Online ISSN: 2588-3526

Journal of Wildlife and Biodiversity

Volume 7 (X): X-X (2023) (http://www.wildlife-biodiversity.com/)

Research Article

On the occurrence of the Pond Slider Turtle *Trachemys scripta* (Thunberg in Schoepff, 1792) from southwestern Türkiye

Batuhan Yaman Yakin[1], Kerim Çiçek[2], Yusuf Bayrakci[2], Ulvi Kerem Günay[1], Murat Afsar[3], Dinçer Ayaz[2], Cemal Varol Tok[4]

[1]Çanakkale Onsekiz Mart University School of Graduate Studies Department of Biology Terzioğlu Campus, Çanakkale, Turkey
[2*]Ege University, Faculty of Science, Biology Department, Zoology Section, Bornova, Izmir, Turkey
[3]Celal Bayar University, Faculty of Science-Literature, Department of Biology, Manisa, Turkey
[4]Çanakkale Onsekiz Mart University, Faculty of Science - Literature, Biology Department, Zoology Section, Terzioğlu Campus, Çanakkale, Turkey
*Email: kerim.cicek@ege.edu.tr

Received: 20 June 2022 / Revised: 27 September 2022 / Accepted: 18 December 2022/ Published online: 18 December 2022. Ministry of Sciences, Research, and Technology, Iran.

How to cite: Yakin, B.Y., Çiçek, K., Bayrakci, Y., Günay, U.K., Afsar, M., Ayaz, D., Tok, C.V. (2023). On the occurrence of the Pond Slider Turtle *Trachemys scripta* (Thunberg in Schoepff, 1792) (Testudines: Emydidae) from southwestern Türkiye, Journal of Wildlife and Biodiversity, 7(X), X-X. https://doi.org/10.5281/zenodo.7701167

Abstract

Trachemys scripta is included among the 100 most invasive species worldwide. Since the first report on the presence of pond slider turtles from natural habitats in Türkiye, the distribution of this invasive species comprises almost thirty provinces. However, it spread to much wider sites than the regions determined until today. Besides, there is a lack of knowledge on which subspecies exist in the invaded habitats. Within this study, we presented the presence of two subspecies of the invasive alien slider turtle for the first time from the Reşadiye, Datça, Muğla, Türkiye. We also suggest certain precautions should be taken against slider turtles to contribute to preventing their invasion of our biodiversity.

Keywords: *Trachemys scripta*, *T. s. elegans*, *T. s. scripta*, invasive species, Datça, Muğla, Türkiye

Introduction

Changing environmental conditions as a consequence of global climate change allowed some species to extend their distribution areas. Besides, some species have been transported

anthropogenically. One of the most important reasons for this transportation is human enthusiasm for having an animal as a pet (Kraus, 2009). A story generally ends up with releasing pets into nature in an uncontrolled way; afterward, these alien species may reproduce by settling in released habitats and pose a threat to the populations of native species (Kraus, 2009; Nekrasova et al., 2022).

The slider turtle, *Trachemys scripta* (Thunberg in Schoepff, 1792), is an omnivorous species that live in many different aquatic habitats, such as natural or artificial pools, lakes, ponds, and streams (Obst, 1983; Ernst et al., 1994). Although the slider turtle is a native species to Mexico and USA, it distributes almost all over the world except the Antarctic, which is over 70 countries at present (Pupins, 2007; Ernst & Lovich, 2009; Ficetola et al., 2008; Böhm, 2013; Taniguchi et al., 2017; Kornilev et al., 2020; Mozaffari et al., 2020; Parham et al., 2020; Yaşar et al., 2021) and represented with three subspecies: *T. s. scripta* (Schoepff 1792), *T. s. elegans* (Wied 1838), *T. s. troostii* (Holbrook 1836) (Ernst et al., 1994).

