

Blizzard Bag Lesson #1: Monarch Populations (Biology – Grade 10)

Objective: Explain the cause and significance of the decline of monarch butterfly populations

Overview: We have discussed in class the interconnectedness of ecosystems and the relationship to the function or health of the biosphere. Often times living species can provide a measurement of this healthy functioning in what is referred to as *bioassessment*. In this assignment, you will use different materials to develop an understanding of how the decline of a population can be used in this way.



Directions

- 1.) **Read** the included article below “A Sad Descent” about monarch populations
- 2.) Watch **one or all** of the following videos: <https://www.youtube.com/watch?v=FpatE-79cKg>
OR http://www.huffingtonpost.ca/2014/06/04/monarch-butterfly-decline_n_5448271.html
OR <http://philadelphia.cbslocal.com/2014/09/26/local-experts-say-monarch-butterflies-suffered-severe-decline-in-population-due-to-destroyed-natural-habitats/>
- 3.) Explore the website **Journey North Monarch Migration Watch** <http://www.learner.org/jnorth/monarch/News.html>
- 4.) Neatly write or type a response that includes ***at minimum*** the following:
 - a.) Describe the survival requirements for monarchs (1 paragraph)
 - b.) Explain the likely cause(s) of the decline of the monarch population (1 paragraph)
 - c.) Describe what conservation methods may help the population – either currently in use or other ideas you may have (1 paragraph)
 - d.) Conclude with an explanation of why the decline of the monarchs is significant in the big picture of the biosphere (1 paragraph)

NOTE: Your response should demonstrate evidence that you have used all the materials.

How to turn in this assignment:

- 1.) Print out your response writing and attach this sheet to it and return to your teacher by the due date
- 2.) If you do not have the ability to print your document from home, you may do so when you return to school and/or you may email the assignment to your teacher.

No Internet Alternative:

If you do not have Internet access at home, see your teacher to arrange a time during your study hall or before or after school to access the materials and complete your response.

Grading:

- _____ Response describes the survival requirements for monarchs (1 paragraph)
- _____ Response explains the likely cause(s) of the decline of the monarch population (1 paragraph)
- _____ Response describes what conservation methods may help the population (1 paragraph)
- _____ Response concludes with an explanation of why the decline of the monarchs is significant in the big picture of the biosphere (1 paragraph)
- _____ Response is neatly written or typed; correct spelling and grammar

A sad descent



McCLATCHY/TRIBUNE

Monarch butterflies cling to a tree in the Monarch Butterfly Biosphere Reserve in Mexico.

Do monarch butterflies' woes signal broader problems for other species?

McCLATCHY NEWSPAPERS

ANGANGUEO, Mexico — On a high mountain slope in central Mexico, a patch of fir trees looks dusted in orange and black. In fact, millions of monarch butterflies cloak the trees. The forest murmurs with the whirl of their flapping wings.

Every year, hundreds of millions of monarch butterflies travel the length of North America to pass the winter in central Mexico. Yet the great monarch migration is in peril, a victim of rampant herbicide use in faraway corn and soybean fields, extreme weather, a tiny microbial pathogen, and deforestation. Monarch butterfly populations are plummeting. The dense colonies of butterflies on central Mexican peaks were far smaller this year than ever before.

Scientists say Mexico's monarch butterfly colonies — as many as several million butterflies in one acre — are on the cusp of disappearing.

When President Obama met with Mexico's President Enrique Pena Nieto and Canadian Prime Minister Stephen Harper on Feb. 19 in Toluca, they agreed to establish a working group to ensure the conservation of the monarch.

Scientists who are studying the monarchs' decline cite many possible reasons, but they're focusing now on one major one: the decline in the United States of milkweed, a plant that's widely treated as a weed to be eradicated. Milkweed is most common in the high-grass prairies of the

AT RISK

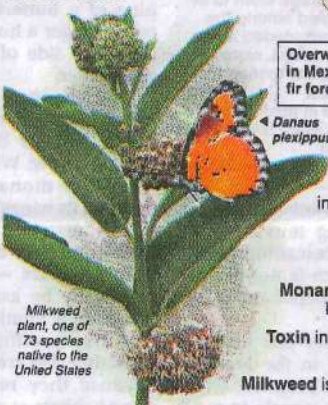
The monarch butterfly population has declined 43 percent since last winter. Facts about this iconic insect and reasons it's at risk:

Main threats

- Breeding habitat loss from increased herbicide use in the United States and Canada, at least 100 million acres lost since 1997
- Weather extremes associated with climate change
- Deforestation at over-wintering sites in Mexico
- OE protozoan parasite, first detected in 2002

Marathon migration

Hundreds of millions of monarchs make the winter migration of up to 3,000 miles to Mexico* then fly north in the spring



