



RETURN OF A NATIVE

Reintroduction of the
Karner Blue Butterfly
to the Oak Openings
of Northwest Ohio

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In 1988, as the Toledo Zoo dealt with a visitor onslaught to our giant panda exhibit, a more serious drama was playing out 20 miles to the west. A terrible July drought parched Northwestern Ohio, withered its prairie wildflowers, and extirpated the Karner blue butterfly (*Lycaeides melissa samuelis*) from its only locality in Ohio – the Oak Openings, a 100 square mile community of wet prairies, savannas, and oak barrens that stretches southwestward from Petersburg, Michigan to Liberty Center, Ohio. Happily, this beautiful little bug’s disappearance from the state was not destined to last for long. In 1993, only one year after the butterfly was federally listed as endangered, a coalition of the Ohio and Michigan Departments of Natural Resources, the U.S. Fish and Wildlife Service, The Nature Conservancy, and The Toledo Zoo banded together to return the Karner blue to Ohio. Within six years an Ohio Recovery Plan was published and the low bobbing flights of the Karner blue butterfly were seen once again in the Oak Openings.

Over the preceding decade the Karner blue – a signature species of the oak savanna ecosystem – had declined by 99 percent or greater over its range and had been extirpated from Illinois, Massachusetts, Ohio, Ontario, and Pennsylvania. The Karner blue butterfly requires pine or oak savanna or barrens habitat that includes extensive patches of wild lupine (*Lupinus perennis*). Karner blue habitat in Ohio is primarily limited to a small region of Northwest Ohio known as The Oak Openings. Agriculture, fire suppression, and drainage projects have severely modified this area, allowing tree invasion and the establishment of exotic plants. Historically, fire was the primary agent in maintaining Ohio’s oak savannas, and its elimination from the ecosystem resulted in the extirpation of many rare and unique taxa, including the Karner blue.

The *ex-situ* conservation program at the Zoo began when a grant from the Ohio Department of Natural Resources Division of Natural Areas and Preserve allowed us to erect a polyfilm greenhouse and produce thousands of wild lupine plants for larval feeding and habitat restoration. We selected the Melissa blue butterfly (*Lycaeides melissa Melissa*), as a model for the Karner blue and used it to perfect breeding techniques for *Lycaeides*. After successfully breeding and over-wintering this taxon, we obtained our federal and state endangered species permits and brought the Karner blue to the Zoo.

The Nature Conservancy had already begun extensive habitat restoration efforts at the Kitty Todd Preserve that cleared woody vegetation and exotic plants from its oak savannas, allowing regeneration of the extensive stands of wild lupine on which the Karner blue depends. We then implemented a detailed study of microhabitat requirements in the Allegan State Game Area in Allegan, Michigan to ensure that habitat in the Kitty Todd Preserve could support populations of the Karner blue. Statistical analysis of these data indicated that target release areas on the Kitty Todd preserve did not differ significantly from localities in the Allegan State Game Area that supported large flights of the Karner blue – at least in terms of microhabitat variables such as temperature, humidity, and light intensity and densities of lupine and nectar plants. By 1997, restoration of the oak savanna at Kitty Todd had

proceeded to the point where a reintroduction of the Karner blue butterfly was feasible.

We elected to use conservation breeding coupled with larval rearing and release rather than translocation as a reintroduction strategy. By doing so, we believed that we could put many more butterflies into the air at our release sites. Although we produced hundreds of Karner blues at the Zoo, the majority of our released animals came from eggs that were oviposited from females that were collected at Allegan and had already mated in the wild, hoping to provide our released cohorts with the genetic diversity representative of nine different Karner blue sites within the 48,000 acre Game Area.

We released more than 1,600 Karner blues at the Nature Conservancy’s Kitty Todd Preserve from 1998-2003 before we took a step back to see if the population would maintain itself without additional augmentation. So far this population has remained stable, but has not escaped the yearly fluctuations so typical of insect populations. We then moved on to the Moseley Barrens, a 14-acre oak barrens adjacent to Kitty Todd. The Barrens is a distinctly drier site – more typical of Michigan oak barrens – less susceptible to tree invasion and less in need of intensive management. We released 2,456 butterflies at Moseley, and are now working at two additional sites. In managing multiple sites the Zoo and its partners are attempting to create a loosely connected metapopulation of Karner blues within the Oak Openings, one that is suited to withstand the stochastic processes that threaten the viability of small populations.

We’ve come a long way since our initial release of 164 butterflies in 1998, subsequently releasing nearly 5,000 Karner blues at three release sites in Northwestern Ohio and one in Southern Michigan. Our facility has evolved from an unheated polyhouse to a climate-controlled Butterfly Conservation Center, allowing us to substantially increase fecundity and longevity in our charges and producing an unprecedented 1,448 butterflies for the 2009 season. This beautiful facility is open to the public and staffed by full time interpreters, who bring the Zoo’s butterfly conservation message directly to our visitors. Planted beds of native prairie flowers and grasses within the Center give visitors to the facility a glimpse of the rare beauty of Karner blue butterfly habitat.

The dedication to restore the Karner blue to Ohio is shared by a powerful coalition of conservation partners. Within the AZA, the Detroit Zoo has become an especially valued partner and has taken the lead in returning the Karner blue to the Petersburg State Game Area in Southern Michigan. With luck, additional habitat management, and the augmentation of additional releases planned over the next five years, it is our hope that the Karner blue butterfly will again become a permanent resident on the dunes of the Oak Openings of Ohio and Southern Michigan.

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