The negative effects of *T. scripta* on the populations of native freshwater turtle species have been reported by previous studies (e.g., Cadi & Joly, 2003; Pérez-Santigosa et al., 2008, Hidalgo-Vila et al., 2009, 2020; Standfuss et al., 2016; Demkowska-Kutrzepa et al., 2018), the turtle has been defined as an alien invasive species by the European Union, and it has been decided to make an action plan for this species by the members of the Union (EU, 2019; Schradin, 2020; Christopoulos et al., 2021). In addition, *T. scripta*, one of the two reptile species included in the "Worst Invasive Species" list prepared by the Global Invasive Species Database (GISD), is considered one of the 100 most dangerous invasive species in the world (Lowe et al., 2000; Scalera, 2009; GISD, 2022; Nekrasova et al., 2022).

This study aims to contribute to the knowledge of the presence of *T. scripta* from Reşadiye, Datça, Muğla, and Türkiye), as well as to draw attention to a potential threat concerning the increasing number of released individuals that may generate breeding populations.

Material and method

Kargı Cove is located in the Datça district (Reşadiye) Peninsula of Muğla province, 3 km away from the town center. Kargı Stream is one of the most important creeks divided into many small branches beside the small ponds in the region flowing into the sea in the north-south direction (Tok, 1993, 1999; Taşlıgil, 2008).

During the field studies between 2017-2019, we observed the sites where Kargı Stream empties into the sea. Semi-natural and natural habitats densely vegetated were investigated, and specimens found were photographed (Lat: 36.700726; Long: 27.675086, sea level). Also, an

adult female slider turtle was captured, and morphological measurements were taken according to Tok (1993) with a caliper (0,01 mm precision).

Results

During the field studies in 2017, sub-adult specimens of *T. scripta* were observed and photographed. Regarding subspecies status, one of the observed specimens belonged to Red-eared slider *T. s. elegans,* and the other belonged to the Yellow-bellied slider *T. s. scripta*. In the following field surveys, specimens of both subspecies were re-observed. Besides, one of the native freshwater turtle species, *Mauremys rivulata* (Valenciennes, 1833), was also observed with slider turtles in the same habitat (Figure 1). Other syntopic species observed were the Levant water frog *Pelophylax bedriagae* (Camerano, 1882) and European eel *Anguilla anguilla* (Linnaeus, 1758) (Figure 2).



Figure 1. Observed slider turtles in the study site. *Trachemys scripta elegans* (A-B) and *T. s. scripta* (C-D). The red arrow indicates the native freshwater species *Mauremys rivulata*.



Figure 2. Other syntopic species inhabit in study site; *Mauremys rivulata* (A-adult, B-juvenile); *Pelophylax bedriagae* (B); *Anguilla anguilla* (D).

In 2019, an adult female Red-eared slider turtle was captured and measured, then preserved in the Collection of Zoology Research Laboratory, Ç.O.M.U. Morphological measurements were taken as Straight carapace length= 163.4 mm, carapace width= 122.88 mm, carapace height= 63.32 mm, plastron length= 147.11 mm, plastron width= 101.78 mm, humeral suture length= 12.47 mm, pectoral suture length= 15.72 mm, abdominal suture length= 43.65 mm, femoral suture length= 16.24 mm, anal suture length= 31.49 mm.

Discussion

Datça Peninsula has been evaluated as a specially protected environment area since 1990. Kargı Cove is located 3 km from the town center of Datça district and is heavily exposed to tourism activities. There are various touristic places such as hotels, motels, and beaches. This situation increases the pressure caused by human impact in the area.

Kraus (2009) stated that herpetofauna species originating from North America, especially reptiles and amphibians, have been distributed outside their natural distribution limits for

approximately 170 years. Among these species, turtles come first with approx.—2500 in numbers of introductions. The fact that they are attractive and easy to maintain are the main reasons that bring this situation into concern in the first place (Pupins, 2007; Çiçek & Ayaz, 2015; Taniguchi et al., 2017). Despite the prohibition of sales of slider turtles in Türkiye by the provisions of the 'Land Hunting Law No. 4915' and the CITES Convention, the illegal marketing or release of animals previously kept as pets continue. Especially in the sites with heavy human impact, the release of slider turtles to water resources should be prevented and controlled.

