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# K-12 Partnership Lesson Plan

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# *Building Bliss for Butterflies*

# *Where the Monarchs have gone and how you can help*

## Overview

Human impacts on the environment are progressively altering ecosystems across the world. In this lesson we explore the dramatic effects of these human impacts on a well-known example, Monarch butterflies, and introduce realistic steps students can take to help address this problem. In the first part of this lesson students will play a game where they will learn the hazards facing Monarch butterflies on their annual migration from Mexico to the Midwest. In the middle of the lesson students will learn how to build a butterfly garden at their schools that will provide critical breeding resources to Monarchs as well as attract and support other butterfly species. We provide resources where you can find milkweed seeds to plant in your own garden. At the end of the lesson we provide a Butterfly Garden Bingo exercise to help students explore other plants and animals that can be found in established butterfly gardens. This exercise can be used with the BEST plots or in your own garden.

**Objectives**

At the conclusion of the lesson, students will be able to:

* Explain several reasons why milkweed populations in the United States are in decline and how this threatens Monarch butterfly populations
* Explain why milkweed is an important resource for Monarchs
* Construct a butterfly garden as a refuge for Monarchs and other butterflies
* Identify other plants and animals in established butterfly gardens (or the BEST plots!)

**Length of Lesson**

Full lesson: 60 min class period

Monarch Migration Game only: 30 min

Butterfly Garden Bingo only: 20-30min

**Grade Levels**

Elementary

**Standards covered (NGSS)**

Disciplinary Core Ideas:

* **K-LS1-1**: use observations to describe patterns of what plants and animals (including humans) need to survive
* **K-ESS3-3**: communicate solutions that will reduce the impact of humans on land, water, air, and/or other living things in the local environment
* **3-LS4-4**: make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change

Cross Cutting Concepts:

* Patterns
* Stability and change of systems

Science and Engineering Practices

* Developing and using models
* Constructing explanations and designing solutions

***Previous Michigan Standards Met:***

* **L.OL.01.2**: life cycles- plants and animals have life cycles. Both plants and animals begin life and develop into adults, reproduce, and eventually die. The details of this life cycle are different for different organisms
* **S.RS.03.18**: describe the effect humans and other organisms have on the balance of the natural world
* **E.ES.E.5**: human impact- humans depend on their natural and constructed environment. Humans change environments in ways that are helpful or harmful for themselves and other organisms
* **L.EC.E.1**: interactions- organisms interact in various ways including providing food and shelter to one another. Some interactions are helpful; others are harmful to the organism and other organisms
* **L**.**EC.E.2**: changed environment effects- when the environment changes, some plants and animals survive and reproduce; others die or move to new locations
* **K**-**ESS3-3**: communicate solutions that will reduce the impact of humans on land, water, air, and/or other living things in the local environment

**Materials**

 *Monarch Migration Game*

* Set of event cards (online- “Building bliss for butterflies” lesson page on the KBS GK-12 website)
* Flags or any other material to mark locations, labeled A-Y for milkweed plants and 1-3 for starting nesting sites
* Game layout guide (online)
* Powerpoint (online)

*Butterfly Garden Bingo*

* Butterfly Garden Bingo sheets, spring version or summer/fall version (online)

**Background**

Human impacts on the environment are progressively having negative impacts on ecosystems worldwide. However, there is often little an individual student can feasibly do to help the situation. Here we explore the story of the Monarch butterfly, which is currently undergoing a sharp decline, and explain how planting milkweeds and other butterfly garden plants can have a real-world impact on the sustainability of butterfly populations.

Many students are familiar with the charismatic orange and black Monarch butterfly. This species displays one of the most impressive invertebrate migrations in the world. There are two distinct migrating populations of monarchs in North America. The eastern population migrates between Mexico and Canada east of the Rocky Mountains. The western population of monarchs remains west of the Continental Divide and overwinters along the coast of California.

The two populations have different overwintering habitats, but are otherwise quite similar in their habitat needs. The eastern population of monarchs overwinters in the forests of the conifer, oyamel, in the mountains of Mexico. The western population migrates from as far north as Washington and as far south as Arizona to the coast of California. These butterflies gather in groves of eucalyptus trees, as well as Monterey pine, Monterey cypress, and redwood. While overwintering, monarchs congregate in large groups (thousands to millions) and spend several months in a slowed down state called diapause. When spring approaches the butterflies awake, mate, and then females start their migrations.

