MERCI project

Managing exotic reptiles on Caribbean islands

MISSION REPORTS N°3

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MISSION IN MARTINIQUE

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Table of contents

Mission report - *Trachemys* - Martinique

Mission period: May 13th to June 7th, 2022
As part of the MERCI Project

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I. Introduction and background

Invasive alien species (IAS) are one of the major threats to biodiversity in the world (Millennium Ecosystem Assessment, 2005). This threat is accelerated by globalization and global changes that blur the natural limits of species distribution. As a result, the number of new interactions between native species and IAS continues to increase. These interactions induce various negative consequences on native species, in particular via competition, predation or genetic hybridization (Ricciardi et al. 2013; Crystal-Ornelas and Lockwood, 2020). Thus, understanding how native species respond to recent biological invasions and how these interactions may affect the coexistence or future extinction of species is of major interest.

This threat particularly affects island territories such as the Caribbean region, considered as one of the greatest biodiversity hotspots in the world (Meyers et al., 2000). In this region, managers attention has mainly been focused on mammalian species voluntarily introduced by humans, as well as on certain spectacular species such as the lionfish. Other IAS, often smaller in size and with more discreet habits, are however also likely to induce negative consequences on ecosystems. This is particularly the case for reptile species which combine a certain number of characteristics at the basis of their invasive nature: generalist diet, high fecundity, large population size, small size (facilitating their transport and reducing their detectability).

One invasive reptile species, the Yellow-bellied slider turtle, *Trachemys scripta*¸ is ranked among the 100 most invasive species in the world (Powell et al, 2011; Lowe et al., 2000). This freshwater turtle is native to the USA and Mexico. The species is the subject of an important trade that led to its introduction in a large number of regions throughout the world (Ramsay et al., 2007; Maillard and David, 2014). Omnivorous and able to adapt to a very wide variety of climates and habitats, its presence and expansion in the Caribbean region represents a potential danger for the flora and fauna of the French West Indies, as shown on native European ecosystems. (e.g. Cadi and Joly, 2003; Polo-Cavia et al., 2009, 2010, 2011). Although its presence in Guadeloupe was reported as early as 1975 (Schwartz and Thomas, 1975) and in Martinique in 1997 (Servan and Arvy, 1997), its impact on the native ecosystems of these islands remains poorly documented.

The Yellow-bellied slider turtle is found in sympatry on these two islands with another invasive alien species belonging to the same genus, the Antillean slider, *T. stejnegeri*. Native to several other islands in the Caribbean region such as Puerto Rico (Culebra and Vieques), Great Inagua (Bahamas), Haiti, Dominican Republic, and the Turks and Caicos Islands (Seidel and Inchaustegui, 1984; Jones and Willey, 2011; Powell et al., 2011; Rhodin et al., 2017), the Antillean slider was probably introduced to Guadeloupe during the Amerindian period, while its presence in Martinique has only recently been reported (Bourgade, 2021). Similarly as the Yellow-bellied slider turtle, it can live in a great diversity of natural and anthropized environments (Seidel and Inchaustegui, 1984; Jones and Willey, 2011), and its spatial distribution and the abundance of its introduced populations, as well as as their impact on native ecosystems, also remain unknown.

Therefore, in order to assess the impact of these species in Martinique, a first scientific mission was carried out. The objective of this mission was to set up a protocol for monitoring the populations of these two species. In addition, genetic samples were collected to analyse the phylogeny of captured individuals and identify potential hybrids. On euthanized individuals, stomach contents were collected

in order to quantify and determine the prey ingested by the captured trachemids. This mission was carried out by Caribaea Initiative, with the support of the Office Française de la Biodiversité (OFB), as part of the MERCI Project (Managing Exotic Reptiles on Caribbean Islands), co-financed by the INTERREG Caribbean program under the European Regional Development Fund. The purpose of this report is to present the outline of the activities carried out during this mission.

