



Mapping and Monarchs

Grade 2

Earth and Space Science

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Unit Overview**Unit Description**

In this unit, students will learn how to analyze and interpret maps through the study of monarch butterfly migration. Through the progression of investigations in the unit, students will use maps and satellite images to explore monarch migration pathways in Chicagoland, analyze how monarch habitat has changed over time, and determine the amount of present green space around their school. Students will then closely investigate an area of green space near their school and analyze how viable the habitat is for monarchs. Lastly, students will develop a map that indicates land features and propose changes that they could make to the green space near their school to make it a more suitable monarch habitat.

Driving Phenomena

Research shows that Monarch butterfly populations have been decreasing rapidly over the past several decades. Monarch butterflies migrate over 2,000 miles from southern Canada to northern Mexico every fall to avoid cold temperatures. New generations of butterflies make the return trip every spring. In order to travel such long distances, monarchs stop in habitats along the way that provide shelter, water, nectaring flowers, and milkweed (to lay eggs on and for their caterpillars to eat) – the things that they need to survive and reproduce. Maps of land cover show that over time, humans have destroyed large areas of monarchs' natural habitat to develop buildings and agricultural land. With limited access to resources during their migration, fewer monarchs are able to complete the journey, and as a result, monarch numbers have drastically declined in recent years. However, by analyzing satellite images to identify potential urban green space, these areas can be improved for monarch butterflies. Proposed changes to improve these green spaces for monarch butterflies can be represented through maps.

Driving Questions

Why are monarch butterflies disappearing? Why do monarch butterflies migrate? What do monarchs need to survive during their migration?
How can we analyze maps to see where monarchs might stop in Chicagoland during their migration? How can satellite images be used to show where green space is available in our neighborhood? What can we do to improve potential monarch habitat in our neighborhood, and how can we represent those improvements on a map?

NGSS Performance Expectation

This unit is aligned to the Next Generation Science Standards (NGSS) Performance Expectation: **2-ESS2-2** – Develop a model to represent the shapes and kinds of land and bodies of water in an area.

NGSS Unit Alignment

The performance expectation **2-ESS2-2** was developed using the following elements from the NRC Document A Framework for K-12 Science Education:

Science and Engineering Practices Developing and Using Models Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions. Develop a model to represent patterns in the natural world.	Disciplinary Core Ideas ESS2.B: Plate Tectonics and Large-Scale System Interactions Maps show where things are located. One can map the shapes and kinds of land and water in any area.	Crosscutting Concepts Patterns Patterns in the natural world can be observed.
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Connections to the three dimensions in this unit:

SEP: Developing and Using Models

Students explore the concept of monarch migration and habitat availability by obtaining information from multiple contexts, including books, maps, and satellite images. Students evaluate and analyze information by summarizing, coding, and translating content from maps into pie charts by habitat type. Lastly, students have the opportunity to communicate information and knowledge gained throughout the unit by creating a coded map that highlights land coverings and monarch resources in a local green space.

DCI: ESS2.B: Plate Tectonics and Large-Scale System Interactions

Students explore maps and the different types of information that they can convey in a variety of ways throughout the scope of this unit. Students explore maps that code for different types of land coverings, create their own coded map of a local area by examining satellite images, and finally create a map that shows the type of land cover in a local area to propose changes to improve the area for monarch butterflies.

CCC: Patterns

Throughout the unit, students will make observations of maps to determine patterns in the changes and currently available types of land cover on a regional and local scale.

Mapping and Monarchs Earth and Space Science Grade 2

Earth and Space Science Grade 2

Investigation 1: Where are the Monarchs?

Lesson 1.1: The Problem of Monarch Disappearance

Lesson Description

40 minutes

Students will analyze data to determine that monarch butterfly populations have decreased over time. Students will then activate their background knowledge to determine what more they need to learn about Monarch butterflies in order to help their situation.

Objective

Students will be able to analyze a bar graph and visual materials to identify the problem of monarch butterfly population disappearance and come up with what they need to learn more of in order to help monarch butterflies survive in their communities.

Guiding Questions

- When and where have you seen monarch butterflies before?
- What do monarchs need in order to survive?
- What type of environment(s) do monarchs thrive in?
- How can we help monarchs

Materials

Per Class

- Five pieces of chart paper
- Monarch News report Video: [Monarch News](#) (play until 40 second mark)
- Sticky notes (4-6 per student)
- Teacher Resource 1.1.A - Image of monarch butterfly
- Teacher Resource 1.1.B - Guiding Questions

Per Pair of Students

Materials Preparation

- Prepare four anchor charts by writing one with each of the Guiding Questions on each of them
- Project or print bar graph Student Resource 1.1.A

New Vocabulary

Population – the total number of a particular type of animal living in one area

Investigation 1: Where are the Monarchs?**Lesson 1.1: The Problem of Monarch Disappearance****Engage****15 minutes**

1. On the board, project the monarch butterfly image from **Teacher Resource 1.1.A**. Direct students to think-pair-share with a partner about what they know about monarch butterflies.
2. Project or pass out **Student Resource 1.1.A**, and have student pairs discuss what they see and can learn from the graph, using the questions on **Teacher Resource 1.1.B** as a guide.
3. Prompt student pairs to share their responses with the whole class. Record responses on an anchor chart or smart board.
4. Play the first 40 seconds of the Monarch News Report Video. Ask students to share how the video made them feel and why.
5. Explain that in order to be able to do anything about this problem, students will need to learn more about monarch butterflies and what they need to survive.

