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# Translocation of a sand-associated blister beetle due to urban development in Uppsala, Sweden

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## Introduction

The blister beetle (*Apalus bimaculatus,* Coleoptera: Meloidae) is a beetle managed for conservation in Sweden. The species inhabits at-risk ephemeral and patchily distributed sandy habitats and are dependent on stable colonies of the bee species (*Colletes cunicularius*) on which it parasitizes. The beetle is not considered threatened at a global or European level. It has previously been categorized as Vulnerable (VU, 2000) and near threatened (NT, 2005 & 2010) in the Swedish National List, but are now considered as Least Concern (LC, 2015). The change in categorization is due to that more populations have been found, which is believed to be an effect of overlooked populations in the past. The species is still considered as declining in the country, due to a general decrease in area of suitable habitat e.g. from sandpits becoming overgrown after excavation has ceased, and when sand dunes and other sandy areas are used for human development. The beetle population in this project has until now inhabited a sandy area between pine-dominated forest and areas used for human activities. The site is in Uppsala, Sweden, and it is located in a part of the city previously little used for human development but where major building work is planned and ongoing.

## Goals

- Goal 1: Translocation of *A. bimaculatus* and *C. cunicularius* from areas planned for urban development.
- Goal 2: Establishment of populations of both species in areas protected from exploitation.
- Goal 3: Increased area of sandy habitat at the translocation site.
- Goal 4: Managing the translocation site for both species to

Blister beetle © Lina Widenfalk

Bee species parasitized by the beetle
© Lina Widenfalk

increase the likelihood for sustainable populations and to know the status of the populations.

- Goal 5: Increased knowledge among the public, exploiting companies and authorities about the focal species and their requirements as well as about the on-going management work, through information signs at the site and through press releases.

## Success Indicators

- Indicator 1: Individuals of both species survived the translocation (first year).
- Indicator 2: Both species are found and are reproducing within translocation areas that are saved from further urban development (second year and onwards).
- Indicator 3: The amount of sandy habitat is kept at a minimum of 10 $m^2$ for each patch in all of the sites (second year and onwards).
- Indicator 4: The management to create and maintain suitable habitats in the translocation sites are done routinely and the information about the populations are gathered systematically and regularly. After five years a minimum abundance of 1 bee-nesting hole/$m^2$ bare sand can be located within at least one newly established site and the beetles are observed each year in increasing abundance.
- Indicator 5: Information signs about the species and about the management are in place at the time of the establishment of new sites, information about the project is published in the local press during 2016. No major complaints about the new areas are made.

## Project Summary

**Feasibility:** Focus of this project is to maintain viable populations of *A. bimaculatus* during urban development. As part of the expansion of the city of Uppsala, an area that has housed one of the largest and most stable populations of the beetle will be used for human development. The Swedish EPA has set a national program for the conservation of the species. As part of this program, restoration of sandy habitats has been carried out in several areas in Uppsala county. In other parts of Sweden, similarly created sandy habitats have been colonized by beetles within 10 years. No attempts to translocate the species have been done previously in Sweden. As the entire area that the population inhabited

was going to be completely cleared within a year, translocation of the full colony with both bees and beetles was decided as the best management action.

**Implementation:** In December (Swedish winter) 2014 areas surrounding the targeted population were visited and habitat conditions were described. To locate possible bee-nesting-hole areas and to determine in which of these the beetle could be found, observation data of *A. bimaculatus* and *C. cunicularius* (years 2004 - 2014) in a 1 km x 1 km region around the focus populations were gathered from the open access database Artportalen (Swedish Species Observation System). The Swedish Species Information Centre, SLU, manages this database.

In spring 2016, the area was censused for number of beetles present in the population and to locate all subterranean nests of the bee. Only two individuals of the beetle were found and from Artportalen five individuals were reported. Both were low numbers compared with the highest records for the area which was 130 beetles (Artportalen, 2012). Five areas of nesting holes of the host bee species were identified during the survey, all close to the observed beetles. As preserving the species within the developmental area was determined impossible, a decision to translocate the population was made.

Suitable areas for release were searched for within a radius of 1 km of the source population. Three areas (two sites at Pollacksbacken and one at Kronparken, within 1 km from each other) were selected based on having sandy soil, a similar sun exposure as the previous nesting-hole areas and not being part of any development plans. All areas had too much grasses and herbs on the sand to be high quality habitats.

