

Is the European pond turtle *Emys orbicularis* strictly aquatic? – Habitats where the turtle lives in central Europe

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Abstract. Based on ecological characteristics and phylogenetic analysis, it is possible to try to reconstruct the evolution of ecological traits in turtles. However, the European pond turtle is treated by different scientists as aquatic or as semi-aquatic species. The importance of terrestrial behaviour for this species is discussed.

Keyword. *Emys orbicularis*, habitat, terrestrial behaviour.

In their paper, Ficetola and De Bernardi (2006) stated – in contrast to the ecological character used by Stephens and Wiens (2003) in their analysis – that the European pond turtle *Emys orbicularis* is a semi-aquatic, not an aquatic species. It is known that terrestrial habitats are important for all freshwater turtles (e.g., because they lay egg on land), and that for protection of the turtles it is important not to overlook the upland environment as it is vital for their survival (Semlitsch and Bodie, 2003). Thus, for the majority of freshwater turtle species, as well for marine ones, the discussion as to whether one is “aquatic” or “semi-aquatic”, seems to be a purely academic discussion about definitions. However, basing on ecological characteristics and phylogenetic analysis, it is possible to try to reconstruct the evolution of ecological traits in Emydid turtles (cf. Stephens and Wiens, 2003), and, for such analysis, information on which ecological group the European pond turtle belongs to, could be essential.

I agree with the main conclusion made by Ficetola and De Bernardi (2006), although some of the information in the article can be disputed. Thus, I would like to discuss some cited data about types of habitat used by the turtle. As it may happen that the importance of terrestrial behaviour is different among populations (Ficetola and De Bernardi, 2006), I have focused this report of mine on data set from central Europe, especially from Poland.

Habitats use by the European pond turtle

The European pond turtle is only one of the native turtle species living in Poland, and in central Europe (Fritz, 2003). Typically, it lives in small bodies of water with muddy bot-

toms, old riverbeds, wetlands and little holes and ponds. Natural habitat types inhabited by the turtle in Poland are (according to Natura 2000 codes; Interpretation Manual, 2007) (Mitrus, 2004; Najbar, 2007):

- 3150: natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* – type vegetation (the most important habitat for the species in Poland),
- 3160: natural dystrophic lakes and ponds,
- 7140: transition mires and quaking bogs (turtles live in small ponds: natural ones or those left after peat exploitation),
- 2330: inland dunes with open *Corynephorus* and *Agrostis* grassland (by the turtle the habitat is used for egg laying).

Generally, individuals of the species bask and mate in or very close to water (Ficetola and De Bernardi, 2006). From central Europe data about mating is scarce – in the area the turtles mate in shallow water (Mitrus and Zemanek, 2000; Najbar, 2008). However, the problem is how often the turtles use terrestrial areas for different activities, and how far from the water bodies they move.

Feeding

As presented by Ficetola and De Bernardi (2006), there are only few studies concerning the diet of *Emys orbicularis*. I think that the abundance of terrestrial insects in the diet of the turtle, may represent insufficient evidence that the upland environment can be important for feeding: Ottonello et al. (2005) showed that terrestrial arthropods were more abundant in the diet of turtles from canals, than individuals from the marshes. However, the abundance of terrestrial animals in the turtle's diet i) could be due to turtles hunting activity on land (using terrestrial habitats for feeding), or ii) because terrestrial invertebrates have fallen into the water. The matter may be then influenced by site features and individual population activity. The large abundance of terrestrial invertebrates in the diet of the turtle was also noted by Kotenko (2000), and she also stated that in Ukraine, the turtle inhabited water bodies located very close to typical terrestrial areas.

Personally, I observed that in artificial conditions, young European pond turtles sporadically try to hunt crickets (given as food), staying on rocks close to water. It is possible that under natural conditions, the turtle use terrestrial habitats for hunting, but there is insufficient data to conclude that such behaviour is a frequent pattern.

Overwintering

Field studies indicate that in central Europe the turtle overwinters in water bodies (e.g., Najbar, 2008; Novotný et al., 2004). Adult individuals of the turtle are able to survive winter on land, but most available data about hibernation on land refers to captive individuals (cf. Ultsch, 2006). Suitable data on the subject are actually needed (e.g., about possibility and frequency under natural condition of an aestivation of the turtle on land).

