

# Best Management Practices for Conserving the Karner Blue Butterfly and Its Habitat



Fig 2. Wild Lupine  
Photo Credit: Creative Commons

## Introduction

The Karner blue butterfly, *Plebejus melissa samuelis*, (Fig. 1) is a critically endangered butterfly on the brink of extinction. The Karner blue butterfly, KBB, survival is dependent on the wild lupine plant, *Lupinus perennis* (Fig.2), which grows in oak savannas and pine barrens and thrives in full sun to partial shade with sandy soils. The butterfly has two broods each year, where they lay eggs on the wild lupine stems and leaves or nearby grasses and sedges. The larvae only consume the leaves of wild lupine, while adults obtain nectar from a variety of plants (Table 1). Since the survival of the KBB is contingent on wild lupine, management and conservation of wild lupine and other nectar sources is critical to maintaining and growing KBB populations.



Fig 1. Female Karner blue butterfly  
Photo Credit: Albany Pine Bush Preserve Commission

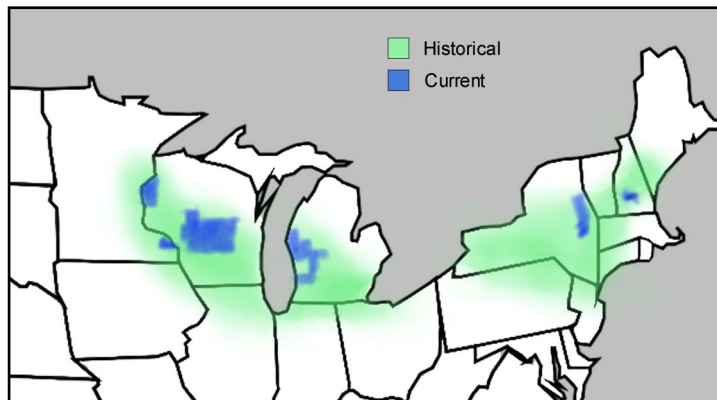


Fig 3. Historical and current ranges of the KBB in the United States.

## Range and Restoration

The introduction of fire suppression, invasive species, and residential and commercial development of habitat has caused a 99.9% loss of oak savannas and pine barrens and has contributed to the drastic range contraction of KBB (Fig. 3). Remnant populations of KBB can still be found in small regions of New Hampshire, New York, Michigan, Wisconsin, and Minnesota. Several regions are actively engaged in recovering Karner blue populations, and successful restoration efforts of pine barrens and oak savannas have seen a significant increase in KBB populations. Common restoration and management techniques include prescribed fire, chemical treatments, and mechanical management.

Table 1. Karner blue butterfly nectar sources (Xerces Society, [xerces.org/karner-blue/](http://xerces.org/karner-blue/))

Latin Names	Common Name	Location
<i>Ceanothus americanus</i>	New Jersey tea	IN, NH, NY, ONT
<i>Asclepias tuberosa</i>	Butterfly weed	IN, MI, ONT, WI, NY
<i>Melilotus alba</i>	White sweet clover	IN, MI, NY, WI
<i>Arabts lyrata</i>	Lyre-leaved rock cress	IN, ONT, WI
<i>Hieracium</i> sp.	Hawkweed	NH, NY, ONT
<i>Monarda punctata</i>	Horsemint	IN, MI, MN, NY, WI



Fig 4. Example of Karner blue butterfly habitat  
Photo Credit: Albany Pine Bush Preserve Commission

## Other Species Benefit

Pine barrens and oak savannas are a rare, fire-dependent ecosystem (Fig. 4) that support a unique set of specially adapted plants and animals. Restoration of pine barrens and oak savannas will benefit a range of other species, many of which also are experiencing population declines. Some notable species that will likely benefit include the dwarf milkweed (*Asclepias ovalifolia*), frosted elfin (*Incisalia irus*), Persius dusky wing (*Erynnis p. persius*), prairie warbler (*Dendroica discolor*), eastern box turtle (*Terrapene c. carolina*), and black rat snake (*Elaphe o. obsoleta*). Restoration of pine barrens and oak savannas, and Karner blue, could increase biodiversity at a regional scale, therefore benefitting the ecosystem as a whole.