Investigate**15 minutes**

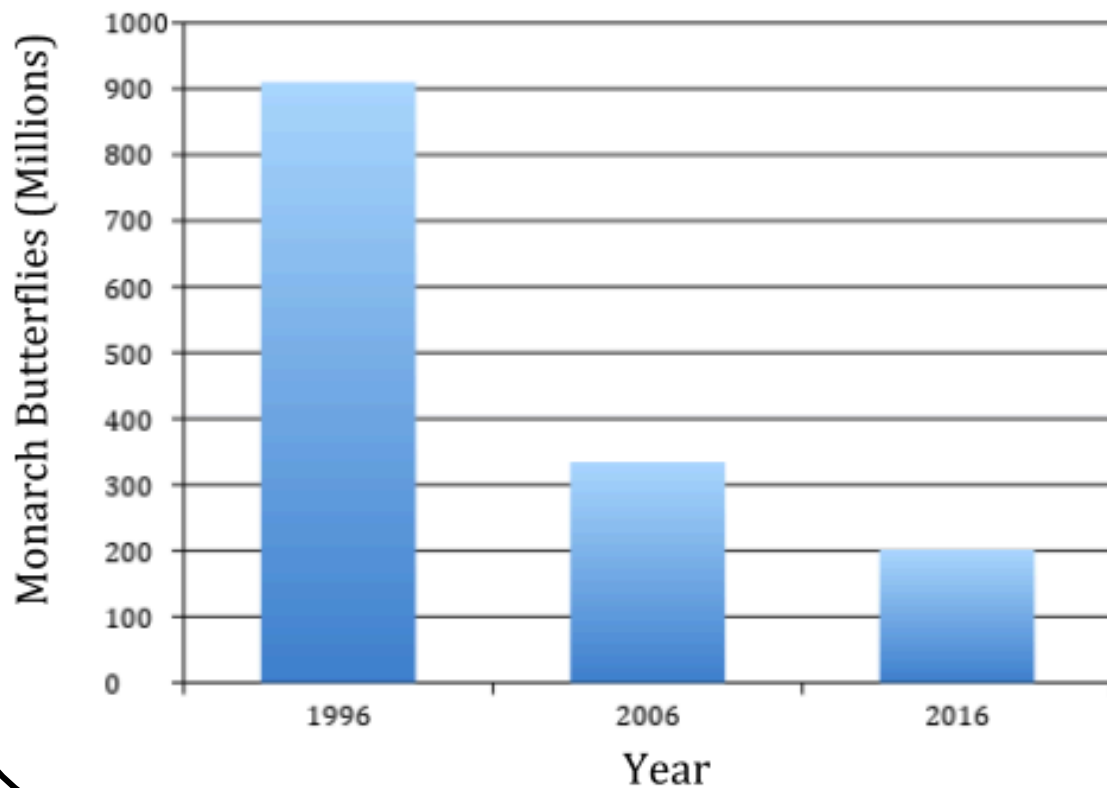
1. Tell students that they will have an opportunity to share what they may already know about monarchs by responding to some specific questions about them.
2. Read the questions on the anchor charts around the room:
 - a. When and where have you seen monarch butterflies before?
 - b. What do monarchs need in order to survive?
 - c. What type of environment(s) do monarchs thrive in?
 - d. How can we help monarchs survive?
3. Give each student a few sticky notes and tell them to record their response to each question on one sticky note and post it on the appropriate poster.
4. Once students have responded to all the questions, invite them to do a gallery walk to read other students' responses and generate even more ideas.

Reflect and Share

10 minutes

1. As a class, review student responses and sort similar answers next to each other on each poster
2. Ask students to discuss what they think they need to learn more about in order to be able to help more monarchs survive in the future. List student ideas on a new anchor chart.
3. Tell students that throughout this science unit, they will learn more about what monarch butterflies need to survive, where they survive best, and how well their schoolyard currently supports monarch survival in order to create a proposal that outlines changes that they think should be made to their schoolyard to improve it for monarch butterflies.

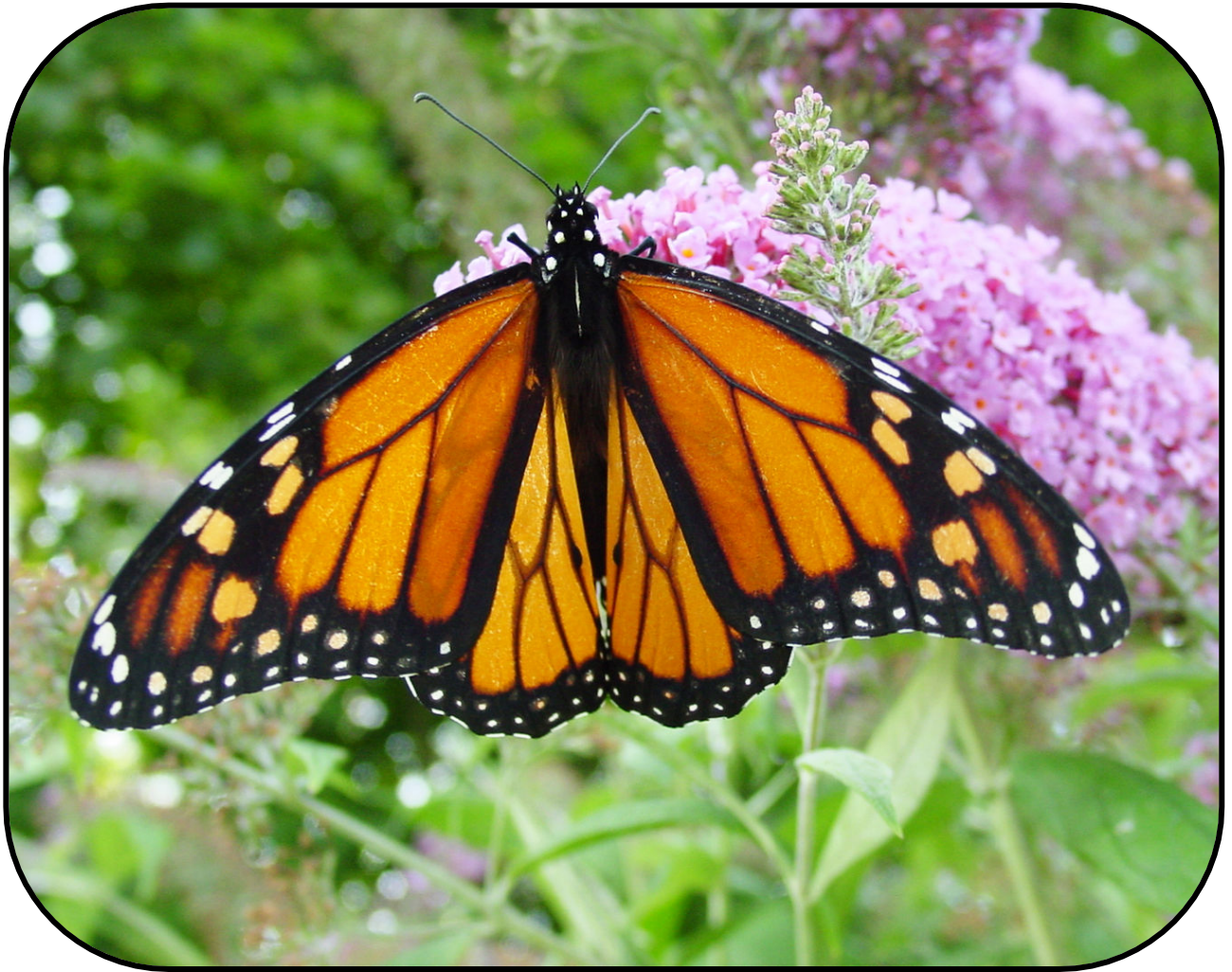
Teacher tip: For each of the following lessons, refer back to the initial anchor charts and add to them as students discover even more about the survival of Monarch butterflies and what can be done in school communities to help them survive.

Student Resource 1.1.A
Monarch Population Graph**Approximate Total Monarch Butterfly Winter Population**

Data from Journey North (http://www.learner.org/jnorth/tm/monarch/pop_millions.html)

Teacher Resource 1.1.A

Monarch Picture



Captain-tucker, Wikimedia Commons, August 2003

Teacher Resource 1.1.B**Guiding Questions for Monarch Population Graph****Guiding Questions:**

1. What does the height of each bar represent?
2. What do the numbers across the bottom of the chart mean? What do the numbers across the left side of the chart mean?
3. In the winter of 1996, approximately how many monarch butterflies were there in North America?
4. In the winter of 2006, approximately how many monarch butterflies were there in North America?
5. In the winter of 2016, approximately how many monarch butterflies were there in North America?
6. How is the population of monarch butterflies changing over time? (Increasing? Decreasing?)
7. What do you think happened to cause this change in monarch butterfly population?

