

Overwintering Site Fidelity in the European Pond Turtle (Emys orbicularis) in Western Poland

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Abstract. The location of overwintering sites of six male and six female European pond turtles (*Emys orbicularis*) were studied using radiotelemetry in Western Poland, over a period of four consecutive seasons. Most of the studied individuals overwintered in the same area during the research; most distances between two consecutive overwintering sites were 0–25 m. However, changes related to the overwintering area were observed, and in such cases the distance between overwintering sites on two consecutive seasons could exceed 2 km. These results can support an efficient conservation strategy of the turtle population.

Keywords: European pond turtle, hibernation, radiotelemetry, temperature.

Introduction

Data on habitat use by animals is crucial for protection of the animal species (e.g., PULLIN, 2004; STEEN *et al.*, 2012). Many animals use similar sites over the years. However, conservation of freshwater turtles depends on the quality and protection of aquatic, as well as surrounding terrestrial habitats (e.g., BURKE *et al.*, 2000; SEMLITSCH & BODIE, 2003; CADI *et al.*, 2008; MITRUS, 2010). The European pond turtle *Emys orbicularis* (L., 1758) is an endangered species in many parts of its distribution area (FRITZ, 2003). For some populations, accurate data is available on nesting area locations (e.g., MITRUS, 2006; NAJBAR & SZUSZKIEWICZ, 2007; BONA *et al.*, 2012) and habitat use (e.g., MEESKE & MÜHLENBERG,

2004; CADI *et al.*, 2008). However, for the larger part of distribution range including central Europe, the absence of data on overwintering areas hampers the development of an efficient protection strategy; indeed, the non protection of seasonal habitats (e.g., overwintering areas) could lead to extinction of a population (cf. CADI *et al.*, 2008).

In this study, we present data on overwintering sites used by the European pond turtle in Western Poland. We tested whether overwintering areas were different for females and males, and if individuals showed overwintering site fidelity. Such data are important for application to wetland conservation and management of the turtle population.

Material and Methods

The research area is situated in Western Poland (Fig. 1), several kilometres far from the mouth of the Ilanka River – a tributary of the Odra River. The European pond turtle is observed particularly in a channel that is approximately 2,500 m long and 7–10 m wide, see Fig. 2), and also in its small tributaries (100–250 m long & 5–15 m wide). In the channel, the flowing is very slow, with stagnant water in places. The bottom of the studied basins is covered with a thick layer of sediment. The Ilanka River flows in parallel with the channel, with significantly faster flowing ($1.76 \text{ m}^3/\text{s}$) (NAJBAR, 2008).



Fig. 1. Location of the study area in Western Poland.

During the research, we monitored six females and six males by using radiotelemetry (straight carapace length SCL: 152.3–197.0 mm, plastron length PL: 141.3–194.1 mm, body mass BM: 600–1100 g for females, and SCL: 143.0–167.3 mm, PL: 131.0–146.4 mm, BM: 445–660 g for males). Turtles were collected during August–September 2011, and transmitters were glued to their carapaces. We used 10–15 g high frequency (VHF) radio transmitters (type RI-2B, Holohil Systems, Ltd., Ontario, Canada) and ASK-032/P directional antennas connected to an ICOM IC-R20 portable receiver. We also used specially designed transmitters weighted 8–16 g. Turtle positions were tracked two to six times per month from autumn to spring, which is adequate considering the extreme sedentariness of hibernating the European

pond turtles (cf. e.g., NOVOTNÝ *et al.*, 2004; THIENPONT *et al.*, 2004; CADI *et al.*, 2008), during four consecutive overwintering seasons (2011/12 to 2014/15).

The accuracy range of site locations was within $\pm 5 \text{ m}$. In addition, water and sediment temperature were monitored at one-hour intervals. We used AZ Instruments data loggers (type 8828) placed in waterproof containers. The data loggers were positioned in the water, several to a dozen centimetres above the sediment layer (i.e. 35–50 cm below water level), and inside the sediment layer (at a depth of 50–65 cm); thickness of sediment in the areas is a. 2–3 m.

Results and Discussion

We collected data on three to four overwintering sites per turtle, during the four above-mentioned consecutive seasons. Although during spring and summer turtles were observed everywhere along the Ilanka River channel, in winter they were detected in only two areas, most of the radio-tracked turtles overwintered at the eastern part and at the end of the channel (Figs 2-3). Females and males overwintered in the same areas (Figs 2-3). Most individuals (four of the six females, and five of the six males) overwintered in the same area each year; distances between two consecutive overwintering locations were 0–15 m for females (mean 8 m, $n=11$ distances for four individuals), and 0–25 m for males (mean 10 m, $n=14$ distances for five individuals).

