



Monarch

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Scientific name
Danaus plexippus

Taxon
Arthropods

COSEWIC Status
Endangered

Canadian range
British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick, Prince Edward Island, Nova Scotia, Newfoundland and Labrador, Northwest Territories

Reason for Designation

This large showy species is one of the most well-known butterflies in the world. The Canadian population is migratory with two distinct pathways and cumulative threats at both overwintering sites and along the long migratory routes. The migratory group west of the Rocky Mountains moves between coastal California and southern British Columbia. The group east of the Rocky Mountains represents the vast majority of the Canadian population and moves between the Oyamel Forest of central Mexico and southern Canada east of Alberta. The overwintering sites in central Mexico are extremely small, and threats to these areas include illegal logging and agricultural development, and increased frequency and severity of storms during key congregation times. Declines of greater than 50% have occurred over the past decade.

Wildlife Species Description and Significance

The Monarch is a conservation icon and one of the most well-known and well-studied butterflies in the world. The species has four life stages. The adult Monarch is a large (wingspan 93 – 105 mm), showy butterfly with predominantly orange wings outlined by a broad black border and two rows of circular white spots. The caterpillar is distinctively white, yellow, and black-banded, with a pair of black filaments at its head and tail. The chrysalis is green and gold. The eggs are approximately 1 mm long, oval with a flat base and bluntly pointed apex.

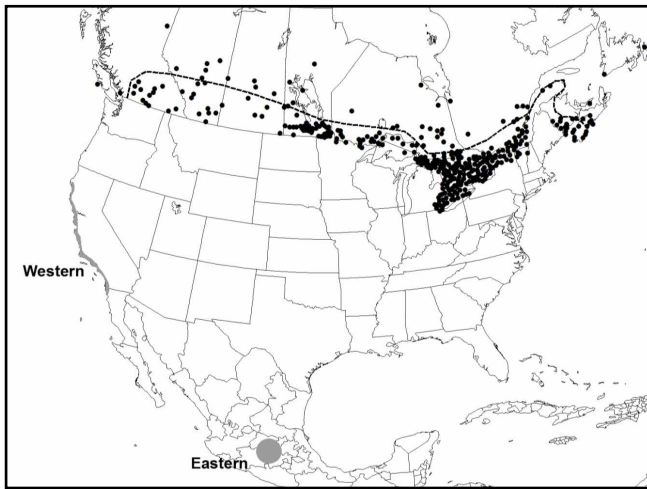
The Monarch is one of a few butterflies that migrate and their migration from southern Canada to Mexico has been described as an endangered biological phenomenon. The Monarch is used in classrooms all over North America to teach children about biology, metamorphosis, conservation, and an appreciation for nature.

Distribution

The Monarch is a migratory butterfly. The overall native range of the Monarch occurs from Central America northward through the continental United States to southern Canada, and from the Atlantic Coast westward to the Pacific Coast. The Canadian range of occurrence includes portions of all ten provinces and the Northwest Territories. Monarchs are loosely divided into eastern and western subgroups based on their migratory routes and overwintering sites. Eastern Monarchs breed from Alberta east to Nova Scotia and migrate south to overwinter in the mountains of Central Mexico. Western Monarchs breed in southern British Columbia and migrate south to overwinter in coastal California. The breeding range in Canada is south of the 50° latitude in Ontario, Quebec and the Maritimes and extends north to the 54° latitude in Manitoba, Saskatchewan and Alberta.

The Monarch is being assessed as one designatable unit in Canada. There is some exchange of individuals between the eastern and western migratory routes and no genetic or morphological evidence to suggest two subspecies.

Monarchs have also colonized continental Europe, North Africa, Australia and many Pacific islands within the last 200 years but these colonized populations do not migrate.



The Canadian range extent of the Monarch. The dashed line is the approximate northern distribution limit for caterpillar food plants Swamp Milkweed, Common Milkweed, and Showy Milkweed. Dots north of the line and in coastal B.C. represent non-breeding vagrants and occurrences at isolated patches of milkweeds planted outside their native range. Overwintering areas of eastern and western Monarchs are shown (grey areas).

Habitat

Milkweeds (numerous species) are the sole food plant for Monarch caterpillars. These plants grow predominantly in open and periodically disturbed habitats such as roadsides, fields, wetlands, prairies, and open forests. Milkweeds are often planted outside their native range, and sometimes wayward Monarchs are observed at these patches.

Overwintering Monarchs require a cool, humid microclimate that is protected from frost, excessive sunlight, wind, and heavy precipitation. These conditions are found along the Pacific coast of California and the high elevation forests of central Mexico. Eastern Monarchs overwinter at elevations of 2900 - 3300 m in the Oyamel Fir forests in Mexico. Western Monarchs overwinter within a few kilometres of the Pacific coast of California, mainly in stands of non-native eucalyptus trees that replaced native pines starting in the 1850s, which were planted to replace native tree species.