Investigation 2: What do monarchs need to survive?**Lesson 2.1: Migration Across the Nation****Lesson Description****40 minutes**

Students will draw and label a sketch or diagram of what they think migration is and share it with a partner and the class. Then, students will analyze citizen science data about monarch butterfly sightings throughout the year to determine if monarchs migrate.

Objective

Students will analyze citizen science mapping data about monarch butterfly sightings to make an argument that monarch butterflies migrate in the fall and spring.

Guiding Questions

Do monarch butterflies migrate?

Materials**Per Class**

- Index cards (one per student)
- Teacher Resources 2.1.A

Per Pair of Students

- Student Resource 2.1.A – Monarch Sightings Maps

Materials Preparation

- Print and preview Teacher Resources 2.1.A
- Print one Student Resource 2.1.A per pair of students

New Vocabulary

Migration – seasonal movement of animals from one region to another

Investigation 2: What do monarchs need to survive?**Lesson 2.1: Migration Across the Nation****Engage****10 minutes**

1. Refer back to the posters from the previous lesson. In particular, revisit the poster with student responses about when and where they have seen monarch butterflies before. Looking across student responses, identify trends, such as monarchs being seen in nature during spring, summer, and fall, but not in winter.
2. Ask students to find a partner and discuss why they think monarchs aren't frequently seen in the Midwest in winter, and what they think happens to monarchs during that season.
3. After sharing with a partner, allow a few students to share their thinking with the class.
4. Tell students that they will examine data about where monarchs can be found at different seasons in order to determine what happens to them in the winter months.

Investigate**20 minutes**

1. Explain that monarch butterflies are important insects in keeping ecosystems flourishing because they act as pollinators to many plants. By pollinating plants, monarchs help these plants create new seeds to reproduce.
2. Because of their important role in the environment, monarch butterfly sightings are carefully tracked and recorded by scientists (and citizen scientists); the data collected by these individuals shows where monarch butterflies are sighted at different times of the year.
3. Pair students and distribute one copy of **Student Resource 2.1.A** to each pair.
4. Ask pairs of students to look at the map and discuss what they notice. Encourage pairs to list as many observations as they can.
5. Allow each pair to share one thing that they noticed about the map.
6. Use the guiding questions on **Teacher Resource 2.1.A** to facilitate further discussion about the map.
7. Project **Student Resource 2.1.A**. Model how to analyze the fall migration map, such as with a think-aloud, and answer the questions on the page to draw conclusions about monarchs over time with the whole class.
8. Then, allow student pairs to complete the spring monarch analysis on their own.
9. As a whole class, discuss what trends students see in monarch sightings over each season. Ask students how they might describe the type of seasonal movement that they noticed. If students do not use the term migration, introduce this word to describe the seasonal movement of monarch butterflies.

Reflect and Share**10 minutes**

1. Ask students to discuss why they think monarchs go on this incredibly long migration in the spring and fall.
2. Allow students to explain their thinking. If students do not discuss weather, guide them to consider how cold weather may impact monarchs directly (they cannot survive freezing temperatures) and indirectly (plants that are sources of food for monarchs do not grow in the cold). Draw upon students' prior knowledge of bird migration, if necessary.
3. Ask students what they think monarchs might need during their migration to survive such a long trip. Record student ideas on the board or chart paper and keep these responses for use in the next lesson.
4. Tell students that next they will research what monarchs need to survive their migration by reading books and watching a short video. Explain that this information will help them figure out what they can do in their schoolyard to support the monarchs on their journey.

Teacher Resource 2.1.A

Analyzing Student Understanding of Maps and Sample Guiding Questions

Below is a list of essential components of map reading. Check off the components that your students mention while indicating what they notice. Challenge students to explain their answer/observations further by using the guiding questions below.

Student Understandings / Map Reading Skills

- ☐ Students understand the map shows land (tan) and water (blue)

Why are different colors (blue and tan) used in the image of the map? How are different colors (tan and blue) used to show additional information about the area?

Notes on student responses: _____

- ☐ Students understand that the map depicts North America, and can identify the Great Lakes region

What continent is shown on the map? What do the black borders on the land represent? Where is Chicago on the map?

Notes on student responses: _____

- ☐ Students understand that the map compass shows the cardinal directions (N-north, S-south, E-east, W-west)

What do the letters N, S, E, and W stand for? How do you know which way is north? Why is it important to know which way is north (or south, east, or west)?

Notes on student responses: _____

- ☐ Students understand the map key shows the meaning of the different colored circles on the map.

What do the circles on the map stand for or represent? Why are the circles different colors?

Notes on student responses: _____

Name(s): _____

Fall Monarch Sightings

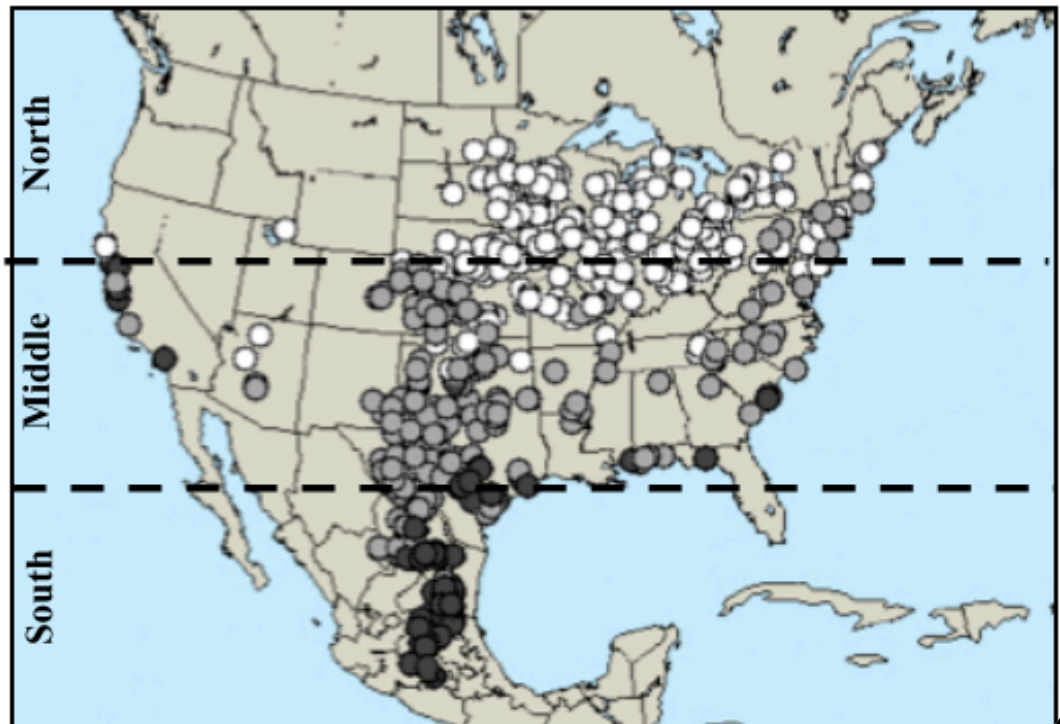
Each dot shows
the location of a
monarch sighting.

