The genus *Trachemys* Agassiz, 1857 includes 15 species and is distributed from the mid-western United States to southern South America (Seidel, 2002). *Trachemys scripta elegans* (Wied, 1838) is native to the west of the United States and occurs from the state of Virginia until the north of Florida (Fritz and Havaš, 2007, van Djik et al., 2011). During the last decades, hatchlings and juveniles of this species have been extensively commercialized all over the world as pets, therefore, established populations are known in several countries (e.g. Ficetola, Monti and Padoa-Schioppa, 2002; Cadi et al., 2004; Bunnel, 2005; Shiau et al., 2006; Perry et al., 2007; Pupins, 2007; Soorae, Quarqaz and Gardner, 2008; O’Keeffe, 2009; Kitowski and Pachol, 2009; Izquierdo et al., 2010), including Brazil (Vieira and Costa, 2006; Ferronato et al., 2009; Bujes, 2011; Silva-Soares et al., 2011), where importation and commercialization were forbidden in 1991 by the federal environmental agency (IBAMA) (Souza et al., 2007). *Trachemys dorbigni* (Duméril and Bibron, 1835) is the southernmost species of the genus. It is present in practically all Uruguayan territory (Cabrera, 1998; Achaval and Olmos, 2007), in northeastern Argentina – from the provinces of Misiones and Corrientes to the La Plata River (Waller and Chebez, 1987; Cabrera, 1998; Alcalde et al., 2012) and in southern Brazil, in the central-south portion of the state of Rio Grande do Sul reaching, by the coastal plain, the northeast region of this state, close to the border with the state of Santa Catarina (Lema and Ferreira, 1990; Lema, 1994; Santos et al., 2005; Bujes, 2010; Alcalde et al., 2012).

Recently, *Trachemys dorbigni* was recorded in two conservation units in southeast and south Brazil. An adult female was found at the Parque Estadual Morro do Diabo, southwest of the state of São Paulo, in the Paraná River Basin (Zaher et al., 2009; Santos et al., 2009). This record was attributed to introduction or recent distribution expansion of the species (Santos et al., 2009). In the west of the state of Santa Catarina, the species was recorded at the Parque Estadual das Araucárias, (Hartmann and Giassom, 2008). Since the species’ occurrence in the southern Brazilian plateau is very unlikely this specimen may also represents a case of introduction. Hatchlings and juveniles of *T. dorbigni* are also commercialized as pets in many Brazilian states (Molina and Gomes, 1998a; Bujes and Verrastro, 2008).

Even though it is probably a native species of the southern coastal plain of the state of Santa Catarina (Bujes, 2010), *T. dorbigni*, as well as *T. s. elegans*, was officially considered an invasive alien species by this state’s environmental agency (CONSEMA, 2010), because of its presence in regions outside its natural range, specifically in the ombrophilous dense forest of the eastern region of the state.

The Parque Estadual da Serra do Tabuleiro (PEST) is located in the mid-east region of Santa Catarina (Fig. 1). With 84.130 ha, it is the largest terrestrial conservation unit in the state, and includes several vegetation physiognomies of the Atlantic Forest Biome, such as ombrophilous dense forest, cloud forest, mixed ombrophilous forest (Araucaria forest), altitudinal fields, restingas and mangroves (Ishy et al., 2009). The coastal plain located at the eastern portion of the PEST, known as Restinga da Baixada do Maciambu (RBM), is adjacent to the Atlantic Ocean (27°50’ S; 48°50’ W), and...
presents mainly grassland formations with shrubs and scattered trees found in the driest areas over the sand ridges. Extensive humid areas are found between sand ridges, formed by perennial lakes connecting to marshes during the rainy season. Cyperaceae and Tifaceae are dominant families (Klein, 1981).

Four turtle species are known to exist in the RBM: the chelid turtles *Phrynops hilarii* (Duméril and Bibron, 1835) (Tortato, 2007) and *Hydromedusa tectifera* Cope, 1869 (M. Tortato, pers. obs.) and the exotic emydids *T. s. elegans* (Wied, 1838) (Tortato, 2007; this study), and *T. dorbigni* (this study), as well as some specimens of the introduced tortoise, *Chelonoidis carbonaria* (Spix, 1824) (M. Tortato, pers. obs.). At least *P. hilarii* is known to nest in this area (Tortato, 2007).