Only three turtles changed their overwintering area (Figs 3-4). For example, female No. 12 showed a strong site fidelity between 2011/12 and 2012/13 (distance $\sim 15 \text{ m}$), then moved $\sim 1,940 \text{ m}$ from this site in 2013/14, and moved back $\sim 5 \text{ m}$ from the first site in 2014/15 (Fig. 4). For female No. 21 the distances between sites used in 2011/12 – 2012/13 and 2012/13 – 2013/14 were 10 m and 20 m respectively, but between 2013/14 and 2014/15 the distance was $\sim 2,275 \text{ m}$ (Figs 3-4).

During overwintering period (mid-November – February 2013/14), the average water temperature was 3.6–7.6°C, and sediment temperature was 6.1–7.9°C (Fig. 5).

Daily temperature changes were 0.0–3.2°C in water and 0.0–1.9°C in sediments for season 2013/14. In other seasons the

average temperatures and daily temperature changes were similar.

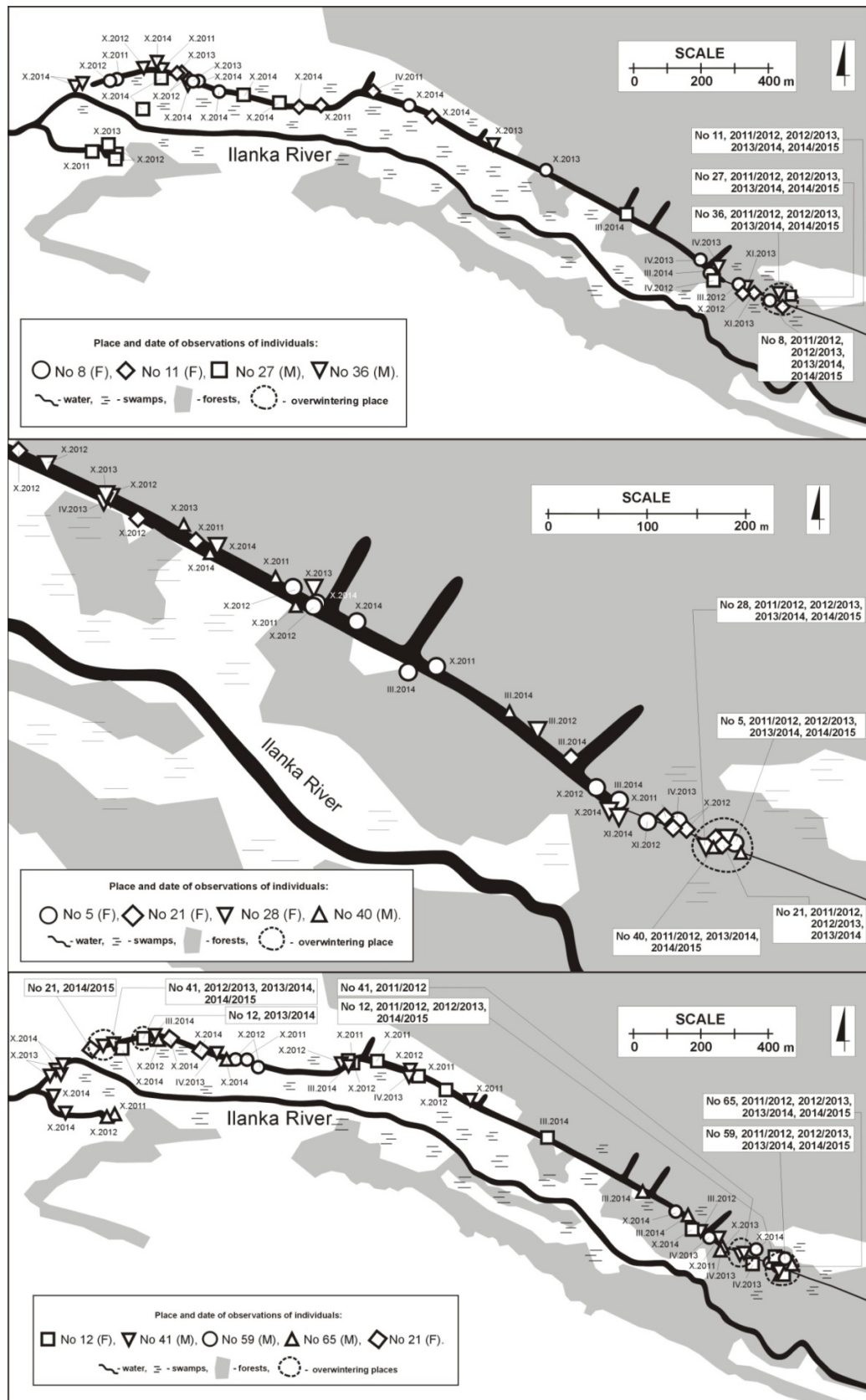


Fig. 2–4. Location of overwintering sites of the adult European pond turtles (*Emys orbicularis*) in Western Poland, during four consecutive seasons 2011/2012 – 2014/2015.

