

**Conservation Matters:**  
**Contributions from the Conservation Committee**

# Status of the Monarch Sanctuaries in Mexico: March 2007

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The storied aggregations of wintering monarchs in central Mexico are remarkable, as is the entire migratory phenomenon that brings hundreds of millions of these butterflies to sites on a few, select forested mountainsides. Not many people visit the Mexican sanctuaries, but those who do experience magic when the sun warms the colonies, and millions of monarchs flutter upward and surround the visitors. It is distressing that the threats to this entire biological phenomenon continue unabated. Protective actions must be taken.

As far as we know, most monarchs that breed from the Atlantic Coast westwards to the Rocky Mountains migrate southward to pass the winter in very large aggregations on approximately 12 separate mountain ranges west of Mexico City (Brower 1995, Slayback et al. 2007). Recent findings suggest that these may be supplemented by monarchs that have bred in the Great Basin, at least some of which also enter Mexico with as yet unknown fates (Brower and Pyle 2004). The following March, as days lengthen and temperatures rise, the butterflies become active, mate, and begin a return trip northward, laying their eggs on newly sprouting milkweeds along the way, especially in the gulf coastal states. The offspring of the individuals that survived the winter continue the journey northward as far as the southern edge of Canada. Two or more generations are produced over the summer. Unlike migratory birds, the monarchs that complete the return migration are several generations

removed from those that flew southward. This is an inherited behavior pattern that we still understand only vaguely.

Monarchs complete this journey for two reasons. As descendants of a tropical group of butterflies, they cannot tolerate the severe freezes that accompany cold northern winters, so their survival is much higher when they migrate to lower latitudes where temperatures seldom drop more than a few degrees below freezing. They return the following spring, however, because the regrowth of milkweeds, their larval food plants, allows them to breed abundantly throughout Eastern North America.

Threats to monarchs fall into two categories. Those in the summer range are due mainly to the rapidly increasing use of corn and soybean crops that are genetically engineered to be resistant to herbicides. When the emergent corn or soybean seedlings are sprayed with herbicide, all the native plants are killed, including milkweeds and nectar sources. Other genetically modified crops contain genes that produce bacterial toxins that can kill monarch caterpillars.

Threats at the wintering sites are from illegal logging that destroys habitat or degrades it to the point at which monarchs cannot tolerate the resulting extreme climatic conditions. Monarchs make their remarkable two-thousand-mile migratory journey to pass the winter in cool, humid, non-freezing conditions. The sites must be cool because the butterflies burn their fat

reserves too quickly when they are warm and, as a result, they may not have enough energy to survive the winter (little nectar is available within flying distance of the overwintering sites for them to replenish their energy stores). Though cool, the sites must also be subject to minimal freezing and retain enough humidity to prevent the butterflies from desiccating. These conditions occur in very limited locations in the oyamel fir forests of Mexico's Transvolcanic Mountains. Colonies develop very predictably every year at several well-known locations (Slayback et al. 2007).

Seven of the twelve known overwintering enclaves in Mexico were set aside by presidential decree in 1986 and subsequently enlarged by a second decree in 2000 to become the Monarch Butterfly Biosphere Reserve, with complete protection in core areas surrounded by less restricted buffer zones. But the official protection is not working. Illegal logging has increased substantially in both the core and buffer zones, usually during the wet season of April to October when the colonies have dispersed, few tourists are around to witness what is happening, and less official surveillance of the sanctuaries takes place. It is astonishing to find newly clear-cut areas adjacent to the monarch colonies, but every year the surrounding forest is further reduced. Degradation of the sanctuaries has been taking place at a rate greater than 3% per year in the core zone (Brower et al. 2002) and is accelerating (World

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## The Status of the Monarchs in Mexico

**Figure 1:** Monarchs clustering on the oyamel fir trees that form the protective microclimate at the overwintering sites; **Figure 2:** A female monarch taking nectar at Gregg's Mistflower as it passes through north Texas, late October, 2006. **Figure 3:** Lincoln Brower holding a recently cut log from an oyamel fir in the middle of the protected zone at the Cerro Pelon colony (Jan 11, 2007). Threats at the wintering sites are from illegal logging that destroys habitat or degrades it to the point at which monarchs cannot tolerate the resulting extreme climatic conditions. **Figure 4:** Monarchs, warmed by the mid-day sun, take flight by the millions at the Sierra Chincua colony (Jan 9, 2007). **Figure 5:** Monarchs taking moisture at mud at one of the small streams near the overwintering sites. Photos 1, 3, 4, and 5 by Ernest Williams in Mexico, January, 2007. Photo 2 by Dale Clark, Dallas Co., Texas, October 28, 2006.



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## Monarch Status in Mexico

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Wildlife Fund 2006). We've recently returned from the sanctuaries (January-March, 2007), where we walked through freshly cut acreage in the core reserve and heard chainsaws in the background. Logging takes place both by family groups seeking wood to burn for cooking as well as by well-organized illegal groups that supply the regional timber industry (World Wildlife Fund 2006, Aridjis 2006). Cutting is exacerbated by the common practice of loggers bribing local authorities for access (Toone & Hanscom 2003). Without an end to logging in the core zone of the sanctuary, the monarch migratory phenomenon is severely and increasingly threatened.