It's all about milkweed

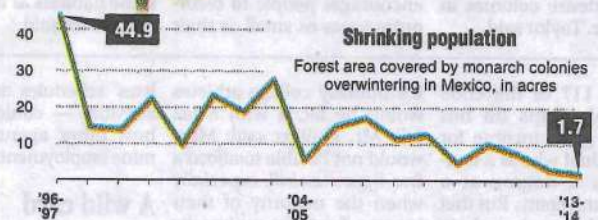
Milkweed plants, which grow wild in fields and along roadsides, are key to a monarch's life cycle

Female monarchs only lay eggs on milkweed leaves

Monarch larvae eat only milkweed leaves before they transform into butterflies

Toxin in plant makes monarchs taste bad to predators

Milkweed is killed by widespread herbicide use



SOURCE: Monarch Watch, MCT Photo Service, World Wildlife Fund, Mexico, Monarch Butterfly Biosphere Reserve

McCLATCHY/TRIBUNE

Canadian and U.S. Midwest, but its 70 varieties also grow along the Atlantic and Pacific coasts, in the Caribbean, and elsewhere.

Monarchs can't survive without milkweed.

Female monarchs lay eggs on milkweed. When they hatch, the larvae grow into caterpillars that feed on the milkweed's leaves. Those leaves contain a poison that inoculates the monarchs from their predators. The caterpillars then form chrysalises and emerge as butterflies.

Over the past decade, U.S. fields containing milkweed have declined sharply. "We've lost something like 24 million acres because of conversion of land to cropland. That's an area the size of Indiana," said Orley "Chip" Taylor, a monarch expert at the University of Kansas.

The advent of genetically mod-

ified corn and soybean varieties that can withstand herbicides has added to that loss.

"The crops survive but any weeds, including milkweed, don't," said Craig Wilson, a scientist at Texas A&M University.

Faced with vast reductions in milkweed, the size of the colonies of monarchs escaping northern winters has shrunk radically in central Mexico.

Nearly two decades ago, in the winter of 1996-97, dense monarch colonies covered 44.9 acres of oyamel fir forest. In the 2013-14 winter, the colonies covered only 1.7 acres, a plunge of nearly 44 percent from the previous year.

"We must turn the tide for monarchs," said Omar Vidal, the president of WWF-Mexico, a branch of the Switzerland-based World Wide Fund for Nature.

Most monarchs live only a little more than a month. But one generation each year lives seven or eight months, long enough to migrate to central Mexico before winter sets in, where the butterflies settle into a semi-dormant state, often clustering around the same fir trees as their forebears. In the spring, the monarchs return to the north, where they lay eggs on milkweed and die, giving way to a new generation.

Other factors may be hurting the monarch population, including extreme conditions associated with climate change. A debilitating protozoan parasite also has exploded since 2002 and now affects 10 to 15 percent of monarchs, said Sonia Altizer, an ecologist at the University of Georgia who's studied monarchs for two decades.

See WOES, Page B2

Woes

Continued from Page B1

While the dwindling monarch colonies worry scientists, who fear they may be a warning of other environmental crises, in this region of Mexico the decline threatens people's livelihood. Butterfly tourism had grown since scientists first came across the dense winter colonies in 1975.

Only 55,000 visitors came this season, said Fernando Guzman Cruz, a member of the El Rosario ejido, or communal agricultural community, that protects the Monarch Butterfly Biosphere Reserve. That was a 50 percent drop from a year earlier.

For years, Mexico received much of the blame for dwindling monarch populations. Scientists pointed to rampant illegal logging of the high-altitude oyamel firs the monarch favor. The government took action and large-scale logging was reduced to "practically zero," said Mr. Vidal of WWF-Mexico.

Blame has shifted north.

HOW TO HELP MONARCHS

One of the primary reasons for the recent decline of monarch butterflies, scientists think, is the eradication of milkweed plants — which the monarchs lay eggs on and their larvae eat — along U.S. highways and near farmland due to the use of herbicides.

Here are suggestions how individuals can help:

■ Plant native milkweed in your yard and encourage local government to plant it in parks.

There are several sources for free milkweed seeds.

Consult livemonarch.com for sources of seeds.

Monarchwatch.org offers a list of providers of milkweed plants and seeds.

Be sure to determine which variety is appropriate to the area where you live.

■ Join programs to monitor monarch butterfly movements and presence in your area.

In the past two centuries, monarchs have spread around the globe, so they may never vanish from the world. But they might stop their seasonal movement, and humanity would lose an awe-inspiring annual event if the monarch no longer moves to dense colonies in Mexico, Mr. Taylor said.



A national count conducted by the North American Butterfly Association is July 1 in Canada and July 4 in the United States.

The association's Web site is naba.org.

■ Write local and state legislators to encourage them to include milkweed among the plants that are seeded along highway roadsides, especially those that follow monarch migratory routes.

Get involved in pushing legislators to set aside larger tracts for milkweed.

— McClatchy Newspapers

"The sensation of hearing and seeing tens of thousands of cascading butterflies at once is not like any other experience on Earth," he said.

