Annex 4. Topic 4: The co-development of AI-based sound recognition of European grasshoppers

1. **Challenges to address by the Proposal**

The creation of machine learning tools to recognize male grasshopper (Orthoptera) sounds can have a practical impact on biodiversity monitoring and conservation efforts. By training people in sound-based identification of grasshoppers and collecting sound data using open access websites, new sound recognition models can be developed and published. The creation of machine learning tools to recognize grasshopper sounds is an innovative approach to biodiversity monitoring and conservation.

2. **Practical impact on site**

The application of sound recognition can be useful for both professionals and active naturalists, who are willing to take a little bit of extra effort to contribute to biodiversity protection. These models can be used for standardised monitoring of grasshopper populations, particularly in the Mediterranean area, where the highest diversity of Orthoptera is found.

3. **Collaborative approach (compulsory activities)**

In 2023, 2024 and 2025 TETTRIs consultants will annually build a new sound recognition algorithm for European grasshoppers. The quality and geographical coverage of this algorithm largely depends on the availability of training data. The proposed project should help to showcase that training professional and non-professional taxonomists in collecting sound recordings can help improve the model, resulting in a better model which in its turn results in more users and more training data becoming available. In cooperation with TETTRIs consultants and trainers, two workshops (in 2024 and 2025) will be organised. The exact date of the workshop will be arranged in co-operation between the selected project(s) and TETTRIs trainer. Workshops will be focused on training on sound-based identification of grasshoppers, collecting sound data and making this and the connected metadata publicly available through Xeno-canto or similar open access repositories, and applying AI-sound recognition for monitoring. Selected project(s) will be responsible for ensuring participants in each workshop and for organisation of the workshop – see specific eligibility criteria.

4. **Innovation**

In addition to the collaboration with TETTRIS consultants, proposals can also include own creative activities and innovations, such as (**but not limited to**):
- The **workshops can be repeated in the project with distance support of TETTRIs consultants** to provide an opportunity for more participants to learn about sound recognition technology and apply it in their biodiversity monitoring efforts. The workshops can be an opportunity for interested taxonomists to attend and collaborate.
- **The sound recognition models can be updated annually based** on the data collected during the workshops and through open access websites. The application of sound recognition technology in biodiversity monitoring is a new field and can lead to further innovations in the future, particularly with the involvement of citizen scientists.
- **Investigating the impact of invasive species, disease, weather, season or climate change on grasshopper sounds:** The sound recognition models can be used to monitor the impact of invasive species on grasshopper populations. This can help identify areas where invasive species are causing significant damage to ecosystems.

- **Exploring the use of sound recognition in biodiversity assessments:** Sound recognition models can be used in biodiversity assessments to identify species present in an area. This can provide a faster and more efficient method of biodiversity assessment, particularly in areas where visual surveys are difficult or impossible.

5. **Expected outcomes**

Proposals should help to showcase that training professional and non-professional taxonomists in collecting sound recordings can help improve the model, resulting in a better model which in its turn results in more users and more training data becoming available.

6. **Specific conditions**

Partnership:
- The main applicant and/or the project partners is well embedded in the organisation active with the taxonomy and conservation of European Orthoptera (e.g. IUCN Grasshopper Specialist Group, non-professional taxonomists).
- Selected projects will be responsible for ensuring 15-20 participants in each workshop and for organisation of the workshop.
- Involved partners should have experience with curating and uploading sound files to GBIF or Xeno-canto
- Involved partners should be established in different parts of Europe including at least two from southern Europe.
- A beneficiary should lead the organisation of the workshops, preferably in the region with the highest diversity of Orthoptera (Mediterranean area or the Alpine region).

Complementarity and collaborations within the partnerships is allowed in order to meet the abovementioned criteria.

Supporting elements:
- A first test model for sound recognition of grasshoppers will become available in 2023 and will be annually updated based on data (among others) collected during the field workshop
- A first test of such a workshop will be held in 2023 and the workshops trainers for 3PP projects to be held in 2024 and 2025 will be ready.

General Instructions to applicants:

To be considered for funding, proposals should clearly address all three key aspects of the topic, i.e. 1) demonstrating a strong practical impact, 2) implement a collaborative approach, and 3) integrate innovative dimensions to biodiversity identification, monitoring and/or conservation.

Proposals should provide a detailed budget and timeline, as well as clear metrics for measuring project success.

Applicants should also demonstrate relevant experience and expertise in areas such as biodiversity science, citizen science, data analysis, and stakeholder engagement.

Citizen science aspects can be involved in all topics. However, Proposals focused primarily or exclusively in Citizen science engagement will fall under Topic 7.

See the Call text for further detailed information.