SHORT TERM SCIENTIFIC MISSION (STSM) SCIENTIFIC REPORT

This report is submitted for approval by the STSM applicant to the STSM coordinator

Action number: CA16224
STSM title: Identification of candidate raptor species and sample matrices suitable for pan-European monitoring
STSM start and end date: 24/07/2019 to 22/08/2019
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PURPOSE OF THE STSM:

The purpose of this STSM was to identify species that are suitable for pan-European monitoring of prioritized environmental pollutants (agrochemicals, anticoagulant Rodenticides and metals such lead and mercury) based on ecological traits such as species distribution, food web, feeding trait, feeding habitat, diet and migratory behaviour.

DESCRIPTION OF WORK CARRIED OUT DURING THE STSMS

First step of the STSM was to summarize and compile the feedback from the Thessaloniki Workshop conducted in February, 2019. Participants of the workshop were divided into four groups and were asked to compile information to the following four subjects:
•   Purpose of monitoring
•   Compound and matrix
•   Chemical priority feedback
•   Candidate species

As a next step I summarized all mentioned candidate species for the identified main environmental pollutant classes. This selection was shortlisted based on species distributions within the four main regions of Europe (United Nations geoscheme for Europe) to exclude species with an unrepresentative spatial coverage. Further on, I assigned the remaining species ecological characteristics such as food web, feeding trait (i.e. facultative scavenging), diet, habitat and migratory behaviour based on an extensive literature review (19 species in total). This listed was extended in order to include both European raptors feeding on the aquatic food web namely the White-tailed sea eagle and the Osprey as well as the four European vultures due to their high susceptibility to NSAID poisoning. As a next step, I identified the main exposure routes to raptors for the prioritized environmental pollutants identified within the "chemical priority feedback" task. Further on, I assigned exposure routes to ecological traits that favour potential uptakes (e.g. foraging within certain habitats or scavenging on certain prey) as well as ecological criteria that favour (e.g. residency) or exclude (e.g. long-distance migration to Africa) a species from pan-European monitoring schemes. These predefined criteria reduced the previously mentioned candidate list for each prioritised environmental pollutant separately. The ecological traits of those species as well as their precise distribution within Europe has been further on described in detail and compared to each other in order to identify the most suitable species. Based on this approach we identified suitable candidate species for pan-European monitoring for each environmental pollutant and assigned a green, yellow and red classification based on the number of met ecological criteria. As a next step I plan to include

exotoxicological data for the identified candidate species as final plausibility check to assess detection ranges and sampling feasibilies.

DESCRIPTION OF THE MAIN RESULTS OBTAINED

The identified priority pollutants from the "chemical priority feedback" task identified pharmaceuticals (NSAIDs) as main pollutant of concern followed by agrochemicals, anticoagulant rodenticides and metals such as lead and mercury.

For Pharmaceuticals, we considered the exposure to veterinary medicinal products via fertilization and livestock/poultry production as main exposure route. Further on we identified Tawny Owls as most suitable species for pan-European monitoring based on their regular distribution, foraging within agricultural habitats and residency (green classification). Species such as the Common Buzzard or Barn Owl received a yellow classification due to their partial migration in the case of the Common Buzzard or limited distribution in the case of the Barn Owl.

- Monitoring of NSAIDs was considered as special case due to the high susceptibility of vultures. However, all the European vultures have a limited distribution within specialized habitats, which excludes them from pan-European monitoring. Nevertheless, we highly recommend monitoring studies for species conservation perspectives due to their high susceptibilities.

For Agrochemicals, we considered pan-European monitoring of bioaccumulative agricultural chemicals in general due to the large variety of pollutant classes.The selection of monitoring species followed the same selection criteria as for veterinary medicinal products, which is why the same species has been identified for pan-European monitoring.

For anticoagulant rodenticides, the criteria were similar to veterinary medicinal products and agrochemicals but facultative scavenging was regarded as advantageous. Therefore, the Common Buzzard and Tawny Owl meet the same number of predefined ecological criteria for pan-European monitoring (facultative scavenging vs. active foraging and partial migration vs. residency).

For lead, the exposure for species that actively forage and scavenge on game animals were regarded as most susceptible species. Thereby, we identified the Golden Eagle as most suitable species. However, due to its limited distribution, the combination with White-tailed sea eagle provides a better special coverage but sampling efforts need to be limited to the winter season when both diets are more similar to each other. The Common Buzzard received a yellow classification due to its variation in diet and lack of active foraging on larger game animals.

For mercury, we separated the terrestrial and aquatic exposure routes due to different biomagnification processes within both food webs.
- For terrestrial Hg monitoring, we identified the Northern Goshawk and Tawny Owl as most suitable species due to their residency and wide-spread distribution. An advantage of Goshawks is their potentially higher trophic position (foraging on raptors), whereas Tawny Owls are distributed in various habitats that allow for landscape comparisons.

- For aquatic Hg monitoring, we evaluated the potential of White-Tailed sea eagles and Ospreys but since both species are not regularly distributed within Europe, we also considered the suitability of mammalian sentinels such as Eurasian Otters.

FUTURE COLLABORATIONS (if applicable)

We will conduct regular Skypes to exchange information on the progress of the manuscript. I will present first results together with Prof. Richard Shore at the LifeApex meeting in October in Florence.