Where trees have been removed, monarch colonies have had to relocate. Where the forest has been thinned, climatic conditions fluctuate much more without the thermal buffer provided by a dense canopy. Open forests allow temperatures to fall further below freezing, and when the butterflies become wet and freeze, few survive (Anderson & Brower 1996). A notable example took place in a single storm in January, 2002, during which an estimated 74 - 80%, or nearly half a billion monarchs, were killed in the overwintering region (Brower et al. 2004), leaving a layer of death on the forest floor. In a one-square-meter sample, observers estimated that there were more than 58,000 dead monarchs in a layer that was over a foot deep (Brower et al. 2004). While natural storm events can cause severe mortality, their negative effect is greatly exacerbated where the forest has been thinned.

The climatic needs of overwintering monarchs have been studied well enough to specify which areas must be protected (Bojorquez-Tapia et al. 2003), even under changing global climate (Oberhauser & Peterson 2003). Given the state of the remaining oyamel forests, one hope for recovery of the monarch sanctuaries is vegetative

succession; if an area is left undisturbed, oyamel firs will grow back. There are serious questions whether areas that have been logged can be protected well enough to give the forest the 50 years needed to recover and where the monarchs will pass the winter in the meantime.

We see the following as necessary:

1. The Mexican government must fulfill its recent promise to take actions that will effectively enforce the law and stop all logging in the core zone of the sanctuaries. The permanent installation of military police check points on the few major roads that the loggers must traverse could easily stop this appalling violation. President Felipe Calderon has recently stated (February, 2007) his intention to increase the presence of federal police in the reserve, and we agree that this action is vital. The logging must cease.

2. Improvements to the local economy must be part of the solution so that people surrounding the sanctuaries can become less dependent on income from the harvesting of trees. Ecotourism is currently in a state of infancy but could be developed to become a lucrative and substantial source of income. The opportunity is ripe for someone to create attractive facilities and provide ecotours for travelers to witness the magical appearance of clusters of millions of monarchs. Expanding the focus to operate year round, these facilities could also support birding, geological, and archeological investigations, and perhaps even horseback adventures. Wonderful opportunities exist for all these activities in central Mexico. The topography of the area is so diverse that a tropical zone with *Morpho* butterflies is nearby to the southeast, while hot springs and fabulous obsidian deposits are a few miles to the northwest. Increased ecotourism could spur the local economy and elevate the local importance of the monarch sanctuaries.

3. UNESCO has the opportunity to designate the monarch sanctuaries of Mexico as a World Heritage Site,

putting them on a par with 162 other recognized natural wonders, including the Galapagos Islands of Ecuador, the Great Barrier Reef of Australia, the Giant Panda Sanctuaries of China, and Everglades National Park of the U.S. A proposal for this designation has just been submitted and a great poet and friend of the monarchs, Homero Aridjis, has just been appointed as the Mexican ambassador to UNESCO. If accepted, international recognition of the monarch overwintering grounds will increase, and additional funding for protection will certainly become available.

It is disheartening to witness the current degradation of the overwintering sites. Our goals are long term, however. Michael Soule (1991) has likened conservationists to the builders of cathedrals during the Middle Ages, who, even though they would not see the finished forms, were not deterred from their work. We, too, must keep working for effective protection of the monarch overwintering colonies so that the biological phenomenon of monarch migration can continue for many centuries yet to come.

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## Populations of Saturniidae

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the expansive fields so instead I examined an edge along the bay facing South Padre Island where I discovered 3 *H. calleta* cocoons at a rest stop. Females flying over the bay are apt to circle back and lay upon the first Ceniza they encounter, those along the edge. Others may attempt the 2-mile flight across the bay and lay their last few ova on the numerous Ceniza on Padre Island.

Scientific study of flight behavior and dispersal of Saturniidae is long overdue. Martin Marietta Energy Systems of Oak Ridge, Tennessee developed microchips which emit infrared transmissions which are picked up by ground based receivers. Apicultural researchers attached these chips to drone honeybees to trace their mating flights. Riley (1996) used harmonic radar and attached electronic tags to bumblebees to chronical their nectar gathering flights. Riley states "Applications...to many other insect species seems feasible...." Perhaps graduate student researchers could pursue a grant and adapt these techniques to Lepidoptera.

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## Aberrations of *Euphydryas*...

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Campground, ca. 10 rd. miles S of Hwy. 244, 4300', by A. D. Warren.

Two additional aberrations of *Euphydryas* are figured herein. One (Figs. 17-18) is a striking individual of *E. anicia eurytion*, collected near the type locality of that taxon, 2.1 rd. miles W of US Hwy. 285, off USFS Fourmile Ck. Rd., 1.3 air miles S of Fairplay, 9860', Park County, Colorado, on July 4th, 1991, by A. D. Warren. This specimen has increased pale scaling on the dorsal and ventral forewings, and increased black scaling on the dorsal (especially) and ventral hindwings, combined with a general reduction of

wing pattern elements, most pronounced ventrally. The second aberration (Figs. 19-20) is of *E. phaeton phaeton*, collected by Irwin Leeuw at the Spring Creek Preserve, nr. Barrington, Cook County, Illinois, on June 6th, 1991. This individual is a close match to the "holotype" of Gunder's (1927) *E. p. phaeton* transition form "superba," but is slightly darker above and below.

For now, all specimens figured herein are housed in the collection of the author, Castle Rock, Colorado. Special thanks are extended to Jonathan P. Pelham (Seattle, Washington) for reviewing this note and for providing copies of cited literature on short notice.

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