

The Butterfly Effect

“The butterfly is a flying flower, the flower a tethered butterfly.” –Ponce Denis Ecouchard Lebrun

Background Information:

Bin Information

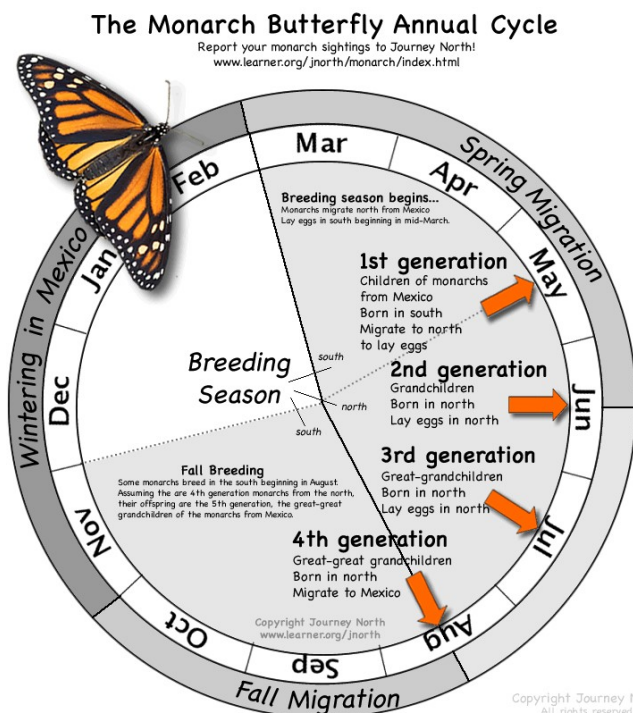
This lesson is the second in a series on pollinators. It is preceded by the lesson ‘Bee’ a Pollinator during which students act as bumblebees to learn more about their life cycle and role as a pollinator, and followed by ‘Planting’ for the Future in which students will do research to plan out a pollinator garden.

In this bin, students will learn more about another specific pollinator; the Monarch Butterfly and the importance of the right plants on every step of its journey. This lesson can also be tied to the Migration Relay lesson in the Phenology bin.

Information for Instructors

Why Monarchs?

Monarch butterflies can be considered a flagship species; that is, they are very widely studied and celebrated. The monarch’s unique migration makes them stand out in the insect world, while also putting them at greater risk, since if they lose key habitat or food sources at any point along their journey, the whole population is threatened.



Author:

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Themes:

Migration, Butterflies, Monarchs, Pollinators

Estimated Duration:

45 minutes

Audience Identified:

3-5th grade

Can be adapted for older and younger

Location:

Indoor or outdoor classroom

Goal:

Students will learn about the key points of monarch migration and how to help them along the way.

Objectives:

Students will name the lifecycle stages of a monarch and identify what each stage needs for sustenance.

Students will describe that migration journey that monarchs take.

Students will identify needs that monarchs have along their journey.

Monarch Lifecycle

Monarch butterflies have four stages to their lifecycle to make up a **complete metamorphosis**

Monarchs start out as **eggs**. The eggs are small and cream colored and are laid one to three per leaf on the underside of milkweed plants. A female will lay hundreds of eggs. Inside each egg is a tiny developing larva.

The **larva (or caterpillar)** hatches by chewing its way out of the eggshell, and then eats the rest of the shell for its first meal. As caterpillars the monarchs must eat and eat in order to grow. They eat only milkweed and their own shed skin. In this stage a caterpillar will grow about 2,000 times their original size. The caterpillars will shed their skin five times as they grow to accommodate this huge change. On the last shedding, they will leave their milkweed plant to find a place to weave a silk mat and a 'button.' The caterpillar hangs upside down and curves to make a 'J' shape as a sign that it is about to become a pupa.

The caterpillar sheds for the last time while hanging upside down and forms a chrysalis to enter its next stage as a **pupa**. During this time, the monarch will go through all of the changes to transform from a caterpillar to a butterfly. This will last about a week.

