

## First record of *Mauremys rivulata* (Valenciennes, 1833) from Atikhisar Reservoir (Çanakkale, Turkey)

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### Abstract

This study firstly reported the presence of *Mauremys rivulata* in the Atikhisar Reservoir in Çanakkale, Turkey. *M. rivulata* was observed during the sampling of freshwater crayfish in the reservoir between 4-5 m water depth on September 27, 2021. A single individual was caught with a fyke-net having 17 mm mesh size. The straight carapace length and straight carapace width of the individual were measured to be 20.52 and 12.95 cm, respectively. Knowing the distribution of a species enables researchers to better understand the ecological biology and is of great importance for researchers to study certain aspects such as population dynamics, migration, reproduction, feeding, habitat preferences, etc. Therefore, this paper provides valuable information for fisheries managers, policymakers and scientists involved in the aquatic species.

**Keywords:** First report, *Mauremys rivulata*, Balkan pond turtle, Western Caspian turtle, Presence

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### 1. Introduction

Turtles live in temperate climates and are particularly abundant in tropical and subtropical regions and they inhabit a wide variety of habitats including ponds, swamps, small ponds filled with vegetation, lakes of all sizes, large streams and rivers (Metin et al., 2008). In Turkey, there are five freshwater turtle species: *Mauremys rivulata*, *M. caspica*, *Trionyx triunguis*, *Emys orbicularis*, and *Rafetus euphraticus* (Ayaz et al., 2006).

*M. rivulata* was reported as a declining species by the European Convention on Wildlife and Natural Habitats in 1979. However, then it was declared “Least Concern” by the IUCN in 2004 (van Dijk et al., 2014). It has been reported that this species has decreased in recent years due to habitat loss, especially in the European territories of

Albania, Cyprus, Bulgaria, and Turkey (Saçdanaku & Haxhiu, 2015).

*M. rivulata* (Valenciennes, 1833) is distributed from southeastern Europe to the Middle East, including the area of former Yugoslavia, Greece, Aegean Islands, Bulgaria, Syria, Lebanon, Israel, and Jordan (Haas, 1952; Mertens & Wermuth, 1960; Wermuth & Mertens, 1961; Iverson, 1986; Ernst & Barbour, 1989; Fritz & Freytag, 1993; Fritz & Wischuf, 1997; Wischuf & Fritz, 2001; Wischuf & Busack, 2001; Wischuf & Busack, 2001; Rifai & Amr, 2004; Ayaz & Budak, 2008; Pupins & Pupina, 2011; Kukushkin & Jablonski, 2016; Popgeorgiev et al., 2017). In Turkey, it lives in western and southern Anatolia as well as in Thrace (Figure 1). Several authors documented the presence of *M. rivulata* in Turkey (Başoğlu & Baran, 1977; Taşkavak et al., 1997; Baran & Atatür, 1998; Taşkavak et



al., 1998; Tok, 1999; Ayaz & Budak, 2008; Güçlü & Türkozan, 2010; Yılmaz & Tosunoğlu, 2010; Çiçek & Ayaz, 2011; Tosunoglu et al., 2011; Baran et al., 2012; Ege et al., 2015; Sarıkaya, 2015; Tosunoğlu et al., 2017).



Figure 1. Spatial distribution of *M. rivulata* in Turkey (Anonymous, 2021)

Scarce studies noted the presence of the turtle in Çanakkale (Hür et al., 2008; Hacıoglu et al., 2012; Gül et al., 2014; Hacıoglu & Tosunoglu, 2014; Hacıoglu et al., 2015; Bayrakçı et al., 2016; Bilgin, 2018; Tok et al., 2018; Uysal et al., 2018; Çördük et al., 2019; Özmen, 2020). However, there is no published paper reporting the presence of *M. rivulata* in the Atikhisar Reservoir. Therefore, there is a gap in the current status of the presence of this species in the Atikhisar Reservoir and the present study fills the gap in the knowledge on the biodiversity of the Atikhisar Reservoir as the first study reporting the presence of *M. rivulata*.

## 2. Material and Methods

### 2.1. Study Area

Atikhisar Reservoir is the only water resource supplying water for drinking purposes to the people inhabiting Çanakkale (Kale & Acarli, 2019a). It also provides water for agricultural and domestic purposes to the society living nearby the reservoir (Kale & Acarli, 2019b). In the scientific studies carried out in Atikhisar Reservoir to date, chub (*Squalis cephalus*) (Akbulut et al., 2008; Selvi et al., 2015), common carp (*Cyprinus carpio*) (Akbulut et al., 2008), European eel (*Anguilla anguilla*) (Kale, 2019), northern pike (*Esox lucius*) (Selvi & Kaya, 2013), spined loach (*Cobitis taenia*) and black goby (*Gobius niger*) (Akbulut et al., 2008) species have been reported. On the other hand, zebra mussel (*Dreissena polymorpha*) (Kaya et al., 2013), margined ramshorn (*Planorbis planorbis*), keeled ramshorn (*Planorbis carinatus*) freshwater snail (*Melanopsis* sp.), European valve snail (*Valvata piscinalis*), ubiquitous peaclam (*Pisidium casertanum*) (Akbulut et al., 2009), and Turkish crayfish (*Pontastacus leptodactylus*) (Kale et al., 2020; Kale et al., 2021) species have also been reported.