Nekrasova et al. (2022) reported that the slider turtle generally did not survive in regions with harsh climates, such as Ukraine, and dead specimens were observed in the spring-summer periods. However, they emphasized that due to climate change, the species can also inhabit these regions and may reproduce. Termine & Turrisi (2020) reported that the species could easily live in Southern Europe, which is in the Mediterranean climatic zone. In concordance with Termine & Turrisi (2020), Çiçek and Ayaz (2015) found nests in Anamur, Mersin, and southern Türkiye, and they stated that the climate along the Aegean and Mediterranean coasts of Türkiye is suitable for the reproduction of slider turtle.

Adult specimens of invasive slider turtles in Japan were compared with those in their natural habitats regarding height, weight, body size of mature males and females, and the number of eggs. The results showed that males in Japan breed at smaller sizes, and females had a larger average clutch size than populations in the USA (Taniguchi et al., 2017). According to Ingold and Patterson (1988), specimens with a plastron length of 145 mm are considered adults. The specimen measured in this study had a plastron length of 147.11 mm and was evaluated as an adult.

Hybridization was reported between subspecies of *T. scripta* (natural or human-made) and other species of the genus (Böhm, 2013). Çiçek and Ayaz (2015) reported that slider turtles distribute synoptically with *Emys orbicularis* (Linnaeus, 1758), which belongs to the same family. In this case, another factor that threatens biodiversity and native species is the possibility of hybridization of *T. scripta* with native species. There is no data on this issue so far; therefore, further studies are needed.

Invasive species suppress native species in terms of competition for food and basking sites (Ficetola et al., 2012). In competition with native turtles, invasive *T. s. elegans* could reach a larger number of specimens in suitable habitats with favorable availability of resources (Pérez-Santigosa et al., 2008). In this study, we observed that the slider turtles share basking sites with

a native freshwater turtle species, *M. rivulata*. Similar cases were reported in other studies from Anatolia (e.g., Çiçek and Ayaz, 2015; Uysal et al., 2018).

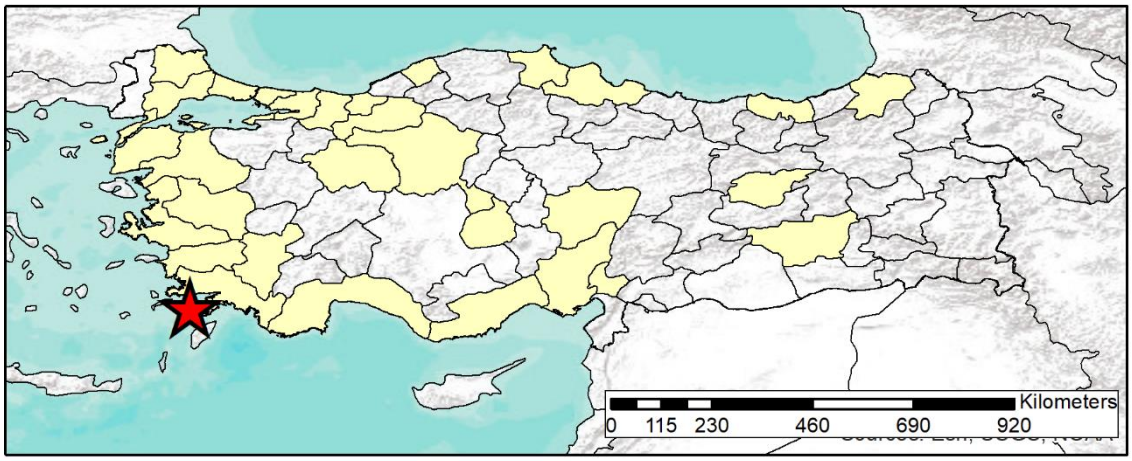

Figure 3. The province-based distribution of *T. scripta* in Türkiye (yellow filled) with a new locality (red star) (Revised from Ayaz and Çiçek, 2022)