KEY

○ September

● October

● November

**Analyzing the Map**

Most monarchs seen in
September were in
the:

(north, middle, south)

Most monarchs seen in
October were in the:

(north, middle, south)

Most monarchs seen in
November were in
the:

(north, middle, south)

Interpreting the Map

I think that in the **fall** monarchs (circle one)

Move from **north** to **south**

Move from **south** to **north**

Do **not** move

Name(s): _____

Spring Monarch Sightings

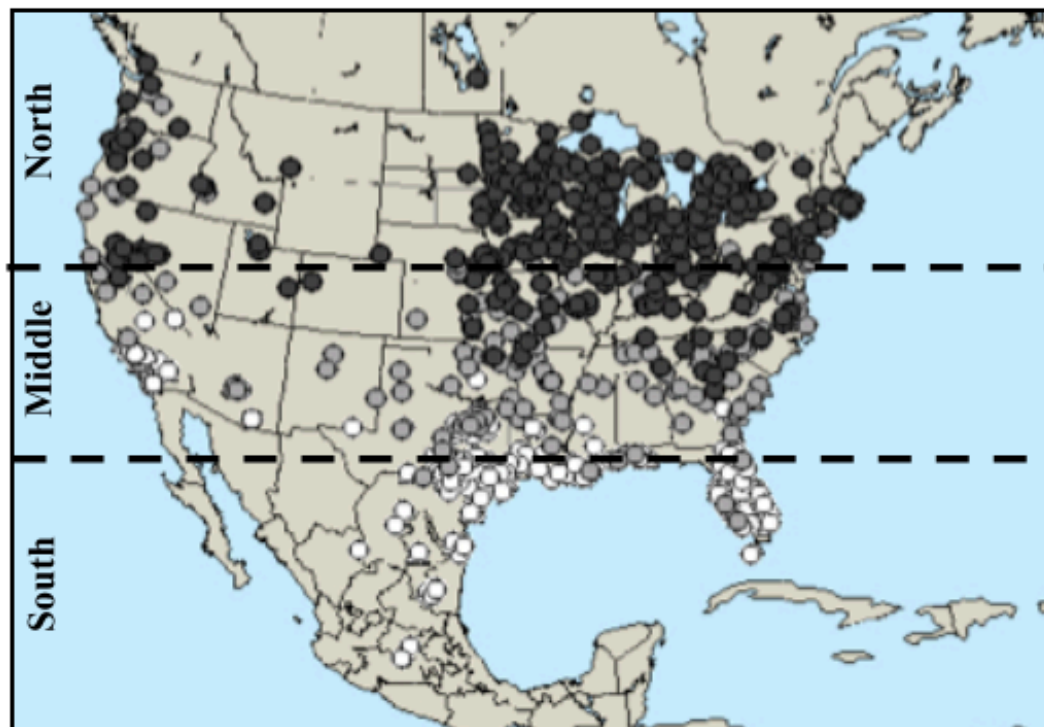
Each dot shows
the location of a
monarch sighting.

KEY

○ April

● May

● June

**Analyzing the Map**

Most monarchs seen in
April were in the:

(north, middle, south)

Most monarchs seen in
May were in the:

(north, middle, south)

Most monarchs seen in
June were in the:

(north, middle, south)

Interpreting the Map

I think that in the **spring** monarchs (circle one)

Move from **north** to **south**

Move from **south** to **north**

Do **not** move

Investigation 2: What do monarchs need to survive?**Lesson 2.2: Monarch Migration Needs****Lesson Description****30 minutes**

Students will predict what monarchs need to survive during their long migration journey. Students will then listen to an informational text and watch a short video about monarch migration to gather this information and confirm or modify their list of predicted monarch needs.

Objective

Students will be able to conduct research from books and videos to determine what monarch butterflies need to survive.

Guiding Questions

What do monarch butterflies need to survive?

Materials**Per Class**

- A book about monarchs that explains what monarchs need to survive through their migration. See Teacher Resource 2.2.B for suggested texts.
- Video about monarch migration needs, such as: Monarch Butterfly Amazing Migration (2:39): { [HYPERLINK "https://safeshare.tv/x/ss5c4b428e48a84" }](https://safeshare.tv/x/ss5c4b428e48a84) }
- *Optional: Teacher Resource 2.2.A – “What Would I Pack?” road trip game rules.*

Materials Preparation

- Gather monarch book(s)
- Pre-read the monarch book and, if necessary, select appropriate sections to share aloud if the entire text is too lengthy or not entirely related to monarch needs.
- Prepare to project and show the Monarch Butterfly Amazing Migration video
- If using, review Teacher Resource 2.2.A rules

New Vocabulary

Nectar – a sugary fluid secreted by plants, especially in flowers

Milkweed – an American plant with milky sap

Investigation 2: What do monarchs need to survive?**Lesson 2.2: Monarch Migration Needs****Engage****5 minutes**

1. Review the list of monarch needs that students generated in the previous lesson.
2. Tell students that the distance between the starting and ending points of the monarchs' migration is about 2,000 miles – this distance would take about 30 hours (roughly four days in school) to drive by car!
3. Ask students if they have ever taken a road trip before, and encourage them to share experiences, or what they think a road trip would be like, with a partner. Then allow a few volunteers to share with the class.
4. Prompt students to brainstorm what they think they would need to pack or stop for on a long road trip. List student ideas on the board. Sample items may include: food, water, snacks, bathrooms stops, rest stops, breaks for sleeping, etc.
5. *Optional: Have students play the road trip game "What Would I Pack?" See **Teacher Resource 2.2.A** for directions.*

Investigate**15 minutes**

1. Briefly review the items that students said they would need to be comfortable on a long road trip.
2. Tell students that monarchs can't pack anything to bring with them on their long journey – they need to get everything they need from places they stop along the way.
3. Tell students they will gather information from text and video to see if their predictions about what monarchs need are correct. Prompt students to take notes from the text about specifically what monarchs need to survive.
4. Read the selected monarch book aloud and then play the *Monarch Butterfly Amazing Migration* video for the class. During the reading and video, pause periodically and emphasize content that highlights what monarchs need on their migration (nectar, spaces to rest, water, milkweed to lay eggs on and for the caterpillars to eat).

Reflect and Share**5 minutes**

1. In small groups or pairs, prompt students to compare notes and identify the essential things that monarch butterflies need during their migration.
2. Allow pairs or groups to share their lists with the whole class, and record ideas on the board. Encourage students to discuss any similarities or differences noted by different groups, and lead the class to consensus about what monarchs need during migration.
3. Allow student pairs to share information or answers related to the other questions posed at the beginning of the lesson.
4. Tell students that, now they know what monarchs need for their migration journey, they will see if those needs can be met around Chicago. In the next class, they will investigate some Chicago habitats to see how well they meet monarchs' needs.

