



LESSON: Pollinators Migration Madness

GRADE: 5th

TIME: 60 min.

SUMMARY:

Students will gain an appreciation for the important role pollinators play in the foods we eat every day. They will then examine maps of the monarch butterfly migration, noting how their community is involved. Then, they will play a game simulating the loss of butterfly habitat to understand the challenges butterflies face. Finally, they will reflect on ways their community is helping to protect monarchs.

OBJECTIVES: Iowa Core

Subject

Science

- **5-ESS3-1.** Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Social Studies

- **SS.3-5.G.1** Understand the use of geographic tools to locate and analyze information about people, places, and environments.
- **SS.3-5.G.4** Understand how physical processes and human actions modify the environment and how the environment affects humans.

MATERIALS & RESOURCES:

- Cloth shopping bag with examples of pollinated foods, for example: chocolate, coffee, nutmeg, apple, banana, almonds, grapes – or other examples found at http://pollinator.org/list_of_pollinated_food.htm
- Photos of flowers with visible pollen <http://ento.psu.edu/pollinators/image-galleries/photos>
- Map of monarch migration:
http://monarchjointventure.org/images/uploads/documents/Monarch_Watch_Migration_Map.pdf
- Hula hoops or carpet squares – approximately 10
- Poker chips or other counters – at least 5 per student
- Timer

PRESENTATION / INTRODUCTION:

Explain that you have a shopping bag of food and all of the food items have something in common. Select students to reach into the bag and pull out a food item to show the class. What do these items have in common? They are all pollinated foods!

Pollinated foods are those that are created when a pollinator, often an insect, moves tiny pollen grains from one flower to another. Show photos of flowers. Once the flower gains pollen from another flower, it can form the fruits, vegetables, and seeds we enjoy eating. It's an incredible system!

"Pollinators are essential to the production of food, and in the United States, honey bees pollinate an estimated \$15 billion of crops each year, ranging from almonds to zucchinis," said Dr. Ann Bartuska, USDA Deputy Under Secretary for Research, Education and Economics. "This new data will add to USDA's robust scientific body of knowledge on the inventory, movement and death loss of honeybees in the United States." Bees are just one type of pollinator. What are other creatures that could act as pollinators? (Butterflies, hummingbirds, beetles, etc.)

Today we are going to focus on one particular pollinator: the monarch butterfly. We have learned a little about why they are important. Next we are going to learn about some of the challenges they are facing and how communities are working to protect them.

DIRECTIONS:

1. Ask students to examine the monarch migration map. Where do butterflies migrate in the fall? Where do they live in the winter? Where do they migrate in the spring? Where do they live in the summer? What time of year do we see monarchs in Iowa? Why? (Discuss caterpillar/butterfly life cycle.)
2. What do animals need to survive? Water, food, shelter, and space. What do monarchs need to survive?
 - a. **Water**
 - b. **Food** - Caterpillars need milkweed, but adult butterflies need nectar from many kinds of flowers.
 - c. **Shelter** - A place to hide. If we look at a backyard through human eyes we like to see mowed grass. Weeds and dead trees may look messy to us, but pollinators prefer it that way. In Mexico, fir trees provide winter shelter for monarchs. Pollinators need habitat in Iowa, too. Brush and leaf litter provides perfect hibernation homes.
 - d. **Space:** Lead discussion to how monarchs need habitat in two different countries and many states in between for their migration.
3. Migration Madness Game: In this role-playing game students will become monarch butterflies. Their task is to migrate safely between their winter and summer habitats. Not only will they encounter dangers such as predators and unfavorable weather conditions during their long journey, but they also face loss or degradation of habitat.
 - a. Students will line up on the North America side of the playing field. Their goal is to make it safely to Mexico (across the field), where they will overwinter.
 - b. Set up: Laid out in the field are hula hoops/carpet square which represent a milkweed plant or flowers (habitat). Only one person is allowed to rest in the habitat at each time. If a "butterfly" is on a habitat they cannot be tagged. On each habitat are poker chips (food and water). In order to get enough nutrients to survive the migration to Mexico, each monarch must gather at least five chips. They cannot grab a chip when another monarch occupies a hula-hoop. They are only allowed to take one chip from each habitat.
 - c. Play the first round with no challenges. All monarchs should survive.

