flapped their pectoral fins for 15-20 minutes. When disturbed by moving boats, the fish preferred to dive deeper into the water column (C. Kurt, pers. comm.). No attack on the cage nets has been observed. However, five specimens entered the cages accidentally during routine net change operation. The tips of the pectoral fins were injured as the fish rubbed against the nets in order to get out of the cage. Unfortunately, all of the rays died within three days of accidental entrance. Three specimens were pregnant, one pup was outside and the others were in the womb (C. Kurt, pers. comm.).

Barash et al. (2018) reported that fish cages are a steady source of food, and therefore, attract sharks; the sandbar sharks, *Carcharhinus plumbeus* (Nardo, 1827), or probably other shark species have been regularly observed in the vicinity of fish farms. Similar aggregation patterns consisting of 32 individuals in the northern Adriatic (Dulcic et al., 2008) and 12 individuals in the eastern Ionian Sea (Zogaris and Dussling, 2010), due most likely to the fish farming operations have been reported. Golani et al. (2006) emphasized that eagle rays are harmful to shellfish beds and they often cause damage in clam and oyster farms. El Kamel et al. (2009, 2010) reported the captures of juvenile and adult *A. bovinus* in the Lagoon of Bizerte, northern Tunisia, due to the abundance of mussels, oysters and gastropods (Zaouali, 1979), that are preferential preys of *A. bovinus* (Capapé, 1977). Therefore, it can be concluded that mariculture operations attract chondrichthyans.

It was interesting to note that recently, some pregnant females of *A. bovinus* were observed in the Lagoon of Bizerte, due possibly to find the best environmental conditions to lay their brood (Rafrafi-Nouira, pers comm., 2022). Therefore, the occurrence of pregnant females among the present shoal of *A. bovinus* suggests that this aggregation is not only due to ontogenetic shifts but also linked to the reproductive process of the species, seeking out nursery areas.

Additionally, all observations carried out for *A. bovinus* showed that the species despite its *k*-selected life-histories (*sensu* Mc Auley et al., 2007), has not totally disappeared from the region where it finds food and suitable environmental parameters to live and reproduce, confirming the previous opinion of Akyol et al. (2017). It is well known that *A. bovinus* displays an economical interest and such pattern explains why specimens are still found in Mediterranean fish markets (El Kamel, 2010). Therefore, as it is the case for other threatened elasmobranch species, a management plan should be delineated in local fisheries, together with the contribution of local fishermen. The latter need to be informed about

the important role they are able to play to preserve bull rays from possible extinction in areas where they aggregate.

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## Conflict of Interest

The authors declare that there are no conflict of interest.

## Author Contributions

O. Akyol; Writing - original draft, visualization, writing – review & editing. H. Şen; Investigation, interview, C. Capapé; Conceptualization, methodology, writing - original draft, writing - review & editing.

## Ethics Approval

Local Ethics Committee Approval was not obtained because experimental animals were not used in this study.

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