Teacher Resource 2.2.A**What Would I Pack? —Road Trip Game Directions**

1. Tell the students that they will play a game to think about the things they might want to pack for a long trip (like a butterfly's migration!).
2. Pick a student to go first and designate the order that students will take turns during the game.
3. The first student says, "On a road trip I would pack..." then says an item that begins with the letter A, like apples.
4. The second player repeats the opening phrase, and after "...I would pack" they repeat the A item then add one that begins with B: "I brought an apple and some bananas."
5. The third player repeats the opener, the A and the B portions, and then adds something that begins with C.
6. Continue on in this way until all students have taken a turn, or all of the letters in the alphabet have been used.

Teacher Resource 2.2.B**Suggested Texts to Accompany Lesson 2.2**

- *Monarch and Milkweed* by Helen Frost
- Video-read aloud available at: { HYPERLINK "<https://safeshare.tv/x/FbXE4fq8JME>" }
- *Monarch Monarch* by Christine Miller
- *Monarch Butterfly* by Gail Gibbons
- *Monarchs* by Kathryn Lasky
- *Fly, Butterfly* by Bonnie Bader
- *Magnificent Monarchs* by Linda Glaser

Investigation 3: Where Can Monarchs Stop in Chicagoland?**Lesson 3.1: Habitat Types****Lesson Description****32 minutes**

Students will identify key characteristics of various Chicagoland habitats through a jigsaw reading activity. Students will use the readings to assess how capable each habitat is of meeting monarch survival needs. Students will use their observations to draw conclusions about places where monarch butterflies can survive.

Objective

Students will be able to determine the key characteristics of some Chicagoland habitats. Students will determine which types of habitats are most suitable for monarchs by comparing their characteristics against monarch survival needs.

Guiding Questions

What are the types of habitats that exist in the Chicagoland area? What are their characteristics, and how well suited are they to monarch survival?

Materials**Per Student**

- Student Resource 3.1 A
- Optional: Student Resource 3.1.C

Per Class

- Several copies of Student Resource 3.1 B (enough for one habitat card per pair of students)

Materials Preparation

- Print Student Resource 3.1.A
- Print and cut out the habitat cards on Student Resource 3.1.B
- For additional habitat review see Students Resource 3.1.C

New Vocabulary

Prairie - a large, open, flat area of grassland

Woodland - land covered in trees and forest

Wetlands - muddy land where the ground is covered or soaked in water

Developed area - land changed for human living and use

Agriculture - land that is used for growing crops and raising livestock

Natural habitat - an environment that occurs in nature without humans changing it

Unnatural habitat - land that has been significantly changed by humans

Investigation 3: Where Can Monarchs Stop in Chicagoland?**Lesson 3.1: Habitat Types****Engage****7 minutes**

1. Ask students to recall what resources a monarch butterfly needs to survive. If needed, remind students that these needs include water, nectar from flowers, trees or other places for resting, and milkweed to lay eggs on and for the caterpillars to eat.
2. Tell students that since monarchs visit Chicago as they migrate, they will investigate the different types of habitats available to monarchs in the Chicagoland area by reading about the characteristics of each one. They will use that information to determine which habitat seems best suited to meet monarch needs.

Investigate**15 minutes**

1. Distribute **Student Resource 3.1.A** to each student.
2. Pair students and pass out one habitat card from **Student Resource 3.1.B** to each pair.
3. Tell pairs to quietly read the text together. As they read, they should fill out **Student Resource 3.1.A** with information from their relevant habitat card text.
4. After pairs have written down information relevant to their assigned habitat, rearrange students so that they form new groups with a representative from each of the habitats. Direct students to share information about their habitat with the group, and record information presented from others in the group to complete the missing rows from **Student Resource 3.1.A**.

Reflect and Share**10 minutes**

1. When groups have finished, encourage a few students to share out with the whole class something that they learned about a habitat that was interesting or surprising.
2. Guide students to use the information they have collected on **Student Resource 3.1.A** to determine which habitat in the Chicagoland area is best suited to monarch needs. *Teacher tip: The prairie is the best suited for monarchs!* Students will write their opinions on the bottom of the sheet.
3. Discuss as a class if there are other possibilities for monarch survival outside of the ideal habitat (For example, monarchs might be able to survive in some wetlands as long as milkweed is available. They might even be able to survive in developed lands if people have planted milkweed and if a water source is nearby).
4. Tell students that now that they have determined which habitats are best for monarchs, next they will investigate where these habitats exist in Chicago.

Teaching Tip: If students need more practice with habitats and their characteristics, utilize Student Resource 3.1.C

Student Resource 3.1.A**What is the Best Habitat for a Monarch?****Name(s):** _____

Read about your assigned habitat and use the key to complete information about how that habitat meets monarchs' needs. Later, share that information with your group and gather information about other habitats from different group members. Finally, decide which habitat seems to be the best suited to monarch survival.

	Flowering plants with nectar	Milkweed plants	Sources of water
Wetland			
Woodland			
Prairie			
Dune			
Agriculture			
Developed land			

Key

! : a lot
□ : a little or some
- : none

Based on the information from the readings, I think that _____ is the best habitat for monarch survival.

**Wetland**

A wetland is a very wet and muddy natural habitat. It has a natural source of water, and it has very moist soil because water covers much of the land. Wetlands also have plants--mostly grasses and aquatic plants that live in the water, but they also have some trees and a few flowers with nectar. In some wetlands, there may be a little bit of a milkweed plant called swamp milkweed. Wetlands are sometimes called by other names like swamps, bogs, or marshes.

**Prairie**

A prairie is a natural habitat with a wide variety of plant and animal life. It has many plant species, including many types of flowering plants with nectar. Many milkweed plants are also found in prairie environments. Prairies are usually flat areas, and they may not have many trees. However, their tall plants and grasses can offer resting places for insects. Prairies often have sources of water nearby, such as ponds, streams, natural pools, and puddles.

**Woodland**

A woodland is a natural habitat known for its many trees and abundance of shade. In a woodland, there are many types of plants, including flowering plants with nectar. A kind of milkweed called poke milkweed can occasionally be found in woodlands, but not always. Woodlands may have natural sources of water like streams and puddles.



Agriculture

Agriculture, or farmland, is an unnatural habitat. It is a type of land that has been developed to grow food for humans. On agricultural land, specific plants or animals are raised so that humans can later eat them or use them for other products. Usually, agricultural land has just one or two kinds of plants--often soybeans or corn in Illinois. Farmers usually don't grow milkweed on agricultural land, and usually there are no trees on this type of land. There may be some man-made sources of water, such as hoses and watering systems, but these sources of water can be difficult for animals to use.



Developed Land

Developed land is an unnatural habitat, meaning it was created by humans. This type of habitat has buildings, houses, streets, and other things constructed by people. It may have some trees and flowers planted by humans, but not as many as in natural habitats. People usually don't plant milkweed, so it is very hard to find that type of plant on developed land. Developed lands may have some access to natural sources of water (like rivers and lakes) or man-made sources of water (like man-made ponds, swimming pools, and water fountains).



Dunes

Dunes are natural, sandy hills formed by wind. They usually form in a beach area near a natural body of water like a lake. Dunes can support plant life such as grasses, bushes, and shrubs. They usually do not have trees or many flowering plants with nectar. Dunes may, however, have several varieties of milkweed.