Translocation was carried out at the end of August 2016. During this period the bees and the beetles are within sand cavities, both as larvae. Areas of 5 m x 5 m within each new translocation area was dug out to a depth of 0.6 m, the soil and vegetation was removed. The sand containing the nesting holes was then excavated with a backhoe and transported carefully to fill the holes of the translocation areas, making sure that the sand layers were not shifted. A reference area was also created (3 m x 3 m, 0.6 m depth) using the same procedure but with sand from the exploited area without known bee cavities. Around each sand area larger stones were placed, to mark the area and prevent from people walking or children playing on the spot. Information signs were placed at both sites during 2016 - 2017.

**Moving sand with a backhoe © Niina Sallmén**

Release site © Lina Widenfalk

**Post-release monitoring:** The full evaluation of the project is not yet possible, as there has only been one season since the translocation and the breeding success in the new habitat is not recorded. Censuses done the year after the translocation, in spring 2017 (mid-March to mid-April) showed that both the bee and the beetle were found in one of the four areas. Several individuals of both species were found at this site on more than one occasion during the season, showing that they were able to complete their development in this site. The three other areas had no observations of either of the focal species.

The findings so far show that it is possible to move the sand, in which the bee and the beetle larvae are present as larvae, as a translocation method, but that the outcome is not certain. Information about reproduction success has not been recorded. Therefore, there are no results on the potential for establishment success for the species.

All translocation sites will be monitored in the coming 10 years during spring, to determine if and how the populations establish and expand. The areas will also be managed and work carried out to increase the area of sand cover. Although considered as a poor flyer, there have been records of *A. bimaculatus* to colonize areas situated >3 km away. There are other populations present in the city of Uppsala within that distance and thus it would be possible for individuals from these populations to colonize the managed areas.

## Major difficulties faced

- The planning of the project started too close to when the area was going to be cleared for the urban development. This made it not possible to prepare for natural colonization of new established habitats and also did not make it possible to do the surveys of suitable translocation sites during the time the species are easiest to find. Sites that were known to be spared from further development for certain, was not possible to find and therefore only one of the four translocation sites used are certain to be permanent.
- Knowledge about the basic biology of the species is still scarce, making it difficult to determine best management plan for successful conservation management.
- Communication difficulties with the entrepreneurs responsible for the developmental plans of the original site lead to that some parts of the area were affected by tree felling and vehicles driving on the sand before translocation.

- Information signs put up too late or not at all, resulting in people walking on and playing in the sand. Lack of communication to the citizens before the project started lead to misunderstandings and different concerns, e.g. teachers at a pre-school close-by a translocation area was worried that the children could be stung by the bees.
- Too small areas of created sandy habitat lead to rapid overgrowth of the sand during the summer after establishment.

## Major lessons learned

- It is possible for both the blister beetle and its host bee species to survive and finish their development in the sand cavities after translocation, when the sand is moved gently in late summer.
- For a successful management of habitat used by sand-dependent species it is crucial that all agencies and stakeholders working in the area are aware of the problem and are interested in working towards the same goal. Also, if the management project is initiated late in the developmental plan it is harder to take the actions that are likely to be successful.
- There has been a decline in the whole region during many years in the abundance and occurrence of the beetle species and of suitable sandy habitat. Other close by populations have disappeared after human development work. Critical thresholds when the quality of a habitat or area in a landscape has become too low to keep viable populations are missed. Therefore monitoring schemes for management of species and habitats that are dependent on a very particular successional stage would be very useful.
- To be able to draw clear and solid conclusions about the success of a translocation a scientific design of the setup, gathering of data before, during and after the translocation is crucial. Scientific analyses of the gathered data are needed to be able to draw conclusions and increase the understanding of the species and the methods used. For these steps to work well, experts of the focal species and skilled analysts should be responsible for the design.
- When working with translocations to preserve threatened species, the guidelines from IUCN should be used, as it would increase the quality of the actions including the design of the work.

## Success of project

| Highly Successful | Successful | **Partially Successful** | Failure |
|---|---|---|---|
| | | √ | |

**Reason(s) for success/failure:**

- Too soon in the project to draw any conclusion about whether the translocation was a success as there has not been enough time for the species to reproduce and potentially establish.
- The entrepreneur translocating the species (by moving the sand in a backhoe) was very careful and made sure to check that all steps was done as planned by the conservation consultancy. This resulted in that at least some individuals survived the translocation.
- The new sites are much closer to foot- and bikeways and primary schools than the original site. This make the sites more prone to problems with sand being

removed, but it also makes the public more aware of the species and their habitat needs.
- Success of the project will depend on the management of the sandy areas and the ability for both species to reproduce the first year.
- Scientific evaluation of the project is somewhat hindered by the lack of data of the areas before translocation, knowledge of the host species, and information about reproduction of both species during the first season.

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