The reports on the occurrence of *T. scripta* in many parts of Türkiye in the last 10 years reveal the delicacy of the matter (e.g., Kırklareli, İstanbul, İzmir, Muğla, Antalya, Mersin, Adana: Çiçek & Ayaz, 2015; Çanakkale: Uysal et al., 2018; Trabzon: Koç Gür et al., 2021, Ayaz and Çiçek, 2022; Figure 3). Generally, the red-eared slider turtle *T. s. elegans* is the reported subspecies in most observations. Our observation on the occurrence of two subspecies, *T. s. elegans*, and *T. s. scripta*, is the first report from this point of view. In this case, most of the records from Türkiye are based on occasional observations [*T. s. elegans* - red stripes behind eyes, dark spots on the plastron scutes. ; *T. s. scripta* - vertical yellow stripes behind eyes, generally two solid black dots on the plastron scutes toward the head.], strengthens the possibility of the third subspecies being found in Türkiye (*T. s. troostii* - oblique yellow stripes behind eyes, fewer and broader stripes on the skin, and irregular patterns on the plastron scutes.). However, a recent study reveals that the arguments on the subspecies status of the slider turtle are more complicated and suggests that the apparent differences in coloration and pattern reflect population-specific, rather than taxonomic, differentiation (Vamberger et al., 2020). Regardless of the consequences of subspecies debate, the presence of the invasive slider turtle in natural habitats is an important threat to natural biodiversity and should be monitored more intently.

Based on our experience with turtles, we can summarize the precautions that should be taken against slider turtles in Türkiye as follows:

- Organizing education/meetings about the threat caused by releasing these invasive organisms into nature on our biodiversity.
- Informing local people about the species and their biology and encouraging them to inform relevant institutions and organizations when they see the slider turtle.
- To create a center where people can leave their turtles instead of nature when they want to release them.
- To conduct more extensive research on its distribution and ecology in Türkiye.
- Retrieval of the invasive turtles from the localities where they were detected.
- Preventing illegal trade of the slider turtles

Consequently, *T. scripta* has been released in every suitable habitat, especially in the southern parts of Türkiye by humans, and apparently, the turtles can successfully adapt to their new environment. Therefore, other established populations of the slider turtles should be determined by further studies, and their effect on the native freshwater turtle species should be examined.

Acknowledgments

Data on this study were obtained in the scope of the "National Biodiversity Inventory and Monitoring Project – Research on Monitoring and Biological Diversity Inventory Terrestrial and Inland Water Ecosystems of Muğla Province" financially supported by the Ministry of Agriculture and Forestry General Directorate of Nature Conservation and National Parks IV. Regional Directorate Muğla Branch Office, Türkiye. The authors would like to thank relevant public institutions and Turunç Peyzaj Co. Ltd. for their financial support.

References

Ayaz, D., & Çiçek, K. (2022). The urgent action plan of Red-eared slider (*Trachemys scripta elegans*) in Türkiye. Project Report, Addressing of Invasive Alien Species threats in terrestrial areas and inland waters in Türkiye.

Böhm, S. (2013). Records of invasive *Trachemys scripta elegans* (Wied-Neuwied, 1839), in cenotes of the Yucatan Peninsula, Mexico. Herpetozoa, 26(1-2), 98-100.

Cadi, A., & Joly, P. (2003). Competition for basking places between the endangered European pond turtle (*Emys orbicularis galloitalica*) and the introduced red-eared slider (*Trachemys scripta elegans*). Canadian Journal of Zoology, 81(8), 1392-1398. https://doi.org/10.1139/z03-108

Christopoulos, A., Vlachopoulos, K., & Christopoulos, I. (2021). The herpetofauna of drained Lake Karla (Thessaly, Greece): distribution and threats. Herpetology Notes, 14, 1385-1405.

Çiçek, K., & Ayaz, D. (2015). Does the red-eared slider (*Trachemys scripta elegans*) breed in Turkey? Hyla: Herpetological Bulletin, 2015(1), 4-10.

Demkowska-Kutrzepa, M., Studzińska, M., Roczeń-Karczmarz, M., Tomczuk, K., Abbas, Z., & Różański, P. (2018). A review of the helminths co-introduced with *Trachemys scripta elegans*–a threat to European native turtle health. Amphibia-Reptilia, 39(2), 177-189. https://doi.org/10.1163/15685381-17000159

Ernst, C.H., Lovich, J.E., & Barbour, R.W. (1994) Turtles of the United States and Canada. Smithsonian Institution.