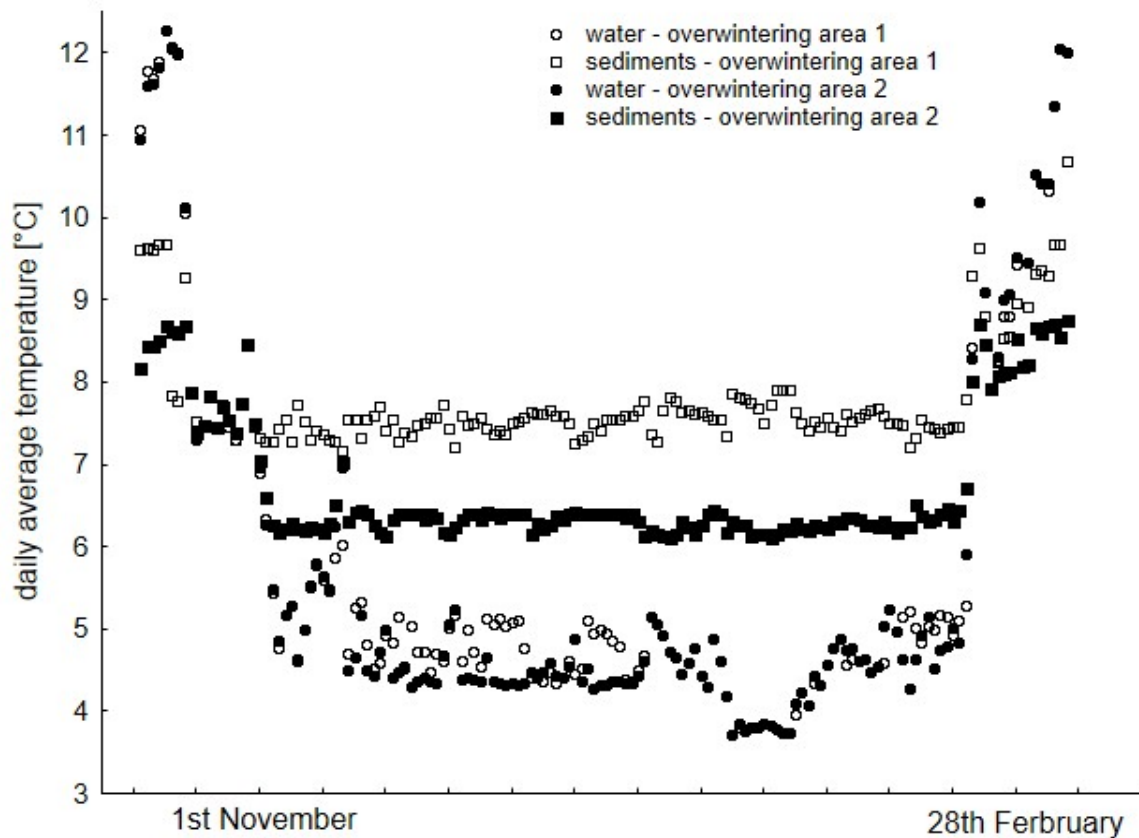


Fig. 5. Average daily water and sediments temperature in the overwintering sites of the European pond turtles (*Emys orbicularis*) in 2013/14.

Underwater overwintering in the European pond turtle is well documented (e.g., NOVOTNÝ *et al.*, 2004; ULTSCH, 2006; CADI *et al.*, 2008; NAJBAR, 2008), especially under cold and temperate climates; our results show that Poland is no exception. In the present study we found that most of the twelve radio-tracked individuals overwintered in the same small area. Our unpublished observations confirm that more turtles from the studied population overwintered in the same area. Thus, the Ilanka river channel extremity portions are of crucial importance for the population. Destroying such area during winter (e.g., during restoration of the irrigation system) could cause the mortality of many individuals, which may be dangerous for the population of this long-living species (BROOKS *et al.*, 1991; CONGDON *et al.*, 1993). Thus, precise data on the location of such overwintering areas could be crucial for the protection of populations, especially small ones.

Our data had been obtained from adult individuals only; we have no data on overwintering sites of hatchlings and juveniles. We found that in the studied population males and females overwintered together. Similar data were presented by CADI *et al.* (2008) for the turtles in France. We suppose that such gregariousness might be beneficial for the turtle by facilitating courtship, which occurs soon after overwintering.

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