Student Resource 3.1.C**Extra Support for Habitat Review****Name(s):** _____

Sort the habitat cards into five separate groups. Each group should have three cards. For each group, list the numbers of the pictures and describe common characteristics. Come up with a name that describes the type of habitat shown in each group.

Picture Numbers	Common Habitat Characteristics	Habitat Name
Group 1:		
Group 2:		
Group 3:		
Group 4:		
Group 5:		

Student Resource 3.1.C

Extra Support for Habitat Review: Sorting Cards



Student Resource 3.1.C

Extra Support for Habitat Review: Sorting Cards



Teacher Resource 3.1.C

Directions for Habitat Sorting Card Review

Habitat	Additional Information
Prairie Pictures: 3, 9, 11	Prairies are large areas of very flat land that are covered mostly by tall grasses. There are many different plants found in prairies including wildflowers and milkweed, but there are very few trees. Prairie grasses can grow up to ten feet tall, and can grow roots underground up to 12 feet long. Many types of animals can be found in prairies, including bison, hawks, foxes, coyotes, and badgers. The temperature is warm in the summer, but cool in the winter. Prairies receive a moderate amount of rainfall.
Wetland Pictures: 2, 6, 12	Wetlands are areas where the ground is completely soaked or covered in water for at least part of the year. Wetlands might also go by the name “swamp” or “marsh.” Many plants can grow in wetlands, including trees, grass, moss, and flowers. Animals found in wetlands include fish, frogs, insects, and even reptiles like crocodiles and alligators.
Woodland Pictures: 4, 7, 14	Woodlands are areas where trees are the main type of plant found. Many other kinds of plants grow in woodlands, including moss, grass, shrubs, and flowers. Woodlands have a lot of open sunlight that helps plants grow. Plants provide food and shelter for the many types of animals that live within. Animals that might be found in woodlands include squirrels, rabbits, deer, and bears.
Developed Land Pictures: 1, 8, 13	Developed lands are places that have been changed for human living and use. Developed areas are where we would find factories, businesses, neighborhoods, and homes. In developed lands we might see highways, roads, railroads, bridges, and buildings. It is harder for animals to live in developed areas than in natural environments.
Agriculture Pictures: 5, 10, 15	Agriculture is another word for farming. Farmland is created when humans change places in nature to make room for growing crops and raising livestock that humans eat. Agricultural areas can be used to grow corn, wheat, soybeans, nuts, vegetables, and fruits. Animals we might find in agricultural areas include cows, pigs, goats, sheep, horses, and chickens.

Investigation 3: Where Can Monarchs Stop in Chicagoland?**Lesson 3.2: Habitat Availability in the Chicagoland****Lesson Description****35 minutes**

Students will examine two maps to learn how Chicago's landscape has changed over time. Students will analyze the maps and complete two pie charts that represent habitat changes at different times.

Objective

Students will complete pie charts that represent patterns of the changing landscape in the Chicagoland area based on their observations of two maps.

Guiding Question

Where are different habitats available around Chicago? How have habitats in the Chicagoland area changed over time?

Materials**Materials****Per Class**

- Teacher Resource 3.2.A
- Teacher Resource 3.2.B
- Teacher Resource 3.2 C

Per Student

- Student Resource 3.2.A
- Student Resource 3.2 B

Materials Preparation

- Prepare Teacher Resource 3.2.A and Teacher Resource 3.2 B to project
- Print Teacher Resource 3.2 C
- Make copies of Student Resource 3.2.A and Student Resource 3.2 B for every student

New Vocabulary

Dune – a mound of sand formed by the wind, especially on the coast or in a desert

Pre Settlement – the time period before people arrived in an area

Map Key – Provides information about symbols and/or colors in order to make meaning from a map

New Vocabulary

This activity aligns with common core math standard:

Interpreting Data.

1: Representing and

Investigation 3: Where Can Monarchs Stop in Chicagoland?**Lesson 3.2: Habitat Availability in the Chicagoland****Engage****5 minutes**

1. Remind students of the types of habitats that can be found in and around Chicago.
2. Explain that students will see these habitats represented on a map to learn more about where these habitats can be found in the Chicagoland area.

Investigate**25 minutes**

1. Project **Teacher Resource 3.2.A**.
2. Ask students the “Guided Questions for Pre-Settlement Map” on **Teacher Resource 3.2 C**.
3. Distribute **Student Resource 3.2.A**. Explain that the whole pie chart represents the entire map, and each segment of the pie chart represents a habitat.
4. Point out the largest segment of the pie chart and ask students which habitat the segment represents. Guide them to realize that it represents the largest habitat area, the prairies, because the color most represented on the map is brown. Tell students to write the habitat “Prairies” on the line next to the segment.
5. Repeat this process to label the remaining segments of the pie chart.
6. After students have finished labeling, ask them to discuss which habitat made up the most area in Chicagoland, and if they think that habitat is good or bad for monarch survival.
7. Tell students that unfortunately, this map of Chicago is from a long time ago, before people started settling on the natural land.
8. Project **Teacher Resource 3.2.B**, and tell students that this map shows what habitats in Chicagoland look like today.
9. Pair students and pass out **Student Resource 3.2.B**, and direct them to use the map to complete the new pie chart on their own.

*Teacher tip: If students are having trouble completing the pie chart, use the “Guiding Questions for Present-Day Map” on **Teacher Resource 3.2.C** to support their thinking.*

Reflect and Share**5 minutes**

1. Ask students to discuss the differences they noticed between the pre-settlement and present day maps and their pie charts. Ask students what they think those differences mean for monarch migration through the area.
2. Allow a few students share out their answers with the class. Tell students that habitat loss seems like a big problem for monarchs, but even small changes to restore habitats can have a big positive effect for monarch migration.