Ernst, C. H., & Lovich, J. E. (2009). Turtles of the United States and Canada. JHU Press.

EU (2019): Commission Implementing Regulation (EU) 2016/1141 of 13 July 2016 adopting a list of invasive alien species of Union concern pursuant to Regulation (EU) No 1143/2014 of the European Parliament and of the Council. Official Journal of the European Union L 189, 14.7.2016, p. 4-8.

Ficetola, G. F., Thuiller, W., & Padoa-Schioppa, E. (2008). From introduction to the establishment of alien species: bioclimatic differences between presence and reproduction localities in the slider turtle. Diversity and Distributions, 15(1), 108-116. https://doi.org/10.1111/j.1472-4642.2008.00516.x

Ficetola, G.F., Rödder D., & Padoa-Schioppa, E. (2012). *Trachemys scripta* (Slider terrapin). In: Handbook of global freshwater invasive species. In Francis, R. (Eds.), Earthscan (pp. 331-339), Taylor & Francis Group Abingdon.

GISD (2022): *Trachemys scripta elegans*. GISD - Global Invasive Species Database. Retrieved from http://www.iucngisd.org/gisd/species.php?sc=71

Hidalgo-Vila, J., Díaz-Paniagua, C., Ribas, A., Florencio, M., Pérez-Santigosa, N., & Casanova, J. C. (2009). Helminth communities of the exotic introduced turtle, *Trachemys scripta elegans* in southwestern Spain: Transmission from native turtles. Research in Veterinary Science, 86(3), 463-465.

Hidalgo-Vila, J., Martínez-Silvestre, A., Pérez-Santigosa, N., León-Vizcaíno, L., & Díaz-Paniagua, C. (2020). High prevalence of diseases in two invasive populations of red-eared sliders (*Trachemys scripta elegans*) in southwestern Spain. Amphibia-Reptilia, 41(4), 509-518.

Ingold, D. A., & Patterson, W. E. (1988). Population parameters of red-eared turtles in a Texas farm pond. Bulletin of the Maryland Herpetological Society, 24, 27-40.

Koç-Gür, H., Bülbül, U., & Kutrup, B. (2021). A breeding population of the exotic species *Trachemys Scripta* (Thunberg in Schoepff, 1792) in Trabzon Province of Turkey. Academic Research and Reviews in Science and Mathematics, Chapter 21-34.

Kornilev, Y. V., Lukanov, S., Pulev, A., Slavchev, M., Andonov, K., Vacheva, E., ... & Popgeorgiev, G. (2020). The alien pond slider *Trachemys scripta* (Thunberg in Schoepff, 1792) in Bulgaria: Future prospects for an established and reproducing invasive species. Acta Zoologica Bulgarica, 72(4), 571-581.

Kraus, F. (Ed.). (2009). Alien reptiles and amphibians: a scientific compendium and analysis. Dordrecht: Springer Netherlands.

Lowe, S., Browne, M., Boudjelas, S., & De Poorter, M. (2000). 100 of the world's worst invasive alien species: a selection from the global invasive species database (Vol. 12). Published by The Invasive Species Specialist Group (ISSG) a specialist group of the Species Survival Commission (SSC) of the World Conservation Union (IUCN), 12pp. First published as special lift-out in Aliens 12 December 2000. Updated and reprinted version: November 2004.

Mozaffari, O., Rahbari, P., & Dargahi, M. D. (2020). *Trachemys scripta elegans* (Testudines: Emydidae) threatens a wetland of international significance in Iran. Herpetological Bulletin, 152, 21-23. https://doi.org/10.33256/hb152.2123

Nekrasova, O., Tytar, V., Pupins, M., & Čeirāns, A. (2022). Range expansion of the alien red-eared slider *Trachemys scripta* (Thunberg in Schoepff, 1792)(Reptilia, Testudines) in Eastern Europe, with special reference to Latvia and Ukraine. Bioinvasions Records, 11 (in press).