When the changes have finished, the monarch will emerge in its **adult** form as a butterfly. It will be unable to fly at first for about two hours while its wings unfold and harden. As adults, monarchs will no longer eat milkweed leaves and will instead get their energy from nectar from many types of flowers.

There are four monarch generations each year. The first generation is born to the south in Mexico and will journey part of the way north to lay eggs and then that generation will travel further, and so on. Only the fourth generation, born in late August or September will migrate south to Mexico and overwinter. Monarchs are the only butterfly species in North America that winters in their adult stage. Their children will begin journeying north the next spring to start the cycle again.

Monarch Migration

This lesson focuses on the monarch migration east of the Rocky Mountain range, as that is the one that Minnesota monarchs are a part of. There is also a separate migration that occurs to the west of the Rocky Mountains where monarchs overwinter in microclimates in California that mimic central Mexico.

While there are some monarchs who will make their way back to the very same trees that their great-grandmothers roosted in, there will be many others who do not complete the journey because they were too old and tired to complete it, or were blown off course and may even attempt to winter in other locations. Still, as a species, the migration is one of the great wonders of the natural world.

Materials and Set-Up:

This kit includes:

- Pine Branch
- Plastic butterfly stencils
- Master copy of paper stencils
- Scissors (class set)
- Tape
- Domino blocks

- Several plain/flowers
- 4 with butterflies
- 3 with a milkweed with an egg and a caterpillar
- Map of North America

You will need:

- Paper
- Orange and black markers
- Hole punch circles (optional)
- Glue (optional)

Set-Up:

- Set out butterfly stencils, scissors, paper, and markers for students at their desks, or similar workspace.
- Place the pine branch up where students will be able to attach the paper butterflies.
- Set out the map

Introduction:

Estimated Duration: 10 minutes

Attention Getter:

Any established group or classroom attention-getters can be used to regain the attention of the students when giving directions for transitioning activities. If you choose to use an attention-getter personalized to this lesson, introduce the following before introducing the lesson:

- The instructor calls out “Monarchs!”
- The students respond “Migrate and pollinate!”
- Instructor responds “How great!”

Warm Up:

Welcome students in and show them a picture of a monarch butterfly. Tell them that today you will be talking about this special butterfly. Direct them to the supplies for the paper butterflies and have them trace the butterfly stencil, color it to look like a Monarch butterfly and cut it out. While they do so, they should start to think about anything that they know about Monarchs. When they are done making the paper butterfly, they can attach it to the tree.

When most or all of the students are done and the tree has many butterflies on it, get the attention of the students. (If a few are not finished, have them listen while working.) Call on a few students to share things that they know about monarchs in order to assess the prior knowledge of the group.

Tell the students that today you will be talking about the monarch’s amazing migration journey as well as learning how we can help them. You have started with the monarchs on a pine tree, because that is where they stay in the winter. For years, people knew that monarchs migrated, but didn’t know where they went. It was only recently that a very special place in Mexico was discovered to be the monarchs wintering grounds. So many monarchs would go there that the trees would be covered with the butterflies. Ask students how much they think a monarch weighs.

Most monarchs weigh between .25 and .75 grams; about the same as a paperclip. It's not very much, but tens of thousands of butterflies in the same spot means that there have even been times when the weight of the butterflies was enough to break tree branches.

The monarchs spend the winter sleeping. The warmer climate and warmth of all of the other butterflies helps them to survive. In the spring, the monarchs that have made it through the winter start the journey north.

Transition to the floor map.

Content and Methods:

Estimated Duration: 20 minutes

- Have students gather around the floor map so that everyone can see clearly.
- Take the first block with a monarch on it and place it in Mexico, for the monarch's wintering grounds. Explain that this **1st generation** of monarchs will fly north until reaching a spot around Northern Texas. Place the second butterfly block in Texas. These are the first butterflies of the year born in the north and are the **2nd generation**. There, they will lay the eggs that will become the next generation.
- Ask the students, what is needed in order for the monarchs to make the journey between the two blocks? (food/energy/nectar/flowers, etc.)
- Fill in the spaces between the two butterfly blocks with flower blocks. When the blocks are being placed, it should be like dominos so that the distance should be enough that if any piece is removed, the chain reaction would be stopped at that point.
- Monarchs need another, specific plant for their eggs and caterpillars however; what is that? (milkweed)
- Add a milkweed block right before the second butterfly block. When monarchs lay their eggs, they try to lay one per milkweed leaf, so that the caterpillars all have food when they hatch. By eating milkweed which is slightly toxic, the monarchs become poisonous themselves which is one of their main protections from predators.
- Add the journey of the 2nd generation (born in Texas) with the same principle; flowers leading north, milkweed for eggs and caterpillars, and a new butterfly block to represent the **3rd generation**.
- Repeat this step for a **4th generation**. This is the super generation. They are different than the generations before, and will make the entire journey back to the wintering grounds in Mexico; a place that they have never been, that their mothers have never been, and that their grandmothers have never been. They are returning to the place that their great grandmothers were.
- Place a trail of flower blocks returning to the wintering grounds.
- Push over the first butterfly block in Mexico to watch the entire domino effect of the migration.
- Reset the blocks up. Ask students what will happen if there is no milkweed in Texas? Or no flowers in Iowa? Remove blocks from one of the hypothetical spots, and watch as the journey stops and the monarch species is not able to make it back to Mexico.

Conclusion:

Estimated Duration: 5 minutes

Humans and pollinators are co-dependent. We rely on them, and they need support from us. Because humans have done so much to drastically change the land and ecosystems where we are present, we also need to be very deliberate about how we act now so that we can support species like monarchs instead of harming them.

Many researchers study monarchs. One thing that has helped scientists to learn more about them is by tagging monarchs. Tagging is one of the ways used to figure the migration paths that monarchs used. The tags are like tiny stickers that are attached to the butterfly's wings and were specially designed so that they do not hurt the monarchs or make it harder for them to fly. Now, citizen scientists also help by applying tags to the butterflies that come through their area. The tags have special codes on them so that if a butterfly that has been tagged is found again, all of the information that was first recorded about them can be looked up to learn more about how far the butterfly traveled and perhaps where it started.



We know that over time there have been fewer monarchs that have been overwintering in Mexico, and scientists want to know why. From the tags, we are able to see that the migration journey has not become more dangerous like some people thought, so that is not the reason for the decline. Instead, it seems most likely that there is less milkweed here in the Midwest, and that is contributing.

Can we make changes for the whole map? Not very easily. However, we can make sure that all of the domino blocks in our own area are present by doing what we can to provide milkweed and flowers for the monarchs by us!

Reflection and Evaluation:

Estimated Duration: 10 minutes

Reflection

Have students take one of the butterflies off the fir tree. It does not necessarily need to be the one that they made. On its wing, have them add a small 'tag' to track their butterfly. The tag can be drawn on, or a circle from a hole punch can be glued on.

After adding a tag to track their butterfly, students can flip the butterfly over and write short answers to the following questions:

- What do monarchs need for their migration journey?
- What is one need that monarchs have that I can help with?

Evaluation

Evaluation takes place based off of student responses on the backs of butterflies and by their participation earlier.

Extensions:

Accessibility and Accommodations

Distance Learning: A shortened version of this lesson is available on Seesaw created by Kim Menard.

It can be found here: https://app.seesaw.me/pages/shared_activity?share_token=RZyWNdwCQf28E-wXSbnBPQ&prompt_id=prompt.89cde0e1-3002-4d0b-b050-cf7038d5c748

Flight of the Butterflies

The Flight of the Butterflies is a 45 minute film that follows the monarch migration and the search to figure out where they went each fall. It can be watched before or after the activity. Copies of the movie are available through the Dakota Public Library.

Trailers and related clips can be found [here](#).

Citizen Science

Though seasonally dependent, you can consider involving your group in a citizen science program for tracking the monarch migration, such as [Monarch Joint Venture](#), [Monarch Watch](#), or [Monarch Larva Monitoring Project \(MLMP\)](#).

You can also get involved by learning to identify and plant milkweed. Monarch Watch also has some great information about creating [Monarch Waystations](#).

Reference Materials:

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