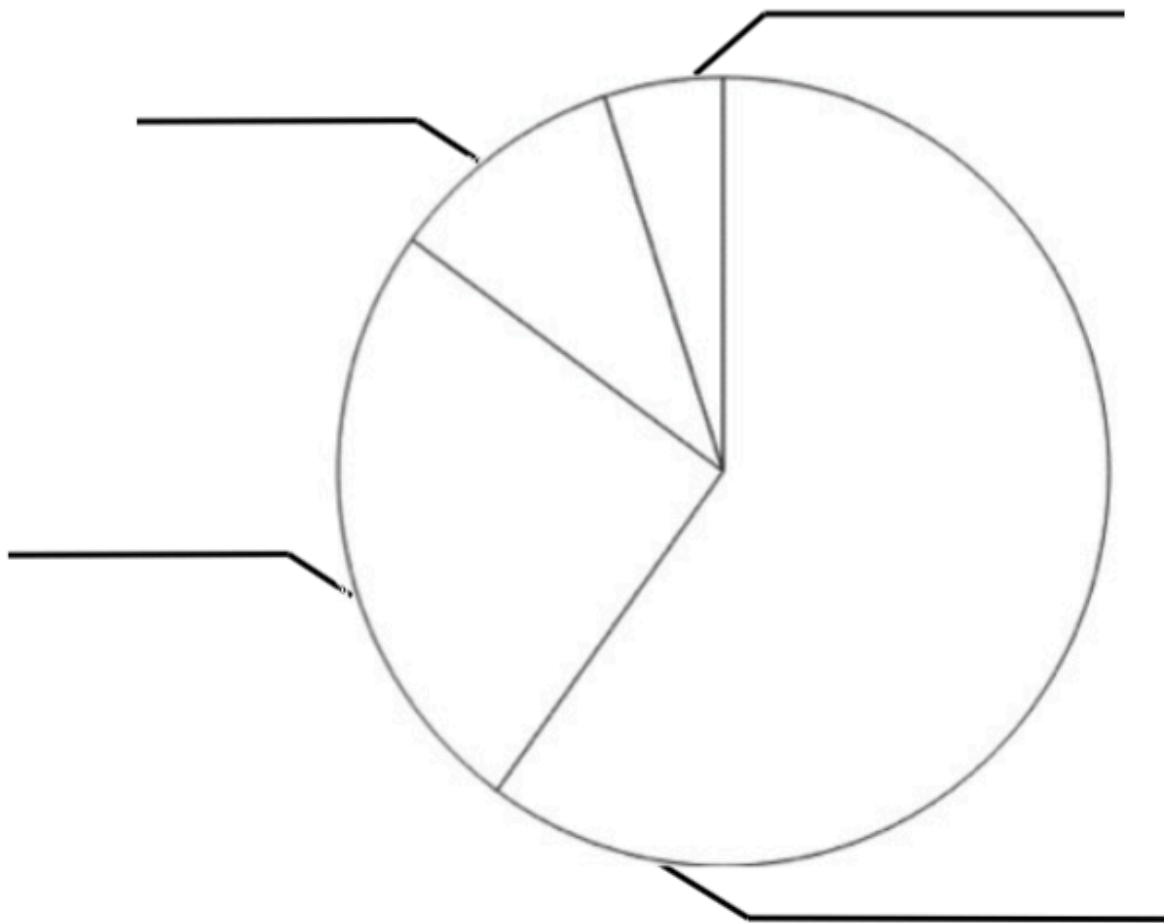
Names: _____

Date: _____

Look at the **Pre-Settlement** map of the Chicago area. Determine which habitat belongs to each segment of the pie chart. Write the name of the habitat on the line next to the segment it matches.

Pre Settlement

Key: ☐ Prairies ☐ Woodlands ☐ Wetlands ☐ Dunes



Student Resource 3.2.B**Pie Chart Habitat Map Analysis**

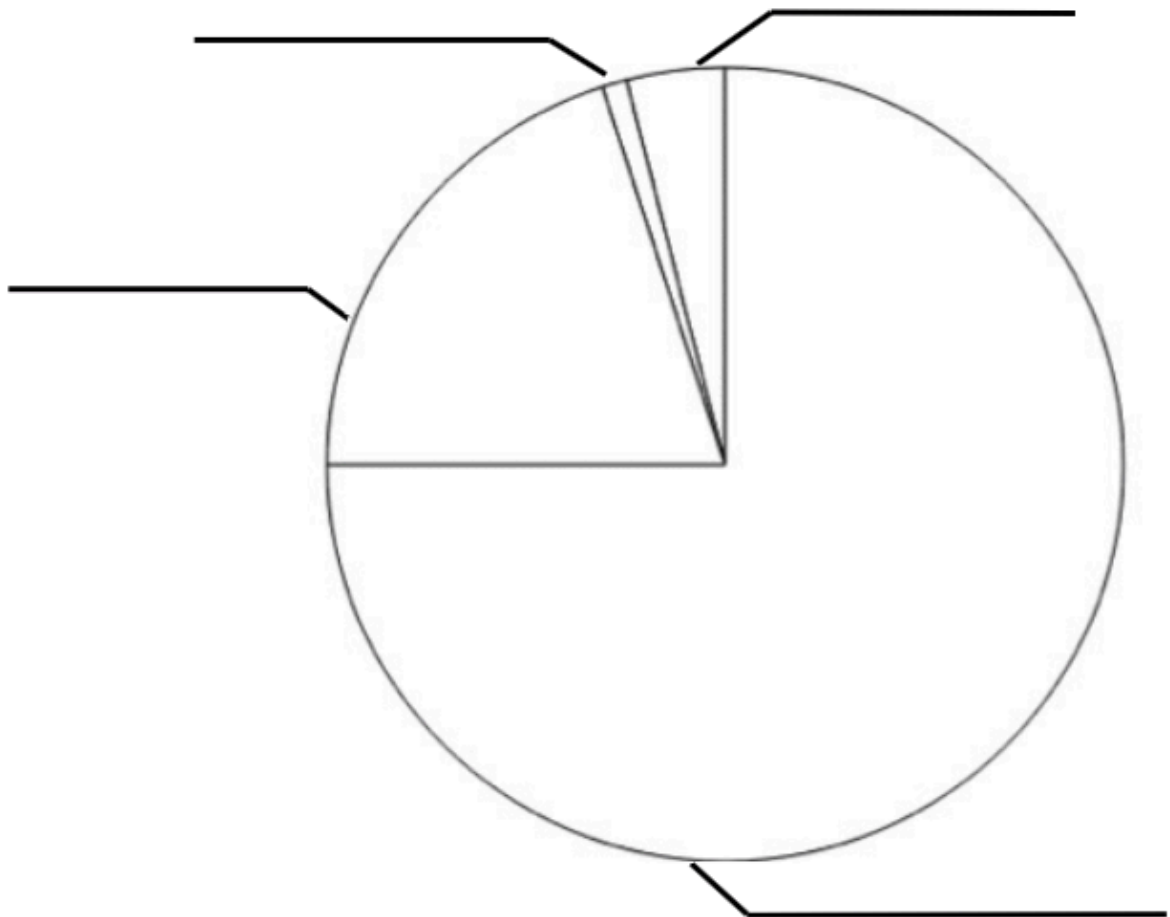
Names: _____

Date: _____

Look at the **Present Day** map of the Chicago area. Determine which habitat belongs to each segment of the pie chart. Write the name of the habitat on the line next to the segment it matches.