Mr. Taylor has been instrumental in the Monarch Waystation program, which encourages people to recolonize areas as small as their

yards with milkweed to serve as stopping points for migrating butterflies.

More than 7,500 "Waystations" now exist, and boosters urge federal and state governments to let milkweed grow undisturbed along highways rather than mow it.

Some experts worry about a variation of "the butterfly effect," the concept coined by Edward Norton Lorenz, an American meteorologist and pioneer of chaos theory, who suggested that the flapping of a butterfly's wings could trigger a hurricane on the other side of the globe weeks later.

That theory of interdependence now seems turned on its head. The question now: What occurs when the monarch stops flapping its wings?

"If monarchs are in trouble — and they are a really robust species — you can practically be assured that there are a number of species like pollinators and birds that also are in trouble because they rely on the same habitats as monarchs," Ms. Altizer said.

AT RISK

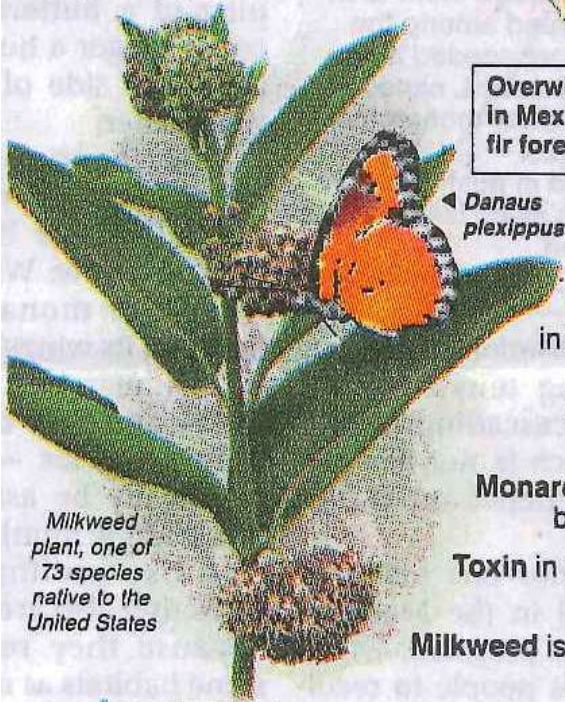
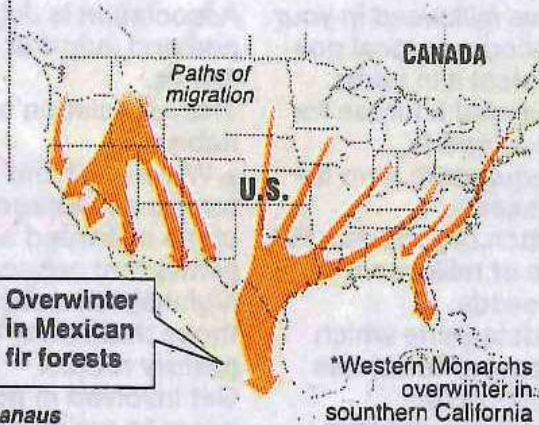
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Marathon migration

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Overwinter in Mexican fir forests
 Danaus plexippus

Milkweed plant, one of 73 species native to the United States

It's all about milkweed

Milkweed plants, which grow wild in fields and along roadsides, are key to a monarch's life cycle

Female monarchs only lay eggs on milkweed leaves

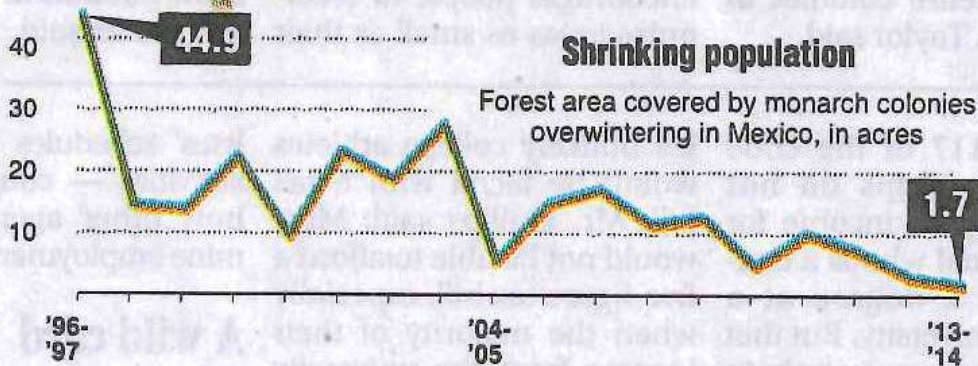
Monarch larvae eat only milkweed leaves before they transform into butterflies

Toxin in plant makes monarchs taste bad to predators

Milkweed is killed by widespread herbicide use

Shrinking population

Forest area covered by monarch colonies overwintering in Mexico, in acres



SOURCE: Monarch Watch, MCT Photo Service, World Wildlife Fund-Mexico, Monarch Butterfly Biosphere Reserve