



## Wild Lupine and Karner Blue Butterflies

by Kim Mitchell and Cathy Carnes

*Habitat loss or modification, the main threat to most rare species, has been particularly hard on the Karner blue butterfly (*Lycaeides melissa samuelis*). Its numbers have fallen by 99 percent, with most of the losses occurring in the past 15 years. Populations survive only in widely scattered remnants of its former range, which once included 12 northern States and the Province of Ontario.*



Photo by USFWS; Joel Trick

Wild blue lupine is the only food for the Karner blue butterfly's caterpillar.

Wild lupine is a perennial plant in the pea family with beautiful pink to blue flowers. It is found primarily on dry, sandy soils in open to partially shaded habitats. Many of the areas where the lupine grows are oak savanna and pine barrens plant communities. In addition to the Karner blue, these communities support a diverse array of other rare plant and animal species such as the Blanding's turtle and prairie fame flower. If the natural forces (e.g., wildfires) that create or maintain these open habitats are suppressed, management is needed. Lupines can occur in power line rights-of-ways and utility corridors, military installations, forest trails, and other open areas that are maintained as early successional landscapes. Without natural or artificial disturbance, savanna and barrens communities yield to shrubs or forests. Lupines in shaded habitats may survive, but usually with poor vigor and without flowering. Eventually, the lupines are shaded out, making the site unsuitable for

## Karner blues.

The Karner blue butterfly's annual life cycle is inextricably tied to that of the lupine. About mid-April, wild lupines sprout from rhizomes and forms clumps of flowering stalks. Two generations of Karner blue butterflies are produced each year. The first brood begins around mid-April, when eggs laid the previous summer hatch. Tiny larvae crawl up the lupine stems to feed on the new leaves. They eat the interior portion of the leaf, leaving behind the surface layer and creating a "window pane" effect. Dense stands of lupine are necessary to ensure that enough butterflies are produced to maintain the population over time. Peak bloom is reached by mid- to late May, when flowering lupines may create a sea of blue in the open meadows of oak savannas and pine barrens. About the time of peak bloom, the year's first brood of Karner blue larvae pupate. Adults are usually flying from late May through early June.

During the flowering period, the first-flight adult butterflies lay eggs on or near the lupine plants. In about a week, they hatch. The season's second brood of larvae feed through mid-July, when lupine flowering is ending and seed pods are produced. The second-flight adults then emerge through mid-August, depending on weather conditions. Because they cannot depend on lupine flowers for food at that time, the adults must have a variety of mid- to late summer flowering plant species to serve as nectar sources. By the time second-flight females lay their eggs, the lupine is dying back or is already dormant. The active periods for both the plant and the butterfly last only about 4 months of the year (Dirig 1994).

The ranges of the wild lupine and Karner blue do not exactly overlap. Instead, Karner blues are found along the northern extent of lupine's range. Historically, the butterfly occurred in a rather narrow band extending from eastern Minnesota, across portions of Wisconsin, Illinois, Indiana, Michigan, Ohio, and Canada (Ontario), Pennsylvania, New York, and Massachusetts to New Hampshire. Dirig (1994) surmises that Karner blues are limited to areas where continuous winter snow pack is present for over 80 days. Because the eggs are often deposited on bare sandy soil, where there is little or no or vegetative litter to protect them, snow is necessary to insulate the eggs from cold temperatures and the drying effects of the sun.

Wild lupine is a plant that thrives in areas that are periodically disturbed, which reduces or eliminates overhead canopies and plant competition. Historically, fire provided open barrens and savanna habitats for colonization by lupine and Karner blues. Not surprisingly, fire suppression has consistently been identified as the primary factor affecting the butterfly's population decline and reduction in range. It is now extirpated from Ohio, Pennsylvania, Massachusetts, Ontario, and probably Illinois, and is barely hanging on in New Hampshire and Minnesota.

In the eastern part of its range (New York and New Hampshire), the wild lupine is most frequently found in remnants of habitat that have been artificially disturbed, such as highway corridors, sand roads, utility rights-of-way, abandoned sand pits, and airports. The Karner blue fares better today in Wisconsin and Michigan than anywhere else. Landscapes supporting lupines and butterflies in these States vary from public lands managed as savannas or barrens to rights-of-way and military lands. Wildfire, prescribed burns, and artificial disturbance--such as mowing and grazing--have maintained a patchwork of open-canopied and lupine-dominated sites that continue to support Karner blue butterflies.

The future for the Karner blue lies in active management to simulate the historic role of fire in maintaining oak savanna and pine barren habitats. The Fish and Wildlife Service looks forward to working with its many partners in the protection of this endangered butterfly, the wild lupine, and the ecosystems upon which both depend.

Dirig, R. 1994. Historical notes on wild lupine and the Karner blue butterfly at the Albany Pine Bush, New York. Pages 23 -36 In KARNER BLUE BUTTERFLY: a symbol of a vanishing landscape. Edited by D.A. Andou, R. J. Baker, and C.P. Lane. St. Paul, MN Ag. Exp. Stn.

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