Report on the outcomes of a Short-Term Scientific Mission[[1]](#footnote-1)

Action number: CA18221

Grantee name: Peter Vermeiren

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| **Details of the STSM**  Title: *Proof-of-concept model regarding exposure and accumulation of currently used pesticides in sand lizards*  Start and end date: 14/11/2022 to 28/04/2023 |
| **Description of the work carried out during the STSM**  Description of the activities carried out during the STSM. Any deviations from the initial working plan shall also be described in this section. |
| *(max. 500 words)*  The STSM aimed at developing a mechanistic model that integrates ecology, physiology and ecotoxicology of sand lizards, as a proof-of-concept for what could be achieved if such tools were integrated as part of a (intended) risk assessment (RA) scheme for reptiles under European registration. The model was adapted from a parallel model on American alligators towards sand lizards, because of their potential as focal species for reptile RA and their broad distribution across Europe.  The STSM workplan was organised in 5 key steps   1. **A lifecycle sketch**, supported by quantitative data was developed. This allowed for the mechanistic modelling of key life processes (growth, reproduction, seasonal movement, pollution accumulation: see step 3), and the validation of predicted model outcomes (population level patterns in activity, life stage duration, size, age and reproductive output, see step 4) 2. **An environmental scenario**, relevant to RA, was developed and focussed on exposure in a vineyard landscape. Key quantitative data characterising the temperature and dietary exposure were gathered across nest, hibernacula and vineyard environments. These were translated into inputs for the model at a daily resolution. Diet preferences and associated pollution intake are undergoing further development (with the aim of providing a publication ready model development and application, see “follow-up activities”). 3. **The model was calibrated** using Add-my-Pet parameters for bioenergetics driven development of individual lizards; using literature data and associated models for activity behaviours; using prey caloric content and pollution levels derived from the EFSA 2009 Bird and Mammal ERA guideline; and using a maternal transfer model developed in a parallel project. Refinements and extensions of model calibration are under discussion (see step 5). 4. **The model was validated** against literature derived data on growth, reproduction and activity patterns of sand lizards using pattern-oriented modelling. Given the absence of pollution accumulation (and effect) data, the toxicokinetics of the model were evaluated based on expert judgement and further development (including data requirements for validation) discussed in terms of this proof-of-concept’s model application in RA (see step 5). 5. **The current feasibility** of the model in terms of data needs and model technical abilities are **under discussion** (with discussion meeting planned in June), with the aim of providing concrete recommendations for further development. The application of this model in RA is planned to be discussed with regulatory experts at RIFCON at a follow up meeting in June. |
| **Description of the STSM main achievements and planned follow-up activities**  Description and assessment of whether the STSM achieved its planned goals and expected outcomes, including specific contribution to Action objective and deliverables, or publications resulting from the STSM. Agreed plans for future follow-up collaborations shall also be described in this section.  *(max. 500 words)*  The STSM resulted in a first proof-of-concept biologically-based model, including associated databases and model software, adapted to the sand lizard, a potential focal species for reptile RA in Europe. The STSM thereby contributed to objectives of PERIAMAR: **Task 1.1** (identify exposure routes); **Task 2.1** (agricultural areas as habitats for reptiles); **Task 3.1** (ERA focal species); and **Task 3.4** (replacement methods and ERA scheme); and extended the ongoing PERIAMAR **project** “Lifecycle energetics of reptiles under pollution stress” (<https://periamar.com/projects/ttView/21>)  The work was partially presented at the SETAC 2023 Dublin conference in a special session on “generating experimental data to inform effect modelling”, and is planned to be presented in a more finalized form at an ecotoxicology conference in 2024 (e.g. SETAC Europe).  The STSM fostered scientific interchange between RIFCON (the host, private enterprise) and the academic sector (A. Focks, Osnabrück University and S. Charles, Claude Bernard University Lyon 1). The STSM (indirectly) also provided opportunities for academic scientists (P Vermeiren, and C. C. Muñoz) to be exposed to the regulatory and industry view on ecotoxicological modelling, leading to career benefits.  As follow up activities, it is intended to refine some of the model calibration and validation to bring it up to standard for publication in an international peer-reviewed scientific journal. The aim of the paper will be to showcase the potential benefit of mechanistic models in a RA scheme adapted to reptile species under European registration. Specific follow-up activities include:   * Work on refined input data regarding diet preferences and associated pollution intake, planned for summer 2023. * Discussion meetings on model development, including data requirements and technical feasibility, are planned in June 2023. * A discussion on the potential application of this model in RA is planned for June 2023. |

1. This report is submitted by the grantee to the Action MC for approval and for claiming payment of the awarded grant. The Grant Awarding Coordinator coordinates the evaluation of this report on behalf of the Action MC and instructs the GH for payment of the Grant. [↑](#footnote-ref-1)