

First reproduction record of *Trachemys scripta* (SCHOEPPF, 1792), in Slovenia

Slider Turtles, *Trachemys scripta* (SCHOEPPF, 1792), are widely distributed beyond their native range in southeastern North America, due to their popularity as pets (ERNST & LOVICH 2009). The natural distribution of *T. scripta* ranges from southern Virginia south to northern Florida and west to Kansas, Oklahoma, New Mexico and north-eastern Mexico (BRINGSØE 2006; ERNST & LOVICH 2009). Formerly it was thought that the species has a much wider distribution including vast parts of Latin America. However, these slider turtles were shown to represent several distinct species (SEIDEL 2002; FRITZ et al. 2012). As in other European countries (see synopsis in BRINGSØE 2001), pond sliders occur in Slovenia all over the country (KROFEL et al. 2009; VAMBERGER 2009), as a result of their formerly massive import by the pet trade (ARVEY & SERVAN 1998; BONIN 2004). In the 1980s and 1990s, before the import was banned by the European Union, enormous numbers of hatchlings were sold in pet stores, many of which over the years were released into the wild as they outgrew their containers (ARVEY & SERVAN 1998).

Trachemys scripta occurs in wetlands, fish ponds and rivers in Slovenia (KROFEL et al. 2009; VAMBERGER 2009), and has been reported from similar habitats of several European countries, i.e., Italy (FICETOLA et al. 2002), Germany (HANKA & ROGER 1998), Austria (KLEWEIN & WÖSS 2011), France (ARVEY & SERVAN 1998), Spain (MASCORT 1998; SANTIGOSA et al. 2008), and Hungary (PUKY et al. 2004). Some Slovenian water bodies are also inhabited by the native European Pond Turtle *Emys orbicularis* (LINNAEUS, 1758) (KROFEL et al. 2009; VAMBERGER 2009). The latter species is listed in the Red List of Threatened Reptiles (Reptilia), marked as an endangered species (IUCN: E) for Slovenia (IUCN 2011), and is also listed in the Habitat Directive of the European Commission (92/43, Annexes II and IV) and the Bern Convention (Annexe II). Despite the fact that several studies

described *T. scripta* as a threat to the native *E. orbicularis* (e.g., as a vector for helminth cross-transmission, see MORAVEC & VARGAS-VÁZQUEZ 1998; HIGALDO-VILA et al. 2006), its actual impact is difficult to assess because data are largely missing (ROGNER 2009).

So far, reproduction of *T. scripta* was recorded from southern European countries, like southern Italy; the northernmost records are known from southern France (FICETOLA et al. 2002; SANTIGOSA et al. 2008) Switzerland (WÜTHERICH 2004) and southeast Austria (BRINGSØE 2001: 537; GEMEL et al. 2005). Because little is known about the impact of *T. scripta* on local *E. orbicularis* populations, conservation measures are ill-defined. Besides investigating the interactions of these two species in known areas of syntopy, it is important to determine the areas where *T. scripta* might be able to represent a long-term potential threat, in that it reproduces successfully. For doing so, we investigated most known sites for *E. orbicularis* (Fig. 1) as well as several other potential sites for *T. scripta* all over Slovenia, a small but geographically diverse central European country with climate zones ranging from continental to sub-Mediterranean (ARSO 2008).

To verify reproduction of *T. scripta*, we aimed to locate nests and recently hatched juveniles. As *T. scripta* eggs need on average 76.8 (61.1-108.0) days to hatch (ERNST & LOVICH 2009), fertile eggs found during the summer months would indirectly confirm reproduction. Recently hatched turtles, diagnosed by the presence of the umbilical scar (Fig. 1, inset) and the absence of growth rings, would represent strong evidence for the reproduction of *T. scripta*.

Between 2006 and 2009, we explored most known *E. orbicularis* localities in Slovenia (KROFEL et al. 2009; Fig. 1). Additionally, we explored new possible localities based on aerial digital photographs of promising areas. We investigated each locality relatively to its size, which lasted from an hour up to a whole day. We also collected sight records (exact locality plus clear photographs of animals) from members of the local herpetological society (records stored at Societas Herpetologica Slovenica).