Obst F.J. 1983. Schmuchschildkroten. Die Neue Brahm Bucherei. A. Ziemsen Verlag. Wittenberg Lutherstadt.

Parham, J. F., Papenfuss, T. J., Sellas, A. B., Stuart, B. L., & Simison, W. B. (2020). Genetic variation and admixture of red-eared sliders (*Trachemys scripta elegans*) in the USA. Molecular Phylogenetics and Evolution, 145, 106722. https://doi.org/10.1016/j.ympev.2019.106722

Perez-Santigosa, N., Diaz-Paniagua, C., & Hidalgo-Vila, J. (2008). The reproductive ecology of exotic *Trachemys scripta elegans* in an invaded area of southern Europe. Aquatic Conserv: Mar. Freshw. Ecosyst. 18: 1302–1310.

Pupins, M. (2007). First report on recording of the invasive species *Trachemys scripta elegans*, a potential competitor of *Emys orbicularis* in Latvia. Acta Universitatis Latviensis, 723, 37-46.

Scalera, R. (2009). Species account of 100 of the Most Invasive Alien Species in Europe. Handbook of Alien Species in Europe. Springer, Berlin, 374 pp.

Schradin, C. (2020). Successful reproduction of *Trachemys scripta* in the Altrhein of Kehl (Germany) and simultaneous increase in population estimate. The Herpetological Bulletin, 154, 1-7. https://doi.org/10.33256/hb154.17

Standfuss, B., Lipovšek, G., Fritz, U., & Vamberger, M. (2016). Threat or fiction: is the pond slider (*Trachemys scripta*) really invasive in Central Europe? A case study from Slovenia. Conservation Genetics, 17(3), 557-563.

Taniguchi, M., Lovich, J. E., Mine, K., Ueno, S., & Kamezaki, N. (2017). Unusual population attributes of invasive red-eared slider turtles (*Trachemys scripta elegans*) in Japan: do they have a performance advantage? Aquatic Invasions, 12(1), 97–108. https://doi.org/10.3391/ai.2017.12.1.10.

Taşlıgil, N. (2008). Datça–Bozburun özel çevre koruma bölgesi ve turizm. Ege Coğrafya Dergisi, 17(1-2), 73-83. [in Turkish]

Termine, R., & Turrisi, G. F. (2020). Amphibians and Reptiles of the Nature Reserve of Pergusa Lake (Enna, Italy), emphasizing Sicilian endemisms. Biodiversity Journal, 11 (2), 639-646. https://doi.org/10.31396/Biodiv.Jour.2020.11.2.639.646

Tok, C.V. (1993). Reşadiye (Datça) yarımadası herpotofaunası üzerinde taksonomik ve biyolojik araştırmalar. Ege Üniversitesi, Fen Bilimleri Enstitüsü, Biyoloji AnaBilim Dalı, Doktora Tezi, 140 ss. [in Turkish]

Tok, C.V. (1999). The taxonomy and ecology of *Mauremys caspica rivulata* Valenciennes, 1833 (Testudinata: Bataguridae) and *Testudo graeca ibera* Pallas, 1811 (Testudinata: Testudinidae) on Resadiye (Datça) Peninsula. Turkish Journal of Zoology, 23(1), 17-22.

Uysal, İ., Tosunoğlu, M., Özdilek, Ş. Y., & Gül, G. Ç. (2018). A record and distribution of exotic species *Trachemys scripta* in the streams of Çanakkale (Turkey). Turkish Journal of Bioscience and Collections, 2(2), 11-18.

Vamberger, M., Ihlow, F., Asztalos, M., Dawson, J. E., Jasinski, S. E., Praschag, P., & Fritz, U. (2020). So different, yet so alike: North American slider turtles (*Trachemys scripta*). Vertebr. Zool, 70, 87-96. http://www.doi.org/10.26049/VZ70-1-2020-06

Yaşar, Ç., Çiçek, K., Mulder, J., & Tok, C.V. (2021). The distribution and biogeography of amphibians and reptiles in Turkey. North-Western Journal of Zoology, 17(2), 232-275.