Monarchs require staging areas which are used to rest, feed, and avoid inclement weather during

migration. In Canada, they are found along the north shores of the Great Lakes where Monarchs roost in trees before crossing large areas of open water.

Biology

Adults mate during the winter or early spring at the overwintering sites in Mexico or California and begin flying north in late February or early March. About 10% of eastern Monarchs arriving in Canada fly the entire journey but most females that leave the overwintering sites breed in the southern United States. Female Monarchs lay 300 - 400 eggs singly on the undersides of milkweed leaves. The eggs hatch in three to eight days and the caterpillars feed almost continuously as they increase their body weight 2000-fold. After 9 - 14 days of feeding, the caterpillar transforms into a chrysalis and the adult emerges 9 - 15 days later. Adults of the following generations continue the migration north, many of which breed, reproduce and complete another generation in the central United States. Most Monarchs that reach Canada are the great-grandchildren of those that left Mexico. Monarchs in southern Ontario and Quebec produce two to three generations between June and October each year. Monarchs in southern British Columbia produce at least one generation each summer. Summer adults live for two to five weeks, but overwintering adults live up to nine months. The late summer adults migrate south to Mexico or California, where they overwinter and the yearly migration begins again.

Monarch caterpillars sequester the chemicals present in milkweed plants, which make them, as well as adult butterflies, unpalatable to most birds and other vertebrates.

Population Sizes and Trends

Population size estimates are not available for Monarchs in Canada. Each fall hundreds of thousands of Monarchs migrate through Long Point in southern Ontario but it's unknown what proportion of the Canadian population these individuals represent. Population estimates are available for the overwintering sites, which include Monarchs from both Canada and the United States. The total overwintering population size in Mexico (eastern Monarch) was estimated at 66 million individuals in 2014-2015 and 200 million in 2015-2016. A storm in March 2016 killed a large but unknown number of Monarchs at the eastern overwintering sites.

Fewer than 500,000 Monarchs currently overwinter in California (western Monarch), and only a tiny percentage of these breed in Canada. In some years, the western Canadian breeding population (in British Columbia) is so small as to be undetectable.

The overwintering population in Mexico, as measured by area of occupied habitat (hectares), declined significantly over the period 1994-2015. A log-linear regression of the time series indicates an 83% decline. The 2012-2014 estimates were the lowest in the time series. The area of occupied habitat in 2015 (4 ha) was higher than the previous three years but below the time series average of 6 ha. The decline rate of the occupied habitat over a 10-year period was calculated using the slope of a log-linear regression of the entire time series applied to a period of 10 years. The estimated 10-year change was estimated to be -59%.

A long-term migration monitoring study at Long Point, Ontario showed modest declines when numbers were adjusted for weather effects but similar studies at Cape May (New Jersey) and the Peninsula Point (Michigan) showed no evidence of decline.

Threats and Limiting Factors

Most North American Monarchs are concentrated in a few hectares in the winter and are vulnerable to extreme weather events, fire, diseases, predation, and anthropogenic threats. Overwintering habitat in Oyamel Fir forest in Mexico has been fragmented and degraded by conversion to agriculture, fire, logging, and forest thinning. These practices increase the exposure of overwintering Monarchs to winter storms, cold temperatures and wet conditions, resulting in increased mortality. Climate change models predict that the area of suitable forest at the overwintering sites in Mexico will decline and the frequency of winter storms will increase resulting in catastrophic mortality of Monarchs. Degradation to the western Monarch overwintering habitat is caused mainly by real estate development along the California coast and by elimination of introduced eucalyptus upon which the butterflies overwinter.

The increased use of herbicides and subsequent decline in milkweeds is a significant threat facing Monarchs throughout their North American range. Increased herbicide use may also cause declines in nectar supplies needed by migrating Monarchs and reduce overwinter survival. Neonicotinoid pesticides are an emerging threat, the magnitude of which is poorly understood.

Protection, Status, and Ranks

The Monarch was assessed as Special Concern by COSEWIC in 1997. The status was re-examined and confirmed in 2001 and 2010 and designated Endangered in 2016. Monarchs are classified as Special Concern under the Ontario *Endangered Species Act* and the New Brunswick *Species at Risk Act*. The Monarch is listed as “under special protection” in Mexico and in the United States, Monarchs are under review for listing under the United States *Endangered Species Act*. Breeding populations of Monarchs are ranked as Apparently Secure (G4) globally and Secure for Canada and the United States. Migratory concentration areas are ranked as Vulnerable to Imperiled in the United States.

Source: COSEWIC. 2016. COSEWIC assessment and status report on the Monarch *Danaus plexippus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xiii + 59 pp.

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