



Global Re-introduction Perspectives: 2011

More case studies from around the globe
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IUCN/SSC Re-introduction Specialist Group (RSG)





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Re-introduction of the American burying beetle to Nantucket Island, Massachusetts, USA

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Introduction

The American burying beetle (*Nicrophorus americanus* Silphidae), is a federally-listed endangered beetle once common throughout the eastern half of the United States and now surviving in only a few isolated or undisturbed habitats in eight states. This species rears its young on vertebrate carrion weighing between 80 g - 180 g and it shows some of the highest levels of parental care known among insects. As part of an 18 year project under the supervision of the U.S. Fish and Wildlife Service, the Roger Williams Park Zoo (RWPZ) and the Nantucket Maria Mitchell Association (MMA) have worked to re-introduce the American burying beetle to Nantucket Island, Massachusetts. Nantucket Island is approximately 41 km from Cape Cod, Massachusetts and is just under 129 km² in area. It contains large acreages of open conservation land that provide habitat for numerous state and federally-listed species. Other than feral cats there are no mammal scavengers to compete with the beetles for the carrion resource. The last record of an American burying beetle on Nantucket was in 1926. This is currently the only successful re-introduction of this species in the country.

Goals

- Goal 1: Build a relationship with public and private landowners.
- Goal 2: Identify appropriate release sites on the eastern and western sides of Nantucket Island.
- Goal 3: Establish a genetically-diverse captive population of American burying beetles to provide the numbers of beetles needed for release.
- Goal 4: Conduct annual releases.



American burying beetle (*Nicrophorus americanus*)

© Roger Williams Park Zoo

Invertebrates

- Goal 5: Annual monitoring of re-introduced population to determine size and distribution.

Success Indicators

- Indicator 1: Successful captive breeding program.
- Indicator 2: Continued presence of the beetles post release.
- Indicator 3: Expansion of re-introduced population from the original release sites.
- Indicator 4: Self-sustaining American burying beetle population on Nantucket Island.

Project Summary

Feasibility

Natural history and conservation status: The federally endangered American burying beetle is the largest of the *Nicrophorus* beetles in North America, measuring 25 - 35 mm in length. It formerly ranged across the eastern half of the United States extending westward into Nebraska. Little is known about its former habitat-use but current populations persist in open grasslands. *Nicrophorus* species (of which there are 14) rear young on small dead mammals, birds, and reptiles. American burying beetles require larger and higher-quality carcasses for reproduction than other *Nicrophorus* beetles (Kozol, 1990) and this is a key component to reproductive success. High densities of mammalian scavengers may compete with these beetles for carrion and the extinction or drastic reduction of potential carrion species (e.g. passenger pigeons) probably increased this competition. Unusually, American burying beetles disappeared from the middle of their range and have persisted only on the fringes. Natural populations currently only exist from Texas north to South Dakota and on Block Island, Rhode Island.

Implementation: The American burying beetle is not yet in the forefront of the public's awareness and there are few cultural or political issues. There is concern for maintaining genetic diversity between the widely separated western and eastern populations. Little is known about diseases or parasites that affect this species and these issues were not directly addressed in this re-introduction program. The main concern is finding areas with natural sources of carrion and suitable habitat.

A rearing program was initiated at Boston University (BU) and successfully expanded at the Roger Williams Park Zoo (RWPZ) in Providence, Rhode Island (RI). The colonies at both BU and RWPZ were started using beetles from the natural Block Island, RI population. RWPZ has produced over 5,000 beetles for release and for a public exhibit at the zoo. One of the benefits of working with most invertebrate species is the relatively small space required to house entire colonies. RWPZ houses the beetle colony in an 2.4 m x 3.6 m room fitted with shelving. The room is maintained on a twelve-hour light cycle and kept at approximately 20° C. Beetles are housed in clear plastic boxes separated by same sex groups of siblings. Substrate for the containers consists of brown paper towels. The towel is placed in the containers and moistened with aged tap water.

The beetles are maintained on a diet of mealworms, wax worms, and frozen-thawed pinkie mice.

Breeding the American burying beetle is a relatively low cost affair. Using protocols developed by Dr. Andrea Kozol of Boston University (BU), five-gallon black plastic flower pots are filled three-quarters full with rich topsoil to serve as nurseries. The soil is firmly packed to make carcass burial and the excavation of a brood chamber



Trapping and provisioning in open grassland and low shrub-land habitat © Roger Williams Park Zoo

possible. Pre-determined pairs of beetles are placed in each bucket. The Association of Zoos and Aquariums (AZA) Species Survival Plan (SSP) maintains a stud book as a tool to insure the genetic viability of the captive populations. Frozen-thawed 80 g - 180 g quail carcasses are placed on the soil surface for the beetles to bury and prepare as a food source for their larvae. In the past, suitable-sized rats have been used in place of quail with equal results. The flowerpots are covered with clear Plexiglas covers and weighted with bricks or rocks to prevent escape. Once their parental role of carcass preparation and larvae rearing is complete the adults are removed from the brood, they are housed separately and heavily feed mealworms for about two weeks. These adults may be used again. The larvae take around 45 days to pupate.

In a pre-Nantucket release pilot study, captive reared beetles were released on Penikese Island, MA and the population persisted for seven years with no other re-introductions. In 1994, Nantucket Island, MA became the site of a full-scale release. Over 13 years, the project released 2,923 beetles. Beetles are released by burying them in pairs or singly with a quail carcass. Each burial is called a brood, and between 50% and 70% of broods successfully rear young on Nantucket. Success and estimates of larvae numbers are determined by exhuming 30% of the broods after 12 days. The broods are reburied immediately.

Post-release monitoring: The first stage of post-release monitoring consisted of trapping as many wild beetles as possible in traps baited with rotten chicken and provisioning pairs with quail carcasses. The number of beetles captured per trap effort has generally increased each year. The second stage of monitoring started in 2011 with a drastic, but planned, decrease in the number of provisioned beetles. Only 24% of the captured beetles (50 out of 212) were provisioned. This is less than half the number provisioned in 2010. The beetles will be monitored in

Invertebrates

coming years to determine if provisioning is necessary to sustain the wild population.

Major difficulties faced

- Unknown availability of carrion on Nantucket.
- Difficulty in accurately estimating re-introduced population size.
- With a short active season, trap results and reproductive success can be greatly affected by weather.

Major lessons learned

- Importance of standardized release and monitoring protocols.
- Importance of long-term monitoring and consistency.
- Importance of establishing long-term collaborations and partnerships.

Success of project

Highly Successful	Successful	Partially Successful	Failure
		√	

Reason(s) for success/failure:

- Successful captive breeding component.
- Successful collaboration and support among multiple organizations.
- Monitoring protocols successfully adapted during project using field data.
- Establishment of a self-sustaining population is still uncertain.

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