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Editor **JIM HENDRY** jim.hendry@sunmedia.ca 745-4641 ext. 242

LIVING

Regal butterflies under siege

Climate change, herbicides and agriculture conspire against a childhood touchstone

Remember the monarchs that were nectaring on your purple coneflowers last August? They are now 4,000 km away, high in the Sierra Madre Mountains of Mexico. If you were fortunate enough to be there right now, you would witness quite a show. According to Dr. Chip Taylor, an insect ecologist at the University of Kansas, the monarchs stream down the mountainside every day in mid-morning to drink water at small springs. "You can actually hear the rustle of their wings as they form a veritable river of orange and black, passing by at almost 20 km/hr and lasting for two hours. At times, there are so many butterflies that you can hardly see people standing across from you only 20 feet away."

DREW MONKMAN
OUR CHANGING SEASONS

Dr. Taylor, who is also the director of Monarch Watch, a butterfly conservation organization, spoke last November at the Royal Ontario Museum in Toronto. He had an ominous warning, however. "The movement of monarchs represents the most spectacular migration on the planet. And, we're going to lose it unless we change a lot of what we do out there." This week, I'd like to talk about just what needs to change and why it won't be easy.

First, there are two very important things to know about monarch butterflies. Most importantly, they are absolutely dependent on milkweed. There is no other plant on which they can lay their eggs. Even though the adults can feed on the nectar of other species, monarch larvae (caterpillars) eat nothing but milkweed leaves. As goes milkweed, so goes the monarch. It's as simple as that. The second thing to know is that monarchs migrate. Male and female monarchs begin to move northward out of Mexico in late February. By the first week of March, they start arriving in Texas where the females will lay most of their eggs and die. What happens in Texas is crucial, because many of the butterflies born here will fly northward into Canada, arriving in Ontario in May. If the conditions during March and April in Texas are good, the monarch population expands very quickly and large numbers arrive in Ontario. Two more generations are born in Ontario, the second of which will make the return flight to Mexico, starting in late August. By the end of September, these Ontario-born monarchs will already be moving through Texas, nectaring on species like frostweed as they go. They will arrive at their high elevation, mountain overwintering sites in the last couple of days of October.

POPULATION DECLINE

Unfortunately, monarchs are facing a rapidly decline in population. Only two decades ago, the numbers – measured by scientists at the Mexican overwintering sites – were still quite robust. On average, nearly seven hectares of mountainside were covered with monarchs in the 1990s. Each hectare represents about 50 million individual monarchs. That number dropped to only four hectares in 2004 and then to an all-time low of little more than one hectare in 2010. According to Taylor, the number is expected to be even lower this year.

WIKIMEDIA photo

DREW MONKMAN Special to The Examiner

DON DAVIS Special to The Examiner

Use of Roundup weedkiller on corn and soybean fields wipes out milkweeds, which monarchs like this adult (above) rely on. Thousands of monarchs (right) stop for a drink at an overwintering site in Mexico.

So, what has happened? We have to remember that the monarch is essentially a prairie butterfly. The prairies of the mid-western United States (e.g., Kansas, Indiana, Iowa, etc.) made up its traditional range. However, only about 4% of the original prairies remain. Even so, up until recently, monarchs were still able to reproduce on milkweed plants growing in the corn and soy fields that have replaced most of the prairie. Even now, most of the monarchs that make it to Mexico each fall come out of the corn and soybean cropland of the U.S. mid-west.

Since the 1990s, however, two things have changed: the planting of genetically modified (GM) corn and soybean and an associated huge loss of monarch habitat. The switch by farmers to GM crops has been no less than a disaster for monarchs. A 2011 paper co-authored by Dr. Taylor and published in the journal Insect Conservation and Diversity found that increased use of glyphosate herbicide (e.g. Roundup) on GM crops in the Midwest is a very effective killer of milkweed plants. GM crops themselves are resistant to herbicides such as Roundup. This means that farmers can spray their fields with Roundup and kill all of the milkweed that happens to be growing there. Before the advent of GM crops, corn and soy fields always had a small amount of milkweed plants growing in amongst the rows of crops. These corn or soy-field milkweeds were used heavily by monarchs. At that time, farmers controlled weeds by tilling; however, milkweeds usually survived the tilling. They do not survive repeated use of herbicides like Roundup, however. Taylor told the New York Times, "The milkweed has disappeared from at least 100 million acres of these row crops. The milkweed is virtually gone."

