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funded by:

European Bumblebee Conference - February 20th & 27th 2021 | European Invertebrate Survey - EIS Kenniscentrum Insecten (Leiden, The Netherlands)

Long-term protection for rare bumblebee species in Lower Saxony (Germany)

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Introduction and aims

The current project „Protection of rare bumblebee species“ of the NABU (Nature And Biodiversity Conservation Union) Lower Saxony is scheduled from 2019 to 2022. It ties in with the predecessor rare-bumblebee-conservation-project from 2013 to 2016 that was initiated by R. Witt and the NABU. Due to the poor data situation one primary objective was on recording current occurrences of rare species. Another main focus was set on the development of adequate measures and getting in contact to landowners of the large scale habitats (mostly farmers and authorities) for the establishment of bumblebee protection areas.
The current project is designed on different working levels. Emphasis is put on the practical implementation of rare species conservation measures and development of bumblebee protecting areas.
An important aim is the resettlement of rare species. There has never been a project of this kind in Germany before. A precondition is the accurate knowledge of the biology of the target species.
Another aim is to survey the uncharted territories and the known bumblebee populations with experts and regional volunteers. For the data processing an app and a professional data base platform are developed.
This poster is intended to provide an overview of the ongoing project. We take a great interest in the exchange of knowledge.

Inventory

Apart from the contribution of experts the integration of volunteers is an essential part of the project. Without voluntary data collection and information of species distribution, especially occurrence of the target species for resettlement, it would not be possible to get an overview of the situation of bumblebees. The large federal state of Lower Saxony with its very different biotopes from mountain regions, marsh- and greenlands, heathes, wood lands or coastal habitats contains 31 bumblebee species.
Volunteers are organised in a Lower-Saxony-wide network including currently about 300 people. Some of the volunteers participate in local – mostly educational – projects. To support the volunteers NABU Lower Saxony offers free workshops for bumblebee determinations and bumblebee protection as well as network meetings. Public relations such as information brochures and press relations and the provision of information about bumblebees and their protection possibilities for interested citizens accompanies the project.

Resettlement of rare species

Based on our inventory we choose *Bombus muscorum* and secondary *B. veteranus* as target species. In the marshland of the Weser estuary there were known some stable populations that may serve as donor populations for the resettlement.
Our schedule was to resettle an established, middle aged colony in a bumblebee nest box. That would be more promising and preserving for the donor populations than the introduction of young queens. Firstly we want to study the nesting biology in the original habitat because the knowledge of the species is low. If the colony accepts the nesting box we want to move the nesting box into a new habitat in the nearby surrounding. Not till then we will start the restettlement to the ultimate target at a distance of approximately 170 km. For some years a restauration of large-scale primary habitat, a wet heath and upland moor with flowering *Erica tetralix*, a keystone species for *B. muscorum*, has taken place.
So in 2020 we tried to discover nests by radio-tracking workers with transponders. In cooperation with Henri Greil* (Institute for Bee Protection) who organizes the technical equipment and operated it in the field. Preliminaray tests under controlled conditions with *Bombus terrestris* workers have been successful. But in the field experiment the lighter *B. muscorum* and also *B. veteranus* workers didn't perform. The workers seemed to be unable to start even with the ultralight transmitter (150 mg). In 2021 we will improve the technique.

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Fig. 1: *Bombus muscorum* worker (Weser estuary) © R. Witt

Fig. 2: *Bombus veteranus* worker with transponder © H. Greil

Bumblebee species conservation work

The conservation and development of habitats is the most important goal of the project. Currently, local measures for populations of *Bombus distinguendus*, *B. humilis*, *B. jonellus*, *B. muscorum*, *B. ruderarius*, *B. sylvarum* and *B. veteranus* are supervised. Special management plans have been developed, for example, for *B. distinguendus*, *B. muscorum* and *B. veteranus*. This means long flowering red clover resources, extensive grassland managment with late and successive mowing, cutting high at least 15 cm and securing a matted herbal layer as nesting habitats are crucial. We also designed special red clover dominated seed mixtures with seed companies.
A crucial point is the cooperation with landowners, which is often associated with practical problems, especially in arable land. Nevertheless, we have been organized several cooperations with farmers, farmers associations or authorities. Consultations are also necessary where the focus is put on conserving other organism like birds because the special needs of bumblebees are often excluded.

Fig. 4: Fencing of *B. muscorum* nesting and forageing sites (Wadden Sea NP) © Witt

Fig. 5: Improvement of greenland as a refuge for bumblebees © Witt

Determination and app development

Educational researchers have long been looking for opportunities to address the problem of growing species blindness. Conventional identification tools are built up dichotomously. To use these tools, students need extensive knowledge about specific scientific terms. This may lead to problems and result in failure of the process, which is accompanied by demotivation and loss of interest.
To solve this problem, the University of Bamberg developed a bumblebee determination App for mobile devices with an educational approach in cooperation with NABU Lower Saxony: determination is possible by answering questions according to a polytomy decision tree. In addition, the app has a fault tolerance, videos with explanations and an intelligent logic that helps student in the process of determination. This approach should stimulate to generally deal with scientific species determination, which nowadays fewer and fewer people are capable of. Once a species is identified, GPS-coordinates of the spotting location, photos and further information can be saved and sent to different (citizen science) observation platforms.

The ID-Logics app is free of charge and can be downloaded from the Apple Store or Google Play Store.

Additionally we use a detailed and weather-proofed identification leporello folder suitable for field use (Witt 2017).

Fig. 5: Intensiv identification seminar with volunteers © N. Feige

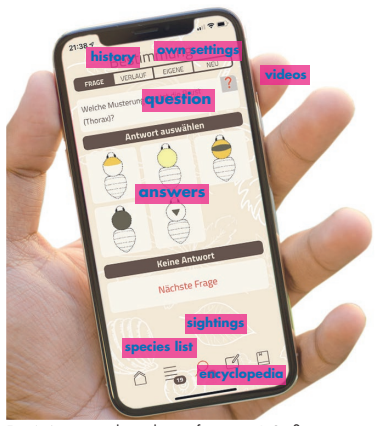

Fig. 6: App-screenshot with main features © J. Groß

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- www.id-logics.com (free ID-Logics app)

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