Terrestrial movements

In central Poland, most of the turtle nests were located less than 150 meters from water bodies, with the largest distance being about 350 m (Mitrus, 2006a). In western Poland, the distances were 69–85 m (sporadically 150–270 m; Najbar and Szuszkiewicz, 2007; Najbar, 2008), and in Slovakia typically 200–800 m (Novotny et al., 2004). However, there is problem if we will try to present data on *distances* of nesting movements. Females can not proceed directly from the water to the egg laying area, and at the nesting area turtles hardly ever go straight ahead (e.g., Jabłoński and Jabłońska, 1998; Mitrus, 2006b).

There is some information about very long distances of nesting migrations, exceeding 1 km (cf. Ficetola and De Bernardi, 2006). However, Schneeweiss and Steinhauer (1998) reported only three females, and only one of them migrated *on land* at a distance exceeding 1 km (1170 m) [there is a mistake in the References of Ficetola and De Bernardi (2006)'s paper – an incorrect paper is cited – but I think that the authors have written about data presented in Schneeweiss and Steinhauer (1998)]. Jabłoński and Jabłońska (1998) write about a particular 4 km journey, but “mostly through water”. It was reported, from different areas in central Europe, that some females probably make the first stage of their nesting movements through water, although precise data are not available (Jabłoński and Jabłońska, 1998; Najbar, 2008; personal observation).

Longer movements unrelated with egg laying are probably rare. There is information about the migration of turtles, although this is mostly in water areas that have since dried out (e.g., Kotenko, 2000), and precise data are very scarce. In Lithuania, turtles could migrate between ponds over longer distances using “flooded areas and/or channels as migration routes” (Meeske and Muhlenberg, 2004). One individual migrated 650 m when one such flooded area “was filled with very little water” (Meeske and Muhlenberg, 2004). So it is by definition questionable, if it was moving on terrestrial areas or not. In western Poland, two males moved 370 m and 450 m respectively from water bodies, to a dry pine forest and back (Najbar, 2008).

From different areas of Europe there are data about land migrations of the turtle, both nesting migrations (e.g., Rovero and Chelazzi, 1996), and migrations on land not connected with egg laying (e.g., Cadi et al., 2008), sometimes exceeding 0.5 km or even 1 km. However, based on available data (and especially on the papers cited by Ficetola and De Bernardi, 2006), it is difficult to conclude that for the European pond turtle terrestrial movements exceeding 1 km are common.

In many cases it is difficult to compare data for different species, presented by different scientists. However, basing on data for *Emydoidea blandingii* and *Clemmys guttata* (Joyal et al., 2001), it is logical suppose that *Emys orbicularis* present shorter land migrations that the two species.

As Ficetola and De Bernardi (2006) pointed out in their paper, the European pond turtle is *not strictly* aquatic. However, Stephens and Wied (2003) defined an “aquatic” species as those reported to “spend their active season primarily in aquatic habitats, generally leaving the water only to bask, migrate to a new aquatic habitat, or nest”. I do not want to discuss if the definition is the best one available, but based on it, the European pond turtle is – at least in central Europe – an *aquatic* species. Whether *Emys orbicularis* should be classified and treated as an aquatic or semi-aquatic species, it would depend on how much

time individuals spend on land during migrations not connected with nesting, as well as how often they are overwintering and hunting on land. Currently, the available data enable one to say only that the European pond turtle is able to survive the winter on land, and it also feeds on terrestrial invertebrates.

The European pond turtle has very wide distribution areas including Northwest Africa a large part of Europe, as well as Asia Minor, and presently it is divided into many subspecies (Fritz, 2003). As the turtles live in different environmental conditions (e.g., in central Europe compared to Mediterranean areas) it is probable that the terrestrial behaviour may be different among populations (Ficetola and De Bernardi, 2006) and/or subspecies. Thus, for studying the evolution of Emydid turtles, comparative analyses of ecology and behaviour of different subspecies and populations of *Emys orbicularis* would be strongly needed.

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