- d. **Round 2:** Have students return chips back to the habitat spaces and play again. This time explain that herbicides and pesticides have been sprayed on fields, as well as grassy areas being turned into housing developments and parking lots. Remove some of the habitat and coins. Play again. Set a timer and after a few minutes have an early winterkill any remaining butterflies that are not yet in Mexico.
- e. **Round 3:** *(similar to a game of tag)* Any butterflies who died in the last round become cars or birds who can tag butterflies. Tagged butterflies should sit down. **If you want to add an additional challenge, you can use rope or string as boundaries that create a "road" (Interstate 35).* What factors made the journey difficult? What was the biggest factor that caused them to die? What could we do to help?

Possible extensions:

- Allow students to manipulate carpet squares/chips to implement their ideas for how to help and run the game one more time with positive results.
- The instructor can have designated "trees" in "Mexico" available to students and have the remaining butterflies, that made it safely to Mexico, pick a tree. Then the instructor becomes a logger, and removes a tree. Those butterflies then die. Used to discuss logging and policy.

REFLECTION/JOURNAL PROMPT:

- What challenges are monarchs facing?
- What could happen if we don't help to protect them?
- How could pollinator gardens at schools help protect monarchs?
- Using the map, where would we need to place these pollinator gardens?
- How could changes we make in our community help the larger system?

Journal entry: How is our community helping protect monarchs and other pollinators? Why are monarchs an important part of the system?

BACKGROUND INFORMATION:

Pollinator Loss Basic Stats:

- Honey bee populations down 50% since 1945
- Iowa colonies' winter losses=54% per year
- Native bee declines-est. 4000 native bee species, 300-400 in IA originally
 - Can be more efficient pollinators than honey bees, esp. for New World crops-squash, tomatoes, cranberries, and blueberries-and wildflowers
 - Think of ecological connections—bees are food and make food, 25% of birds rely on berries and fruits for food, raccoons, bears, etc.
- 28% of Iowa's butterfly species listed as of special concern or higher designation
- Monarchs—population high in '96-'97 at over 18 hectares
 - 2000s--populations begin to decline
 - '13-'14—0.67 hectares
 - '14-'15—1.13 hectares (rebound)
 - IA centered in core breeding area (50% of population in Upper Midwest tallgrass region)

Causes of Loss:

- **Habitat:** Recent estimated habitat loss per year about 2 million acres; 167 million acres = size of Texas
 - Conversion to row crop
 - Reduced ditches and margins
 - Development
 - Round-up Ready crops: before GMOs corn and soybean fields produced more monarchs than any other single habitat.
 - Illegal logging in Mexico (over wintering homes)
 - Not enough shelter to protect them from weather elements.
- **Weather:** Droughts, no food, rain, hail, high winds, freezing temps,
- **Food source timing and availability**



What's being done to help?

In Iowa, planting native grasses, wildflowers, and other vegetation along our roads has helped. The concept of integrated roadside vegetation management (IVRM) uses native and other select types of vegetation with appropriate management techniques to produce a cost-effective, environmentally sound management alternative for roadsides. To achieve Iowa's IRVM objectives, the state's IRVM Plan is implemented along federal and state highways through the coordination of the Iowa Department of Transportation. Additionally, many counties and cities have adopted an IRVM plan for managing vegetation along their roadsides. To date, more than 50,000 acres of federal, state, county, and city roadsides in Iowa have been planted to native grasses, wildflowers, and other select types of vegetation. For more information visit: <http://www.iowadot.gov/lrtf/irvm.html>

In June 2014, President Obama created a Presidential Memorandum that created a federal strategy to promote the health of honeybees and other pollinators. As part of the project, things like the I-35 Corridor were created. Interstate 35 is an especially important roadway for honeybees and other pollinators. As native grasses, wildflowers, and other vegetation are planted along the road, a 1,500-mile "butterfly corridor" is being created to help Monarchs get from Mexico to Minnesota. This expands habitat along the interstate, almost like creating a path for the monarchs to follow.