### 2.2. Sampling

On September 27, 2021, *M. rivulata* was detected from the Atikhisar Reservoir in Çanakkale, Turkey (Figure 2). Morphometric measurements were made with a scale

having a precision of 0.01 cm. *M. rivulata* was collected from a depth of 4-5 m using a fyke-net with 17 mm mesh size. This kind of fishing gear is commonly (and commercially) used to catch freshwater crayfish species as documented by Kale et al. (2020) and Kale et al. (2021). A general view of the sampling location was presented in Figure 3.

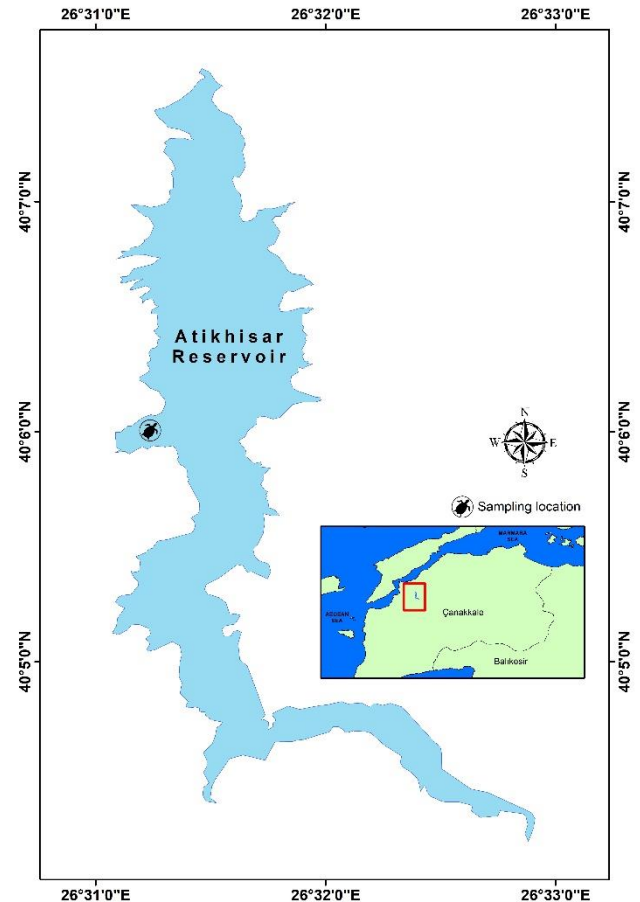


Figure 2. The sampling location of *M. rivulata* in the Atikhisar Reservoir

## 3. Results

The detected *M. rivulata* is presented in Figure 4. The straight carapace length and straight carapace width were 20.52 cm and 12.95 cm, respectively. The bark was oval and blackish. The plastron was black. Carapace and plastron were fused. The head, sides of the neck and legs were yellowish striped. The texture and pattern of the ventral of the specimen are clearly provided in Figure 5.

## 4. Discussion

This study describes the first appearance of *M. rivulata* from the Atikhisar Reservoir in Çanakkale, Turkey. Atikhisar Reservoir. *M. rivulata* was detected on September 2021. Supportively, Anonymous (2021) stated that the activation time of this species occurs from March to September. In the present study, *M. rivulata* was caught using a fyke-net with 17 mm mesh size as noted by Tok et al. (2014) that fyke-nets are used to collect these turtles.



Figure 3. General view of the sampling location of *M. rivulata* in the Atikhisar Reservoir

