



# Mission Blue Butterfly Monitoring in the Golden Gate National Recreation Area

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**Importance:** *The Golden Gate National Recreation Area (GGNRA) supports some of the only populations of the San Francisco Bay Area's federally endangered mission blue butterfly.*



The quarter-sized mission blue butterfly is a subspecies of Boitard's blue butterfly native to the Bay Area. Here it rests on its favorite host plant, silver lupine.

Having already lost vast swaths of habitat to development, the mission blue is now found only in parts of the Golden Gate National Recreation Area, Twin Peaks, San Bruno Mountain, and the San Francisco Peninsula Watershed.

Mission blue habitat consists of grassland where silver lupine (*Lupinus albifrons* var. *collinus*), summer lupine (*Lupinus formosus*) or varied lupine (*Lupinus variicolor*) are present. These are the only plants mission blue caterpillars can eat. Unfortunately, mission blues' grasslands continue to be threatened by invasions of non-native trees and plants and by a lack of natural disturbances such as historic elk grazing and wildfires that would normally prevent scrubland from taking over. Disease has also attacked mission blues' preferred host plant, the silver lupine, resulting in serious declines in mission blue numbers. Small population sizes, isolation, poaching, trampling, and climate change even further threaten the mission blue butterfly's survival.

**Monitoring Program:** *The National Park Service and the Golden Gate National Parks Conservancy monitor mission blue abundance, distribution and phenology.*



Methods such as larval monitoring, above, are being tested as ways of supplementing monitoring of adult butterflies.

Monitoring mission blues to detect trends in their abundance, distribution, and phenology (e.g. the timing of their flight season) helps us understand how these trends are affected by various conditions and identify where and when intervention is appropriate. Two important long-term monitoring sites for mission blue butterflies in Golden Gate are Milagra Ridge and the Marin Headlands. Thirteen linear transects, where monitors count butterflies while walking a straight line through patches of lupine-rich grassland, were selected for monitoring at Milagra Ridge. Sixteen were selected in the Marin Headlands. Monitoring commenced at these sites in 1995 and 1994, respectively.

Challenges to the monitoring program include monitoring on a regular schedule when adverse weather makes it difficult to find adult butterflies, and lupines shifting away from established transects as their seeds disperse and new

plants grow in new places. As a result, alternative methods such as larval monitoring, where monitors can check lupine plants for caterpillars (or evidence of caterpillar feeding) rain or shine, are being evaluated.

**Status and Trends:** *Mission blue butterfly populations in the Golden Gate National Recreation Area declined sharply in 1998 when a fungal pathogen afflicted their lupine host plants.*

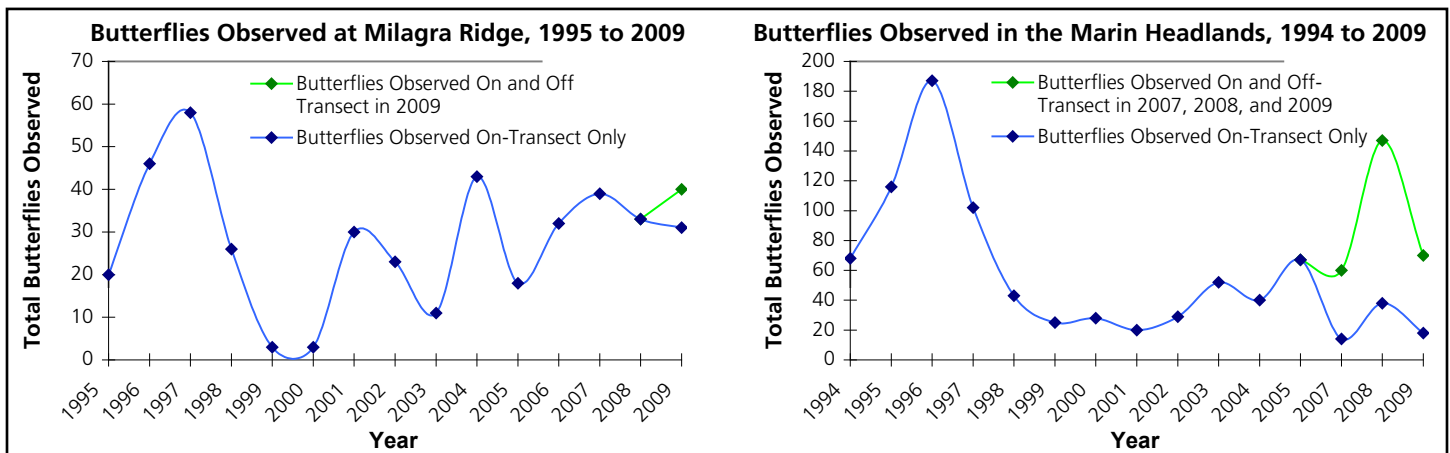


**A mission blue butterfly monitor searches for mission blue adults on a bright sunny day (ideal for butterfly spotting) in the Marin Headlands.**

During the initial years of monitoring, mission blue butterfly abundance and distribution were at their highest. Their flight season was also relatively long and early, with butterflies usually emerging in mid- to late-March, and flying for an average of more than seven weeks. Then, in 1998 a fungal pathogen attacked up to 80 percent of lupines in many areas, causing butterfly populations to plummet, distributions to shrink and phenology to shift.

Between 1999 and 2001 as few as three and 25 mission blues were observed annually at Milagra Ridge and the Marin Headlands, respectively. Distributions also fell with butterflies occupying as few as three transects at Milagra Ridge and six in the Headlands. The butterflies also experienced later and shorter flight seasons.

Although the data can be difficult to interpret, especially in the Marin Headlands where lupines have shifted away from transects, butterfly abundance seems to be fluctuating but increasing steadily since 2001. Flight seasons have returned to pre-pathogen timing and length in the Headlands, but have been slower to rebound in Milagra Ridge. The distribution of mission blues since the pathogen has also been more worrisome in Milagra Ridge where populations have become increasingly concentrated on opposite sides of the Ridge leaving those butterflies more vulnerable than ever to future pathogen outbreaks or other unforeseen events. As a result biologists at Golden Gate are considering ways to improve habitat connectivity and facilitate the re-establishment of populations at lupine patches in between sites where the butterflies are already thriving.



**In 2009 31 butterflies were observed along transects and nine butterflies were opportunistically recorded off-transect on Milagra Ridge. In the Marin Headlands, 17 butterflies were recorded along transects and an additional 53 were observed off-transect, probably due to a shift in lupines away from many transects there in recent years.**

**Update:** Lupines at Milagra Ridge experienced another pathogen outbreak in 2010 causing another decline in mission blue butterfly abundance. This document will be updated as more information becomes available.

**Additional Resources:**

For more information on mission blues within the Golden Gate National Recreation Area visit [http://www.sfnps.org/mission\\_blues](http://www.sfnps.org/mission_blues) or contact Bill Merkle, Golden Gate National Recreation Area Wildlife Biologist, at 415-331-2894 or [bill\\_merkle@nps.gov](mailto:bill_merkle@nps.gov). Summary written by Jessica Weinberg.