In 1996, the acreage used for corn and soybean production in the U.S. was 143.5 million acres. By 2012, it had grown to a staggering 169 million acres. The huge growth in acreage has come primarily by converting conservation reserve land, grassland and rangeland to GM corn and soy cropland. This has meant a huge loss of monarch habitat since all of these lands used to contain milkweed. Much of the impetus for the expansion of cropland for corn and soy has come from the rush to produce ethanol and biodiesel as an alternative to fossil fuels. This caused the price of corn and soy to soar.

When all types of habitat loss are added up, a staggering 20% of the monarchs' breeding habitat has been lost since 1996. Taylor estimates that about 6,000 acres a day or 2.2 million acres a year are still being taken out of monarch habitat as a result of agriculture and development (e.g., subdivisions, shopping centres). We can, of course, see the same phenomenon happening all around Peterborough as fields that sustained monarchs in the past are now being converted to housing subdivisions. It is habitat destruction by a thousand tiny cuts – everywhere and all the time.

The loss of milkweed and monarch habitat is occurring for other reasons as well. Intensive agriculture means that farmers are taking their fields right to the very edge of roads and getting rid of old hedge rows and ditch areas that used to have milkweed plants. The management of marginal lands and roadsides is usually not milkweed-friendly, either. We need to remember, too, that this is not only a problem for monarchs but for pollinators like bees that share the same habitat.

CLIMATE CHANGE

A lot of what eventually happens to monarchs will depend on climate change. For the last 15 years, the mean temperature for the U.S. has been above the long-term average. The all-important March temperatures have been increasing by almost 0.7 F per decade. By 2040, March temperatures in Texas could go up by 6 F. According to Taylor, March temperatures are crucial. "Every time we have high March temperatures, the population declines. Low March temperatures mean population increases." Elevated temperatures mean that the adults die sooner, often before they've had time to lay all of their eggs. This is also true on their Mexican wintering grounds where warmer temperatures cause many more monarchs to die as a result of a quickened metabolism.

Climate change also impacts the overwintering grounds. As predicted by climate models, severe winter storms originating over the Pacific Ocean are occurring more and more frequently. The storms bring in masses of warm air that sweep eastward and cause huge amounts of rainfall. Because many of the forests have already bee thinned by illegal logging, the butterflies are more likely to get wet in these storms and often to die from hypothermia. In 2004, about 80% of the overwintering butterflies died as a result of storms. Because the population was still fairly robust, however, it did eventually recover. The low populations of today will find it much more difficult to bounce back from these storms. New research is also showing how climate change will affect the Oyalmel fir trees on which the monarchs roost. It is feared that the warmer temperatures – a 2 C increase is predicted by 2030 – may eventually kill these trees.

To have any hope of saving monarchs, the following measures are critical:

- Maintaining monarch breeding habitat and changing the culture of mowing and herbicide use, especially along road margins. One way individuals can help is by creating "Monarch Waystations" by planting milkweed in home gardens, at schools, businesses, parks, zoos, nature centers, along roadsides, and on other unused plots of land. Go to www.monarchwatch.org for more information.
- Carrying out a nationwide landscape restoration program called "Bring Back the Monarchs." The goals of this Monarch Watch program are to restore 20 milkweed species, used by monarch caterpillars as food, to their native ranges throughout the United States and to encourage the planting of nectar-producing native flowers that support adult monarchs and other pollinators. A lot of work is being done in south-central Texas which, as I have explained, is ground zero.
- Continuing to fund programs aimed at maintaining high-quality overwintering habitats in Mexico through conservation education, reforestation, the stopping of illegal harvesting.
- Addressing climate change, the most serious threat of all, in order to limit planet-wide warming to 2 C.
- Simply learning more about this amazing creature and spreading the word. A great way to start if by going to see the wonderful new Imax movie "Flight of the Butterflies" which filmed hundreds of millions of monarchs in their overwintering sanctuaries and also along their migratory routes. It opens April 12 at the Ontario Science Centre.

Drew Monkman is a retired Peterborough teacher and author of Nature's Year: Changing Seasons in Central and Eastern Ontario. He can be reached at dmonkman1@cogeco.ca. Visit his website and see past columns at www.drewmonkman.com