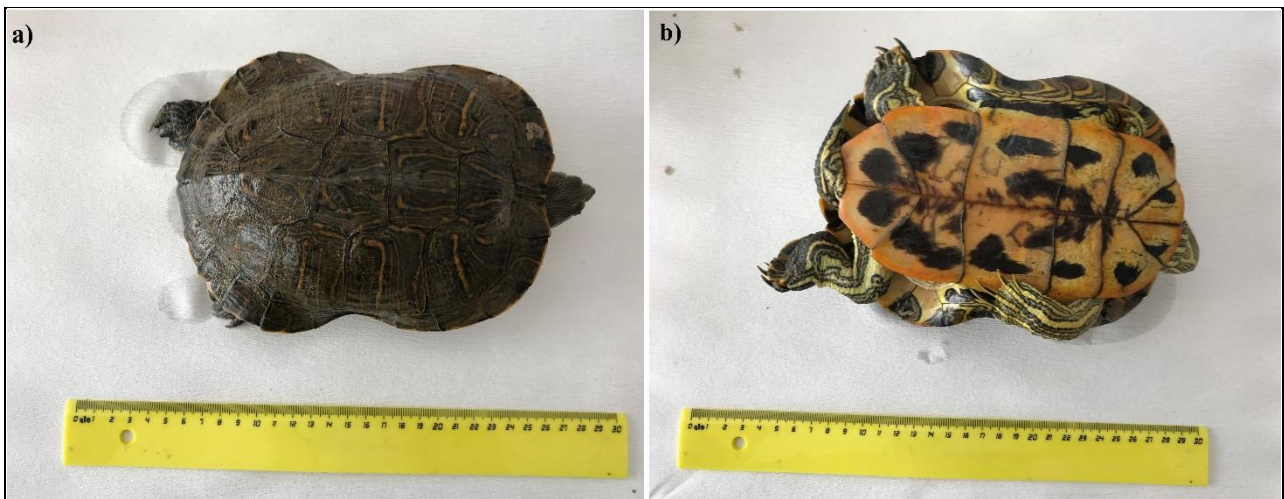


Figure 4. Dorsal view (a) and ventral view (b) of *M. rivulata* detected from the Atikhisar Reservoir



Figure 5. High quality image of the ventral of *M. rivulata* detected from the Atikhisar Reservoir

*Mauremys* species have scarcely been investigated in Turkey. Auer and Taskavak (2004) investigated the population structure of *M. rivulata* in Çukurköy village of Menemen, İzmir in the west part of Turkey. Ayaz et al. (2006) compared the populations of *Mauremys caspica* and *M. rivulata* in Turkey serologically and morphologically. Ayaz and Budak (2008) studied the morphology and distribution of *M. rivulata* in the Lakes District and Mediterranean region of Turkey. Bayrakçı et al. (2015) studied data on the population of *M. rivulata* from the Great Menderes Delta. Bayrakçı et al. (2016) documented the abundance of *M. rivulata* from Gökçeada. Çiçek et al. (2016) studied growth parameters of *M. rivulata* from the southern parts of Turkey. Apart from the morphology studies, Çördük et al. (2019) evaluated nuclear abnormalities in erythrocytes of *M. rivulata* from the Biga Stream in Çanakkale. Bayrakçı et al. (2021) investigated the effects of altitude and temperature on the erythrocyte morphology of *M. rivulata*. İlhan et al. (2021) studied the population structure and gene flow of *Mauremys* from coastal and inland regions of Anatolia and documented that the populations of *M. rivulata* sustain to diversify, therefore, new species appear in the evolutionary process to achieve the optimal allelic structure.

The species is widely distributed along the southeast Europe including the Bosphorus and Marmara Sea (Tok & Çiçek, 2014). Mantziou et al. (2004) pointed out that climate change is the main factor that influenced the present distribution of *M. rivulata* in the Balkans. Kale (2019) noted that the water level and surface area of the water body in the Atikhisar Reservoir have been affected by climate change between 1975-2017. Therefore, *M. rivulata* population in the reservoir might be under pressure of climatic changes. On the other hand, climate change caused fluctuations in the water level of the reservoir (Kale, 2019). The fluctuations in the water level could increase the competition between aquatic animals. Similarly, Kale (2019) claimed that water level fluctuations in the Atikhisar Reservoir could lead to interspecies and/or intraspecies competition.

No information has yet been collected on whether the *M. rivulata* individuals in the Atikhisar Reservoir have achieved reproductive success in the location. However, if they have established a natural breeding population here, they may compete with other species living in the reservoir. Uysal et al. (2018) found *M. rivulata* in the Sarıçay Stream and noted that it might compete with *Trachemys scripta*. Anonymous (2021) stated that *M. rivulata* feeds on aquatic insects, fish, mollusks and amphibians. Changes in the aquatic ecosystem due to climate change may lead to the addition of new fish species or reductions in existing ones in water resources. Thus, prey-predator relationships between aquatic organisms may vary according to the biodiversity in the reservoir. High water temperature and shorter winter season prevent nutrient transport in the water column and cause

stratification. This leads to a decrease in the efficiency of the food chain. Therefore, it causes increased competition between native species in the region and their predators and may lead to a decrease in the existing species diversity (Kale, 2019). Atikhisar Reservoir is also under intense pressure due to supplying water for drinking, agricultural and domestic purposes for the people inhabit Çanakkale. The request for more water consumption from the reservoir can cause a sudden drop in the water level in the reservoir. If this scenario occurs, aquatic ecosystem and biodiversity will be negatively impacted. Moreover, Chelazzi et al. (2007) indicated that the population of *M. rivulata* living in a human-impacted area is decreasing. Therefore, potential effects of anthropogenic activities on the reservoir should be reduced.

## 5. Conclusion

This study provided evidence for the presence of *Mauremys rivulata* in the Atikhisar Reservoir in Çanakkale, Turkey. The spatial and temporal distribution of aquatic species is of great importance for aquatic researchers to better understand the biological diversity in the ecosystem. Therefore, this paper presented valuable information for the spatial distribution of *M. rivulata*.

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## Conflict of interest

The authors declare that there is no conflict of interest.

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