The migration of the eastern population of monarchs is lengthy and spans several generations of Monarchs. The females from the eastern population travel north towards Texas. Over the course of the summer the Monarch population spreads out across the Midwest and southern Canada and then contracts back down to Mexico before the killing frosts come. This migration extends past the lifespan of a single butterfly. The butterflies that make it to Michigan are not the butterflies that were alive in Mexico.

A female monarch must find a milkweed plant to lay her eggs. These are the only plants on which the monarchs can survive. A diet consisting of milkweed makes caterpillars and the resulting monarch adults unpalatable to predators. These plants were once abundant throughout the United States, but have been disappearing rapidly. Unfortunately, as this crucial habitat disappears, so do the monarchs. In 1995, monarchs covered more than 44.5 acres of pine and fir forests in Mexico. As of January 2014, scientists estimate they only cover 1.65 acres. Scientists are now worried the entire migration might collapse.

Milkweeds are native prairie plants that grow throughout the United States. As the human footprint grows, these plant populations become increasingly fragmented. Milkweeds were once common weeds in agricultural fields. However, the rise of round-up ready crops has virtually eliminated these important refuges. Monarch also face other challenges. Extreme climate events in either direction can threaten plant or butterfly survival. These are particularly damaging when the Monarch migration is at a bottle-neck point in Texas or Mexico. Monarchs are also particularly vulnerable at their Mexican overwintering sites since they are compressed into such narrow pockets. Illegal logging has reduced habitat and climate modeling predicts increased frequency of killer freezing rain in these mountain regions.

Students and people in general can have a meaningful impact on Monarch populations by planting milkweed plants in their own gardens. In fact, flower gardens are an easy way to benefit many types of pollinating invertebrate species, including other butterflies and bees. Butterflies in general prefer areas with lots of sunlight. They are mostly attracted to brightly colored flowers, especially those that are purple/blue, pink, orange, yellow, and red. When planting your garden, it’s important to choose native species that flower at different times throughout the year. A quick Internet search for native plants that attract butterflies will result in a multitude of resources that will help you plan a garden – big or small!

These gardens are not only pretty, but can be used for a multitude of educational goals. In the following section, we describe a few ideas.

### Activities of the session

### *Monarch Migration Game*

1. (Before you start) Set up the markers for the game in a location outdoors following the instructions on the game layout guide. ALTERNATIVELY If you are unable to go outside, you can also play this game on desk-top printouts of the game layout guide and a small playing piece for each individual student.
2. Using the power point or other classroom materials introduce the Monarch life cycle
3. Play the Monarch Migration Game following the instructions in the game layout guide.
4. Based on the results of the game, prompt students for reasons why the Monarchs faced difficulty during the migration.
5. Return to the power point to discuss the reasons why the Monarch population is declining

*Building a Butterfly Garden*

1. Use the power point to go over how to build a good butterfly garden. Additional resources are provided at the end of this lesson to help you build your own garden.

*Butterfly Garden Bingo*

1. Provide students with the appropriate bingo card for your season (spring or fall)
2. Go out to a garden (or BEST plot) near your school and have students attempt to find the plants and animals on the bingo card.
3. If you find 5 in a row, you win!

**Resources**

* Event cards and layout instructions for the migration game, a powerpoint, and Butterfly Garden Bingo cards are all located on the “Building Bliss for Butterflies” lesson page on the KBS GK-12 website.
* Monarch Migration Tracker website: <http://www.learner.org/jnorth/maps/monarch_spring2014.html>
* National Phenology Network website: <https://www.usanpn.org/home>
* Native seed suppliers: Prairie Moon Nursery <https://www.prairiemoon.com>

**Extensions and Modifications**

All three sections of this lesson can stand alone (Monarch Migration game, building a butterfly garden, and Butterfly Garden Bingo). The migration game can be played outside with students playing butterfly families or inside with students moving small pieces to represent butterflies. The bingo game can also be used with the BEST plots, particularly for younger students