II. Methods

Mission period: May 13th to June 7th, 2022

2.1. Sites selection

The study sites were selected taking into account the first information on the presence of Trachemys provided by Maillard and David (2014). In addition, preliminary surveys were carried out by the OFB, revealing the drying up of certain ponds in the study conducted by Maillard and David (2014). Some owners also refused that the research team accessed to their private ponds. Consequently, only three ponds were chosen for the study, spread over the communes of Robert (97231), Marin (97290) and Rivière Pilote (97211; Fig.1), with the aim to initiate a Capture-Marking-Recapture protocol (CMR) to estimate the number of turtles present in these sites. Captures and euthanasia of trachemyds took place in a fourth pond, located in the commune of Marin (Fig. 1), in order to estimate the impact of the trachemyds on Martinican biodiversity by determining the prey they ingest thanks to the analysis of their stomach contents.

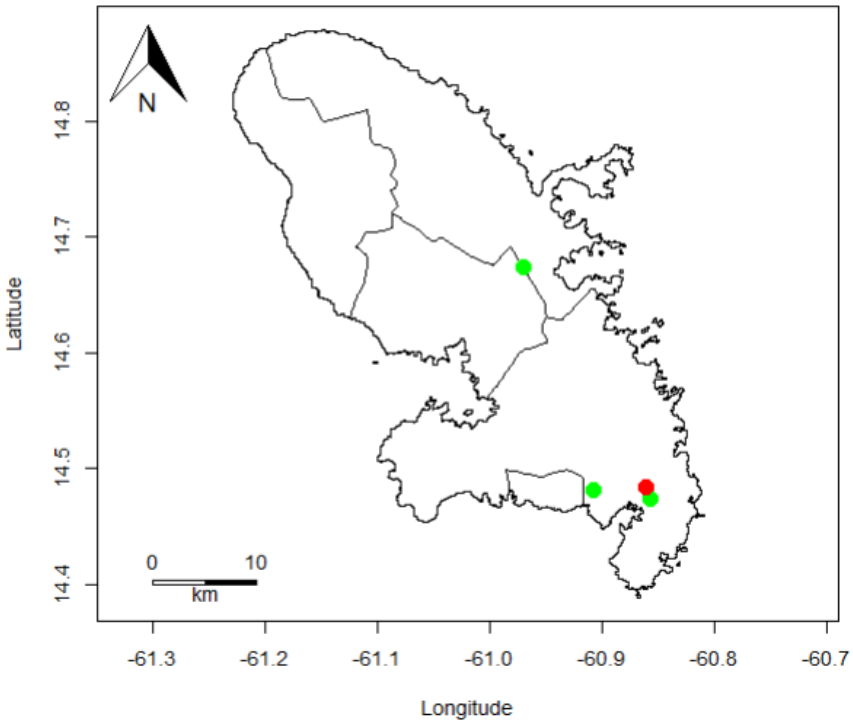

Fig. 1. Distribution map of the ponds visited. The green dots represent the geographical location of the ponds selected for the CMR study, and the red dot corresponds to the pond where captures were followed by euthanasia.

2.2. Presentation of traps and capture

For the study, 8 dip nets and 9 basking traps (Annex 1 and 2) were built on site to allow the capture of *Trachemys*. For logistical reasons, only 2 nets and 7 basking traps were used during this first mission. In addition, 9 insolation platforms on which a camera trap was installed were also built on site (Appendix 3). Six of them were deployed on the capture sites without acts of euthanasia in order to determine the relative and absolute abundance of *Trachemys*. For the site where the trachemids were captured and euthanized, 2 nets were used for the captures (Appendix 4).

2.3. Implementation of the CMR protocol

For the implementation of the CMR, the turtles captured were marked using a PVC plate (4cm or 7cm in diameter) engraved with an alphanumeric code. These plates were glued to the back of the turtle with epoxy resin (Appendix 5). PVC plates were placed on the turtles after performing biometric measurements and collecting saliva samples. The turtles were released at the exact location of their capture.

2.4. Data collection during the mission

The turtles captured during the mission were measured, weighed and photographs of the carapace, temple and plastron were also taken (Appendix 6). A behavioural test, called reversal test based on the righting capacity of Chelonians (Delmas et al., 2007; Ibáñez et al., 2018) has also been implemented. This righting test is one of the methods for evaluating the survival and predation control capabilities of turtles (Ibáñez et al., 2018) taking into account the physical abilities of the individuals considered (Delmas et al., 2007). This test was carried out on all the turtles captured before the measurements and photographs were taken so that the behavioural test was not biased by the potential stress caused by handling the turtles. Saliva samples were also collected for all captured individuals. For euthanized individuals, blood (approximately 0.1 ml) and tissue (tail tip) samples were collected after killing.

