

# GLOBAL RE-INTRODUCTION PERSPECTIVES

*Re-introduction case-studies from around the globe*



**Edited by  
Pritpal S. Soorae**



The designation of geographical entities in this book, and the presentation of the material, do not imply the expression of any opinion whatsoever on the part of IUCN or any of the funding organizations concerning the legal status of any country, territory, or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The views expressed in this publication do not necessarily reflect those of IUCN, Environment Agency - Abu Dhabi or Denver Zoological Foundation.

**Published by:** IUCN/SSC Re-introduction Specialist Group

**Copyright:** © 2008 IUCN/SSC Re-introduction Specialist Group

Reproduction of this publication for educational or other non-commercial purposes is authorized without prior written permission from the copyright holder provided the source is fully acknowledged.

Reproduction of this publication for resale or other commercial purposes is prohibited without prior written permission of the copyright holder.

**Citation:** Soorae, P. S. (ed.) (2008) GLOBAL RE-INTRODUCTION PERSPECTIVES: re-introduction case-studies from around the globe. IUCN/SSC Re-introduction Specialist Group, Abu Dhabi, UAE. viii + 284 pp.

**ISBN:** 978-2-8317-1113-3

**Cover photo:** Clockwise starting from top-left:

- Formosan salmon stream, Taiwan
- Students in Madagascar with tree seedlings
- Virgin Islands boa

**Produced by:** IUCN/SSC Re-introduction Specialist Group

**Printed by:** Abu Dhabi Printing & Publishing Co., Abu Dhabi, UAE

**Downloadable from:** <http://www.iucnsscrg.org> (downloads section)

**Contact**

**Details:** Pritpal S. Soorae, Editor & RSG Program Officer  
E-mail: [psoorae@ead.ae](mailto:psoorae@ead.ae)

## Captive management and re-introduction of the Karner blue butterfly to the Oak Openings of Northwest Ohio, USA

Mitchell L. Magdich

Curator of Education, The Toledo Zoo, P.O. Box 140130,  
Toledo, Ohio 43614-0801, USA ([mitch.edu@toledo zoo.org](mailto:mitch.edu@toledo zoo.org))

### Introduction

The Karner blue butterfly (*Lycaeides melissa samuelis*) is a resident of oak savanna, pine barren and sand barren habitats of the Midwest, mid-Atlantic and New England regions of the United States. Within these arid habitats resides its sole host plant, wild lupine (*Lupinus perennis*). In the last 25 years, the butterfly has suffered a dramatic population decline throughout its range primarily from habitat loss and fragmentation. Originally native to 12 states and one Canadian province, the species is now extant in Indiana, Michigan, Minnesota, New Hampshire, New York and Wisconsin. The Karner blue was re-introduced to Ohio in 1998. The species is listed as a federally (U.S. Fish and Wildlife Service 1992) and state (Ohio Department of Natural Resources 1992) endangered species.

### Goals

- Goal 1: To re-establish viable populations of the Karner blue butterfly (*Lycaeides melissa samuelis*) within its historic range in Ohio, and maintain and restore associated species of oak savanna lepidoptera.
- Goal 2: Increase the quantity and quality of oak savanna habitat within the Oak Openings Region of northwest Ohio, USA.
- Goal 3: Increase public awareness of the Karner blue butterfly and associated Lepidoptera, as well as the Oak Openings Region.

### Success Indicators

- Indicator 1: The establishment of a self-sustaining population of the Karner blue butterfly with a minimum of three meta-populations within the Oak Openings Region, increasing the populations of associated lepidoptera in the process.
- Indicator 2: The amount of protected and managed oak savanna habitat will increase by several thousand hectares.
- Indicator 3: Discontinuous oak savanna habitat supporting



Karner blue butterfly



**Karner blue butterfly habitat in the ASGA, Michigan, USA**

recovered Karner blue populations will be connected by habitat corridors to reduce the isolation of these populations.

- **Indicator 4:** The production and distribution of educational materials for the general public regarding the Karner blue butterfly, associated Lepidoptera, and the importance of the Oak Openings Region.

## Project Summary

**Feasibility:** Since 1992, the Ohio Karner Blue Butterfly Recovery Team has been working on a plan to re-introduce the Karner blue

butterfly (KBB) to its historic habitat in the Oak Openings of Lucas County, Ohio. Preliminary studies were conducted to determine the feasibility of a re-introduction. Initial funding by the Ohio Department of Natural Resources (ODNR) Division of Natural Areas and Preserves centered on the construction of a greenhouse on the grounds of The Toledo Zoo and mass propagation of the KBB host plant, wild lupine (*Lupinus perennis*). Over 5,000 lupine plants were successfully grown, using protocols developed by The Toledo Zoo staff. Butterfly rearing and transportation protocols were developed using a model species, the closely related Melissa blue butterfly (*Lycaeides melissa melissa*). Adult Melissa blue butterflies (MBB) were successfully shipped from Denver, Colorado to The Toledo Zoo and their progeny reared through a partial third generation. During 1997 and 1998 the ODNR Division of Wildlife provided funding for an intensive habitat analysis of the founder location, Allegan State Game Area (ASGA), Allegan County, Michigan USA and the re-introduction site, the Kitty Todd Preserve (KTP), Lucas County, Ohio USA. The density and frequency of lupine and preferred nectar sources were measured at both sites. Data collected from the founder site was used to establish a benchmark. This data was then compared against the data collected from the proposed release site. This provided the team with a tool to gauge the habitat's readiness for a re-introduction. Lastly, a study comparing the microhabitat of the KBB at the founder location and the re-introduction site was undertaken.

