NIFS: THE DEFINITIVE THREAT TO ISOLATED POPULATIONS OF EMYS ORBICULARIS?

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ABSTRACT

Non-indigenous freshwater species (NIFS) are one of the biggest problems to local biodiversity, especially in freshwater habitats. Some of these species have changed the composition of the original communities of their new habitats. The impact of some of the most common NIFS, as the red eared slider (Trachemys scripta elegans), are well known. Usually the impact is based on direct competence for food, basking areas or nesting areas. Other NIFS as the racoon (Procyon lotor) can predate over European pond turtles, being able to mutilate or even eradicate small isolated populations. But the last threat, and maybe the most important, could be the spill-over of parasites from NIFS to Emys orbicularis. This is the case of the event detected in a small population from NW Spain, where transmission of trematodes from red-eared sliders resulted in a mortality outbreak.

Key words: NIFS, Procyon, Trachemys, Emys, parasites, Spain.

Non-indigenous freshwater species (NIFS) can be introduced deliberately or unintentionally (Gherardi et al 2008), but all of them might have detrimental effects on native biodiversity (Cobo et al. 2010). Ecosystem alteration, introduction of alien species that usually became invasive, and globalization that permits movement of merchandises and passengers in a few hours, represent factors that are involved in the dispersal of new pathogens. Several cases of negative effects due to pathogen spillover have been reported in Europe, as the parasitic fungus (Aphanomices astaci. Schikora) propagate from American crayfishes (Peeler et al. 2011) to native crayfishes, also Aleutian mink disease virus propagated by American mink to the endangered European mink (Manas et al. 2001).

In Galicia region (NW Spain) there are several reports that introduction of alien species produced a severe decline of native species, caused by transmission of pathogens or parasites. The problems in the European eel (Anguilla anguilla. Shaw) populations due to the spread of the swimbladder nematode Anguilicolloides crassus. Kuwahara, Niimi & Hagaki (Gollock et al. 2004) are well known.
The impact of some of the most common NFIS, as the red eared slider (*Trachemys scripta elegans* Wied.), are well known. Even though that it was supposed that the species was not able to cope with European winters (Luiselli et al. 1997), later the data supported its tolerance. Usually the impact is based on direct competence for food, basking areas or nesting areas (Cadi and Joly 2003, 2004).

In the Iberian Peninsula it have been tested the detrimental effects on native turtles (*Mauremys leprosa* Schweiger). *T. scripta* cues are avoided by *M. leprosa* (Polo-Cavia et al. 2009a), changing their use of the space available. When *M. leprosa* share space with *T. scripta*, its access to food resources is limited by the presence of the alien turtle (Polo-Cavia et al. 2011). Also, native turtles bask shorter times and avoided use of basking platforms shared with sliders (Polo-Cavia et al. 2010a). *T. scripta* has a higher thermal inertia, that represents an advantage in the competition with native turtles (Polo-Cavia et al. 2009b). The shape of its carapace allows the alien species to turn right-side up faster than *M. leprosa* (Polo-Cavia et al. 2012a). Experiments comparing bioenergetics of *M. leprosa* and *T. scripta* showed that both species differ in thermal requirements (Polo-Cavia et al. 2012b), being more efficient the alien one. A review of the detrimental effects caused by red-eared sliders on native herpetofauna has been published recently by Polo-Cavia et al. (2014).

A Life project funded by the European Union has been running from 2011 to 2013 in the Iberian Peninsula, most of the actions were developed in the Eastern coast of Spain, but with some actions developed in the South of Portugal. More than 22,000 turtles have been captured during the LIFE Trachemys project (LIFE Trachemys Layman´s report).

Other NFIS that have arrived recently to the Iberian Peninsula is the racoon (*Procyon lotor* Linnaeus.), with multiple introductions (Alda et al. 2013). This alien species can predate over European pond turtles, being able to mutilate or even eradicate small isolated populations (Schneeweis & Wolf 2009). It was first detected in the Sureste Regional Park, in Madrid region, in 2003. More than 300 ex. have been captured during a culling campaign (Garcia et al. 2012). Later it was detected in the surroundings of Doñana National Park in 2011 (Fernandez-Aguilar et al. 2012), at least 11 raccoons were captured in that area. Last year it was detected the presence of the species in the Miño river in Galicia region (NW Spain). As all European pond turtle populations in Galicia inhabit tributaries of the Miño river, or surrounding areas, the presence of the raccoon could be an important threat that should be controlled as soon as possible.

The last threat, and maybe the most important, is the spillover of parasites from NFIS to *Emys orbicularis* Linnaeus. Parasite host switching between native and alien turtles have been reported by Verneau et al. (2011), and later host switching between alien and native turtles by Meyer et al. (2014). In those studies no detrimental effects on native turtles are reported, but it´s suggested that spillover of parasites from sliders could occur.
This is the case of the outbreak event detected in a small population from North Western Spain, where transmission of trematodes from red-eared sliders resulted in mortality of European pond turtles (Iglesias et al. in press). During winter 2012-13 was detected the first case of blood fluke switching between *T. scripta* and *E. orbicularis*. Several turtles died due to damage in internal organs caused by the eggs of *Spirorchis elegans* Stunkard. To our knowledge, this is the first case detected in Europe of mortality associated with spillover of parasites from alien turtles to autochthonous pond turtles. Mortality caused by this parasite could decimate small isolated populations of European pond turtles, as there is no treatment available.

**REFERENCES**