III. Results

The results presented here are preliminary and data is currently being collected and analysed.

A total of 38 turtles were captured in the study. They were measured and photographed for morphometric and colorimetric analyses. Among the 38 turtles, monitoring by the CMR method was carried out on 14 marked individuals, all captured in a single pond (14 captures and 2 recaptures, Mare de Rivière-Pilote). In the pond of the municipality of Robert, only one turtle was captured, and none were captured in the pond of the municipality of Marin, making the CMR protocol impossible. As a result, the CMR protocol was only carried out in the Rivière-Pilote pond. However, insolation platforms equipped with a camera trap were deployed on all the ponds in order to recapture in image the marked individuals in the Rivière-Pilote pond and to estimate a relative abundance in the ponds where the CMR was not possible.

The behavioural test was only carried out on the 15 individuals captured for the CMR protocol. From all 38 individuals, saliva samples were collected for genetic analysis. A sample of excrement was also collected from an individual from Rivière Pilote who had defecated in the retention bucket. Additionally, 23 individuals were euthanized and blood and tissue (tail) samples, in addition to saliva samples, were collected for genetic analysis. A comparison between these three types of DNA samples (blood, tissue and saliva) will be carried out in order to determine the best method for collecting genetic material from aquatic turtles. The 23 euthanized individuals were stored in the freezer (-20°C)

in Martinique, at the Office Français de la Biodiversité, in order to limit any damage to the food bolus. Soon, the stomach of each turtle will be removed by dissection in order to study their diet. This information will provide a concrete answer regarding the impact of these invasive turtles on the local fauna and flora of Martinique.

IV. Conclusion et perspectives

The results provided at this stage are preliminary and will be supplemented by subsequent analyses and ongoing post-mission monitoring with camera traps. They are only provided as an indication for an evaluation of what was done during the mission in Martinique.

The traps built for this mission are stored at the OFB and will be used, if necessary, during a second mission in Martinique.

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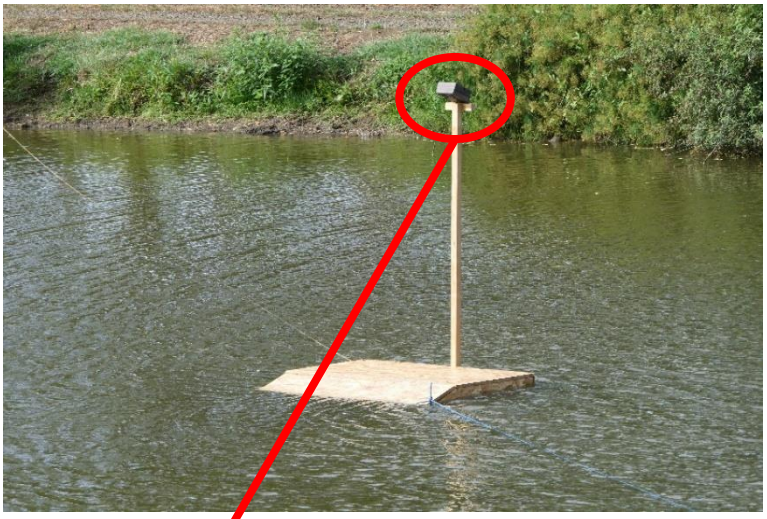
Appendices

The photographs were taken by the association Caribaea Initiative.

Appendix 1: Photo of a basking trap

Appendix 2: Photo of a dip net

Appendix 3: Photographs of the insolation platform, with a camera trap



Appendix 4: Photograph of trachemydes dip net fishing

Appendix 5: Photographs of trachemydes with an alphanumeric PVC plate glued to the shell. The photograph on the right, of the E8 turtle, is a recapture.

Appendix 6: Photographs taken during biometric measurements