## Prescribed Fire

To create conditions suitable for lupine germination and establishment, prescribed fire should be implemented (Fig. 5). Prescribed fire can boost nutrient and soil conditions to improve seed production of plants, and new plants tend to be more nutritious for the caterpillars. Areas should be divided into different sections, so only one section is burned at a time to ensure a source of colonists to recolonize the burned area, reduce the potential to kill all dormant eggs, and provide refugia for animals fleeing the fire. High intensity fires should be used for restoration purposes and lower intensity fires for maintenance purposes. Prescribed fire can be implemented at any time during the year but must be coordinated with the USFWS and other local authorities.

### Steps to apply

- Burn habitat dominated by grasses every 2-6 years
- Once restored, burn pine barrens every 5 years
- Burn forests dominated by larger trees every 10-20 years
- Take precautions to ensure the necessary population of lupine is left unburned in order to ensure the recolonization of new lupine plants in the burned areas



Fig 5. Prescribed burning at Albany Pine Bush Preserve  
Photo Credit: Albany Pine Bush Preserve Commission

## Mechanical Management

In oak savannas and pine barrens, mowing can be used to maintain early successional habitat and increase wild lupine growth by reducing competition from shrub and brush coverage (Fig. 6). The removal of trees is also a method used to decrease the amount of canopy coverage, especially in areas that are difficult to use prescribed fire. After areas have been cleared of trees and tall grasses, the process of restoration seeding is used to plant native tree and plant species. Attention should be paid to creating dispersal corridors for KBBs as well as creating partially shaded openings to promote the growth of nectar species.

### Steps to apply

- Use this technique in areas that are too small to burn
- Optimal canopy cover is ~ 30% of the area targeted
- Do not mow until all KBB activity has stopped and wild lupine has senesced, which is after the first frost or mid-October
- Mow oak savannas and pine barrens every 4 years
- Mower blades must be 6-8 inches above the ground

## Chemical Management

Often, the most important plants to manage in pine barrens and oak savannas are the invasive species. These species of plants can be treated with cut stump herbicide and foliar herbicide (Table 2). Drill and fill techniques are also appropriate for trees. Species native to the area also are treated when they are overabundant and need to be controlled.



Fig 6. Mowing to temporarily remove shrubs at Albany Pine Bush Preserve  
Photo Credit: Albany Pine Bush Preserve Commission

Table 2. Invasive plants and the most effective treatments, chemicals used, and the best time of application.

Scientific name	Common name	Primary treatment	Primary chemical	Secondary treatment	Secondary chemical	Time of application
<i>Fallopia japonica</i>	Japanese knotweed	Foliar herbicide	5% glyphosate	NA	NA	6 weeks after mowing
<i>Celastrus orbiculatus</i>	Oriental bittersweet	Cut stump herbicide	54% glyphosate	Foliar	3% glyphosate	After August 15
<i>Acer platanoides</i>	Norway maple	Cut stump herbicide	54% glyphosate	Drill and fill	54% glyphosate	After August 15
<i>Lonicera tatarica</i>	Shrub honeysuckle	Cut stump herbicide	54% glyphosate	Foliar	3% glyphosate	After August 15
<i>Phragmites australis</i>	Common reed	Wicking herbicide	5% glyphosate	Foliar	5% glyphosate	After August 15
<i>Artemisia vulgaris</i>	Mugwort	Foliar herbicide	5% glyphosate	NA	NA	After August 15
<i>Robinia pseudoacacia</i>	Black locust	Cut stump herbicide	54% glyphosate	Drill and fill	54% glyphosate	After August 15

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Learn More: Karner Blue Butterfly Recovery Plan. 2003. US Fish & Wildlife Service, Fort Snelling, Minnesota. <https://www.fws.gov/northeast/nyfo/es/karner03.pdf>

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