



U.S. Department of Defense and U.S. Fish & Wildlife Service

Protecting Endangered Species on Military Lands:

The Karner Blue Butterfly at Fort McCoy, Wisconsin

Each summer, as the military training activities at Fort McCoy reach their peak, the Karner blue butterfly (*Lycaeides melissa samuelis*), a federally listed endangered species, can be seen fluttering throughout its habitat alongside soldiers and their modern weaponry.

Fort McCoy

Fort McCoy is a 59,750-acre Army installation located in west-central Wisconsin. As the Army's premier Total Force Training Center in the Midwest, Fort McCoy maintains the readiness of America's armed forces, while providing environmental stewardship for the land entrusted to its care. The installation, founded in 1909, provides training support for more than 100,000 personnel annually.

Fort McCoy is situated within the "tension zone," a relatively narrow band across Wisconsin that separates the northern coniferous forests from the central deciduous forests, and within the transition zone between the western prairies and the eastern forests. Due to its unique location, Fort McCoy is home to diverse flora and fauna.

The Karner blue

The Karner blue is a small butterfly with a wingspan of only 0.87 to 1.25 inches. In the male, the upper surface of all four wings is a deep violet-blue fringed with white. In the female, the upper surface is a dusky brownish blue with orange spots on the edge of the hindwing. The lower surface is pale silver with white-ringed black spots and rows of bright orange and blue markings near the edge of the



Female Karner blue



Male Karner blue

hindwings. The protective coloration of the larva, which reaches half an inch in length before changing into a pupa, perfectly matches the green leaves of the vegetation.

Life History

Like all butterflies, the Karner blue has four stages in its life cycle--the egg, larva (caterpillar), pupa (chrysalis), and adult (butterfly). There are two generations per year. The first generation adults appear in late May to mid-June. Females lay eggs on the underside of a leaf or stem of the food plant, wild lupine (*Lupinus perennis*), the only known host plant for Karner blue larvae. These eggs hatch in 7 to 8 days. About 40 to 50 percent of the eggs survive to the adult stage.

The resulting second brood adults, emerging in mid-July to early August, lay their eggs singly on dried lupine seed pods or near the ground on the stems. Eggs of the second brood remain dormant over the winter and hatch the next May.

The average life span for an adult Karner blue is 5 to 7 days. Karner blue adults are nectar-feeders, aiding in the pollination of a variety of wildflowers. The larvae, however, are highly specialized, feeding exclusively on the

wild lupine leaves. Without wild lupine, the Karner blue would not survive.

Distribution

The Karner blue was once found in a narrow north to south band stretching from eastern Minnesota to Maine. Karner blues are currently found in seven states with the largest populations in Wisconsin and Michigan. Other populations are found in Minnesota,



The Karner blue host plant is wild lupine (*Lupinus perennis*) - Photo Source: www.plantbio.ohiou.edu

Indiana, New York, New Hampshire, and Ohio. The species is considered extirpated from Iowa, Illinois,

Pennsylvania, Massachusetts, Maine, and the Canadian province of Ontario. Reintroductions of Karner blues are underway in Ohio, Indiana, and New Hampshire. Many of the remaining populations are thought to be small and isolated.

The decline of the Karner blue is due to commercial and residential development within its habitat, fire suppression resulting in vegetation succession, habitat fragmentation, and conversion of habitat for agricultural and forestry purposes (e.g., converting oak forest and barrens areas to pine plantations). These continue to be the main threats to its survival today.

An Endangered Species

The U.S. Fish and Wildlife Service (FWS) listed the Karner blue as an endangered species in 1992. After learning about the butterfly's declining status in 1990, Fort McCoy began surveys to map the location of wild lupine. As part of the survey, researchers documented the presence or absence of the Karner blue within these lupine patches. Approximately 3,800 acres of wild lupine were mapped on the installation, with more than 95 percent of the lupine supporting the



The Karner blue number 400, marked during a research project on Fort McCoy.

butterfly.

Karner blues are thought to exist on the landscape as metapopulations. A metapopulation is defined as a group of smaller populations where individuals from each of these populations can interact with or disperse to other populations. The presence of Karner blues in wild lupine patches is an important indicator of the health of the entire population. The population at Fort McCoy appears to be healthy, based on the fact that more than 95 percent of the surveyed lupine patches support the butterfly.

Recovery Efforts

Fort McCoy completed a management plan for the Karner blue in 2000. This plan identified recovery goals and the actions needed to obtain those goals.

The primary recovery goal for Fort McCoy is to maintain two large populations of Karner blues. The FWS criteria for a large population are based on the extent of habitat and the number of butterflies supported within the habitat area. Habitat for each large population must spread over a minimum of 10-square miles and support a minimum of 6,000 butterflies during either the first or second flight annually. To estimate populations at Fort McCoy, 19 sites are surveyed multiple times during each flight period with an average of 200,000 meters of transects surveyed annually. Since 2001, population estimates have exceeded the 6,000-butterfly minimum in at least one of the flights.

Several research projects were conducted at Fort McCoy to better understand whether Karner blue populations are impacted by military training activities and prescribed burns. A study conducted in 1994 helped staff biologists determine Karner blue dispersal distances and provided a population estimate for the study site. Fort McCoy now uses information obtained through these research projects to help make habitat management decisions.

Management Actions

Management activities for the Karner blue strive to maintain wild lupine and a variety of nectar species scattered throughout the landscape. Minor soil disturbance helps create optimal seedbed conditions for wild lupine. Habitat management occurs through military training activities, timber sales, prescribed burning, mowing, and use of a severe-duty shredder.

One threat to the butterfly and its habitat is the encroachment of invasive plant species, such as leafy spurge (*Euphorbia esula*) and spotted knapweed (*Centaurea maculosa*). Fort McCoy has been involved in efforts to control and eliminate these invasive plants using an integrated pest management approach. Control



Removing brush and briars using a severe-duty shredder.

measures include the use of herbicides, mowing, prescribed burning, hand pulling, and biological controls.

Too much disturbance to Karner blue habitat can be detrimental. To assist in the long-term survival of the butterfly, Fort McCoy established 10 core areas in 1996. Establishment of these core areas does not mean the areas will be undisturbed, but the land managers will determine when disturbance should occur. Foot traffic through these areas is allowed.

Fort McCoy staff and the FWS have had an open dialogue since the first Karner blue was documented at the installation. This atmosphere of cooperation is a major factor in no loss of military training days due to an endangered species thriving at Fort McCoy.

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