**Implementation:** Annually, Toledo Zoo conservation staff captures first generation adult females from sites in Michigan. Individual females are placed in a clear plastic container that is then positioned in a cooler for transport to the Zoo. Each female is sequestered on a potted lupine plant covered with a cylindrical net. Adults are hand fed daily using a honey-water solution. Eggs are typically deposited on the leaves and petioles of the host after one or two days. Once hatched, larvae are closely monitored. To negate cannibalism, second instar larvae are moved to new plants so that no more than 10 were on a single plant. Host plants are replaced regularly. Small pieces of pine bark are added to the soil

surface of the potted plant during the final instar. Larvae usually crawl under the bark to pupate. Adults are transported to the release site in the afternoon following eclosion. The rearing unit is enclosed in a double barrier and isolated from other invertebrates in the collection. Instruments as well as the floor, benches and other equipment are regularly disinfected.

**Post release monitoring:** Monitoring of 1<sup>st</sup> flight Karner blue adults begins approximately the third week in May. Transects are monitored daily, as weather conditions permit, until no adults have been sighted for at least three days. Monitoring is then suspended. Monitoring resumes in the same fashion when 2<sup>nd</sup> generation adults appear (approximately 28 days after the conclusion of the first flight). Emigration of adults is monitored and recorded daily by walking transect routes through lupine patches outside the initial release zone. The transect routes are always monitored by two spotters. The primary release site is the major transect area. This area has a plot of 120 m x 100 m with path widths of 10 m. Spotters walk 10 m abreast, counting adults that appear 5 m to either side or in front of the observer. Direction is reversed at the border of the plot. Secondary transect sites are smaller but are monitored using the same method. Sightings of adults are plotted on a topographic map. Gender and condition of each observed adult is recorded in addition to weather conditions (e.g. temperature, relative humidity, wind speed and percent cloud cover) and duration of the monitoring event. Since the initial release in 1992, Karner blue adults have migrated and populated lupine sites throughout the preserve.

## Major difficulties faced

The introduction of the Karner blue at KTP precluded the continuation of the intensive habitat management regime that was in place prior to the initial release. Provisions under the U.S. Endangered Species Act (ESA) prohibited the use of management practices that could potentially harm individuals. Consequently, habitat that had been restored in preparation for the re-introduction degraded and was no longer suitable for the species. Eventually, amendments to the ESA permit allowed for a rotating schedule of prescribed burns in the KBB habitat to control woody invasives. A late freeze in May of 2005, during the period when 1<sup>st</sup> generation adults would normally be eclosing, had a great impact on recovery. Up until that time, indices indicated that the population had steadily increased since the initial re-introduction. Numbers have not recovered to pre-2005 levels. Having sufficient quantities of lupine available for the captive breeding efforts has continuously presented challenges. The stresses imposed on the plants by larvae feeding are extensive and plants normally do not recover. Thus, new plants must be grown from seed every year. In addition, certain strains of seed have produced less vigorous plants. In some instances, zoo staff has used cuttings from wild grown lupine to supplement the potted greenhouse plants. The use of cuttings presents a concern because of a possible breakdown of important nutrients and secondary compounds and because of the possibility of introducing disease and bacteria to the captive population.

## Major lessons learned

- The importance of having an abundance of vigorous lupine plants for captive

# Invertebrates

breeding cannot be overemphasized. Sufficient resources of funds, personnel and greenhouse space must be dedicated to this end. Without an adequate supply of host plant, the captive-breeding effort is much more problematic and susceptible to failure.

- Because of stochastic events (e.g. freeze, fire, drought, etc.), it is important to identify new introduction sites and, subsequently, prepare those sites for releases. Additionally, the sites should cover the gambit of habitat types that have been identified to support Karner blue butterflies. For instance, a habitat with a widely spaced oak (*Quercus spp.*) canopy cover provides protection against late freeze events.
- Habitat management that has taken place as a result of the Karner blue introduction has benefited the entire ecological community. Many state endangered plants (e.g. *Habenaria ciliaris*) and butterfly species occupying habitat with the Karner blue (e.g. *Incisalia irus* and *Erynnis persius* in particular) have benefited from the effort to recover the species.

## Success of project

Highly Successful	Successful	Partially Successful	Failure
		√	

### Reasons for success/failure:

- Karner blue recovery is an ongoing conservation effort. Stochastic events still threaten the recovery of the species in Ohio. Augmentation of currently establish populations and releases into newly restored habitat will continue. Minimum viable population size has yet to be realized.
- Karner blue habitat will disappear unless ongoing management is continued in perpetuity. Fire suppression and invasive and aggressive non-native plant species precludes a laissez-faire approach to KBB habitat. Funding and personnel cuts will threaten the long-term recovery of the species.

## References

- Ohio Department of Natural Resources (1992) Division of Wildlife. Wildlife That are Considered to be Endangered, Threatened, of Special Interest, Extirpated, or Extinct in Ohio. August 1992. Columbus, Oh. 14 pp.
- USFWS (1992) Endangered and threatened wildlife and plants; determination of endangered status for the Karner blue butterfly. Federal Register 57(240): 59236 - 59244.

## Project Partners

- The Ohio Department of Natural Resources (ODNR), Division of Wildlife, Columbus, Ohio, USA.
- The ODNR, Division of Natural Areas and Preserves, Columbus, Ohio, USA
- The ODNR, Division of Forestry, Columbus, Ohio, USA.
- The Nature Conservancy, Ohio Field Office, Columbus, Ohio, USA.
- The Ohio Lepidopterist Society, Columbus, Ohio, USA.
- The Metroparks of the Toledo Area, Toledo, Ohio, USA.
- The USFWS, Endangered Species Unit, Reynoldsburg, Ohio, USA.