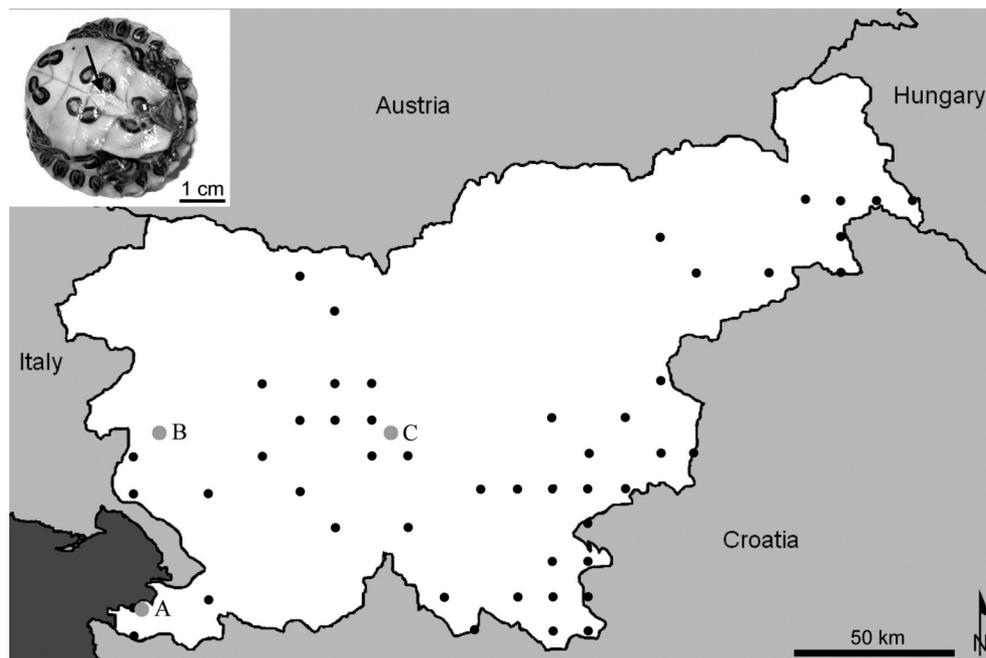


Fig. 1: Grid based cellular representation of the known distribution of *Emys orbicularis* (LINNAEUS, 1758) in Slovenia (after KROFEL et al. 2009, black dots), and Slovenian sites where hatchlings or reproduction success of *Trachemys scripta elegans* (WIED, 1838) was confirmed (grey dots; inset: *T. scripta elegans* hatchling with visible umbilical scar). A - lake Vogršček; B - Polje ponds, Izola; C - Draga pri Igu ponds.

From April to June and September to October, when the vegetation was low, the authors examined all small water bodies by walking along their edges, the larger ones were additionally examined using binoculars. Encountered individuals were caught by hand or net, and baited fish traps were used in areas with deeper water, following VAMBERGER & KOS (2011).

At three localities in southwestern Slovenia (Fig. 1), we located a total of nine *T. scripta* juveniles. Three of them measured around 3 cm in carapacial length, but none could be caught for further inspection. The shell of the other five encountered juveniles were 5 - 8 cm in length. We found a recently hatched *T. scripta* juvenile at the Vogršček lake in south-western Slovenia, confirmed by the presence of the umbilical scar (Fig. 1, inset) and the absence of growth rings. Carapace length and width of this individual measured 3.2 and 3.3 cm, respectively, plastron length was 2.9 cm.

On 14 April, 2009, at the Draga pri Igu ponds in central Slovenia, we inspected an open turtle nest (nesting procedure obviously just interrupted) containing six eggs. Because we could not locate the egg-laying turtle, we incubated the eggs in the laboratory at a constant temperature of 29-30°C, in order to identify the taxon that turned out to be *T. scripta elegans*. All six eggs were fertile, but only four hatched 48 days later.

The hatchling found in the wild confirms the successful reproduction of *T. scripta elegans* in the sub-Mediterranean south-western part of Slovenia. The hatchling's size corresponds to the measurements of ERNST & LOVICH (2009) for native North American *T. scripta* populations (carapace length = 3.15 cm; carapace width = 3.02 cm; plastron length = 3.03 cm). The sightings of six further *T. scripta elegans* juveniles of 3 cm shell length confirm outdoor reproduction by their small size.

In its native distribution area, *T. scripta* occurs in a wide variety of different climate zones, ranging from a humid subtropical to semi-arid climate (ERNST & LOVICH 2009). It is thus not unexpected that *T. scripta* is able to reproduce in the Mediterranean climate of southern Europe. However, our data provide additional evidence that *T. scripta* may reproduce in colder regions as well. The presence of hatchlings and of larger juveniles indicates that juveniles can survive in the sub-Mediterranean parts of Europe. Furthermore, the nest with fertilized eggs found in central Slovenia once again shows that *T. scripta* may be able to produce offspring in continental Europe. Although our data cannot confirm successful hatching there, this is likely the case due to the high summer temperatures.

The native and endangered *Emys orbicularis* occurs in all localities where we found evidence for the reproduction of *T. scripta*. Even though there are virtually no data about the syntopic occurrence of the two species in Europe, it has been suggested that the two species might compete for food and habitat (ARVY & SERVAN 1998).

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