In September and October 2006, three *T. dorbigni* females were recorded nesting in the RBM (fig. 2A). Two records occurred on September 17th, between 9 and 11 a.m.; the first nest was 12 cm deep and contained nine eggs; the second nest, located 30 cm away from the first, was 16 cm deep and contained 10 eggs. Both were above the maximum water level, 1.5 m away from a dry water channel and approximately 140 m away from a perennial pond. On October 18th, around 1 p.m., the third nesting female was found on a sand ridge covered by low vegetation (grasslands). This female laid five eggs in a 15 cm deep nest. It was cloudy and rainy in both days when *T. dorbigni* nesting was recorded. Females of this species may lay at least two clutches per year as was verified by Vanzolini (1997) and corroborated by Molina and Gomes (1998b) and Bager, Freitas and Krause (2007). Clutch size recorded at the Taim Ecological Station, Rio Grande do Sul state, varied from six to 19 eggs (Bager, Freitas and Krause, 2007), while Fagundes, Bager and Cechin (2010) recorded a clutch size varying from four to 15 eggs.

On October 20th a tegu lizard (*Tupinambis merianae*) was observed digging and preying on eggs from the second nest. Lizards of the genus *Tupinambis* are well known predators of vertebrates’ eggs, including turtles (*e.g.* Krause, Gomes and Leyser, 1982; Gonçalves, Cechin and Bager, 2007; Tortato, 2007; Salera-Jr., Malvasio and Portelinha, 2009; Schneider, Ferrara and Vogt, 2009; Fagundes, Bager and Cechin, 2010; Schneider et al., 2011).
The nesting activity of *T. dorbigni* observed in the PEST occurred at the beginning of the species egg-laying season, known to extend from September to February (Krause, Gomes and Leyser, 1982; Bager, Freitas and Krause, 2007; Gonçalves, Cechin and Bager, 2007; Fagundes, Bager and Cechin, 2010). The occurrence of nesting during rainy days may be a way to prevent desiccation of eggs or the elevation of females’ body temperature (Moll and Legler, 1971).

On September 1st 2006, three *Trachemys* hatchlings were observed; one was being predated by a burrowing owl (*Athene cunicularia*) and the other two were in a pond about 50 m away from the *T. dorbigni* nesting site. Of these, one was collected (maximum carapace length 39 mm; fig. 2B-C), identified as *T. s. elegans*, and deposited in the Collection of Reptiles of the Departamento de Ecologia e Zoologia of the Universidade Federal de Santa Catarina, Santa Catarina, Brazil (CHUFSC 866). Considering that they were found in late winter, it is possible that these hatchlings had overwintered in the nest (see Bager, Fagundes and Piedras, 2007). The collected individual already presented a completely unfolded shell and a partially closed umbilical scar.

Figure 2. *Trachemys* spp. recorded in the PEST. 2A) Female *T. dorbigni* photographed after nesting (nest 02); 2B) Dorsal view of the *T. s. elegans* hatchling (CHUFSC 866); 2C) Ventral view of the same hatchling.
The establishment of reproductive populations of *T. scripta* in the European Union is related to warmer climates and higher precipitation (Ficetola, Thuiller and Padoa-Schioppa, 2009) and its establishment risk was evaluated as moderate (Kopeccky, Kalous and Patoka, 2013). There is no data about the establishment of reproductive *T. scripta* populations in Brazil, and the same is true for *T. dorbigni* populations out of its natural range. Field observations indicate that *T. dorbigni* is more abundant than *T. scripta* in the PEST. If these were reproductive populations, as our data suggest, *T. dorbigni* could be favored by the resemblance and geographic proximity to its natural range of distribution.

Acknowledgements. The authors would like to thank the Fundação do Meio Ambiente of the state of Santa Catarina (FATMA), the staff of the Visitors Centre of the Parque Estadual da Serra do Tabuleiro, Alex Bager and Silvia Ziller for their help and information provided. We would like to specially thank Flavio de Barros Molina for the valuable contributions and for reviewing the manuscript.

References


Lema, T., Ferreira, M.T.S. (1990): Contribuição ao conhecimento dos Testudines do Rio Grande do Sul (Brasil) – Lista sistemática...
Reproduction of two exotic species of *Trachemys* Agassiz, 1857


Accepted by Mirco Solé