Present Day

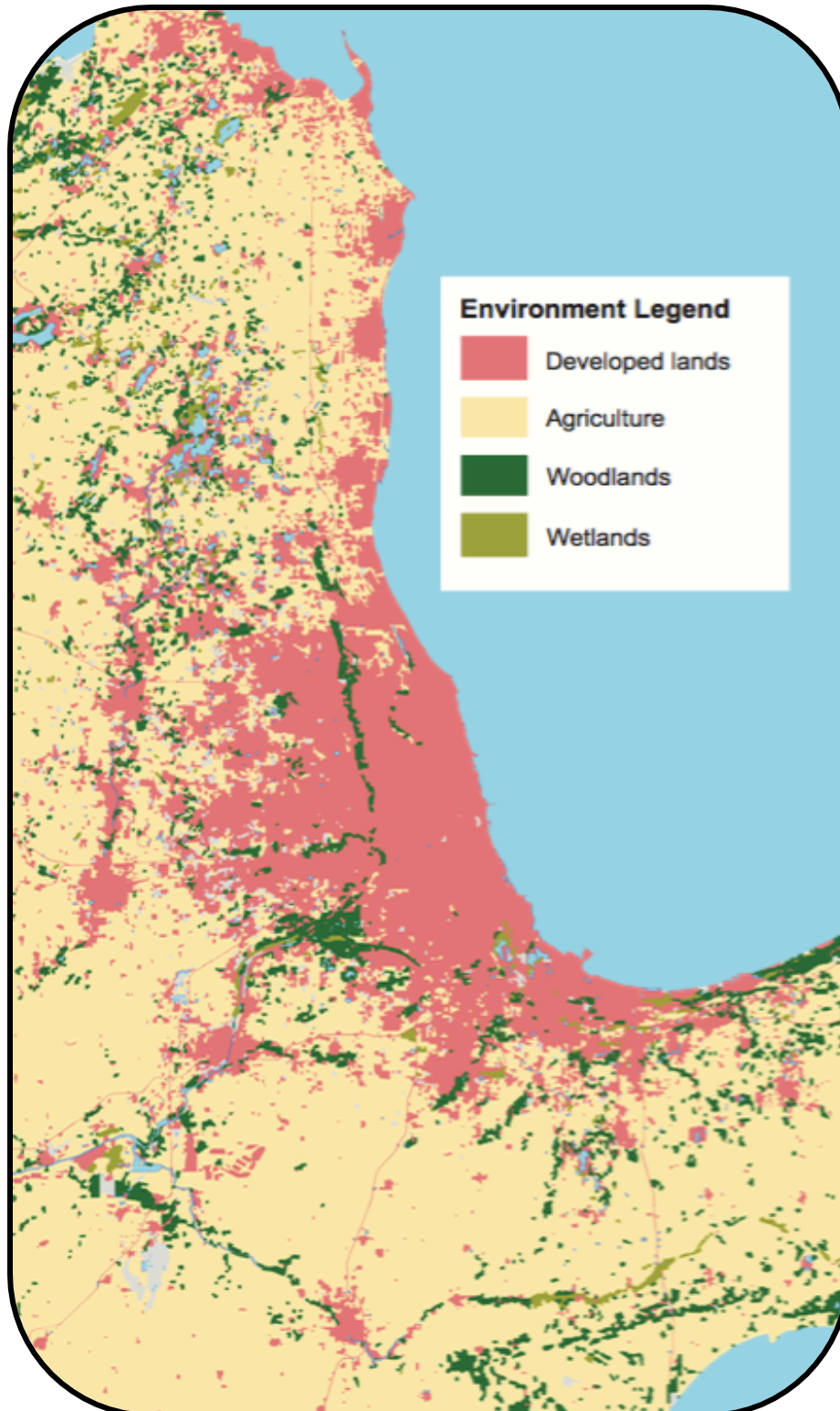
Key: ○ Developed Lands ○ Agriculture ○ Woodlands ○ Dunes



Teacher Resource 3.2.A
Pie Chart Analysis Maps



Teacher Resource 3.2.B
Pie Chart Analysis Maps



Teacher Resource 3.2.C**Guided Questions for Maps of Chicago Habitats**

Use the guiding questions below to prompt students to think critically about the maps of pre-settlement and present-day Chicago.

Guiding Questions for Pre-Settlement Map

1. Where is this? *(Do students recognize that this is a map of the Chicagoland area?)*
2. Where is the map key? *(Do students know what a map key is? If not, define it.)*
3. Look at the words on the map key – what are prairies, woodlands, wetlands, and dunes?
4. What does the brown color represent? *(Repeat for each color on pre-settlement map. Ensure students recognize that each color matches up with the word next to it.)*
5. Which color do you see the most of? What does that mean? *(Do students understand that the map shows mostly prairie land?)*

Guiding Questions for Present-Day Map

1. Where is the map key?
2. Look at the words on the map key. What do developed areas and agriculture mean?
3. What does the pink color represent? *(Repeat for each color on present day map. Ensure students recognize that each color matches up with the word next to it.)*
4. Which colors do you see more of? What does that mean? *(Do students understand that the land has been almost entirely developed by humans?)*
5. Which colors do you see less of? What does that mean? *(Do students understand that very little natural land remains?)*

Investigation 4: Where Can Monarchs Meet Their Needs by our School?**Lesson 4.1: Analyzing a Green Space Near Our School****Lesson Description****35 minutes**

Students will analyze satellite images of the area around their school to determine how much surrounding land is “developed space” (driveways, buildings, sidewalks, etc.) and how much is “green space” (trees, plants, grass, etc.).

Objective

Students will be able to develop a key to code a satellite image to represent different types of land available around their school.

Guiding Questions

Where are green spaces around our school?

Materials**Per Class**

- Teacher Resource 4.1.A: Example Satellite Image of The Field Museum
- Teacher Resource 4.1.B: Color-coded satellite image of the Field Museum
- Teacher Resource 4.1.C: Directions for Obtaining a Satellite Image of Your School
- Satellite image of your school to project

Per Pair or Small Group of Students

- Student Resource 4.1.A: Your school’s satellite image
- Green, orange, and blue highlighters, colored pencils, markers, or crayons

Materials Preparation

- Print or prepare to project Teacher Resource 4.1.A
- Review Teacher Resource 4.1.B for directions on how to color-code satellite images
- Print or prepare to project a satellite image of your school with a small surrounding area (see Teacher Resource 4.1.C for instructions)
- Print one copy of the image of your school for each pair or small group of students

New Vocabulary

Green space – an area of grass, trees, or other vegetation in an otherwise urban environment.

Satellite image – a picture of Earth or other planets taken from space by satellites

Investigation 4: Where Can Monarchs Meet Their Needs by our School?
Lesson 4.1: Analyzing a Green Space Near Our School**Engage****5 minutes**

1. Prompt students to recall the Chicagoland habitats they learned about in the last investigation, and what has happened to these habitats over time. Ask students how this change has impacted monarch butterflies.
2. Tell students that even in developed areas, there is usually some green space – land that is covered in trees, grass, or other types of plants. This green space has the potential to become a stopping place for monarchs during their migration.
3. Ask students which habitat might best describe the area around their school, and if there is any green space present. With a partner, encourage students to think about how they could find out where green space exists around their school. Allow students to share their ideas and record them on the board.

Investigate**20 minutes**

1. Tell students that one way to identify green space in an area is through satellite imagery – high-resolution pictures of the earth taken from space.
2. Project a satellite image of your school on the board. Ask students to observe the image, and help them orient themselves by pointing out key landmarks such as the school building, parking lot, or other notable features.
3. Tell students that in order to analyze the green spaces available, it is useful to color-code them (similar to the maps seen in the previous lesson).
4. Show the example coded map of The Field Museum in **Teacher Resource 4.1.A**.
5. Ask students to generate a list of features to be coded as green space (i.e. trees, grass) and developed land (i.e. buildings, roads, sidewalks). Record the list for each type of land of the board.
6. Pass out a copy of **Student Resource 4.1.A**, your school's satellite image, to each pair or small group of students. Pass out coloring utensils to each group.
7. Direct student pairs to figure out a plan for color-coding the satellite image for the different land features, and fill in the key at the top accordingly.
8. Give students time to color code their images according to the key, and answer the questions at the bottom of the page.

Reflect and Share

10 minutes

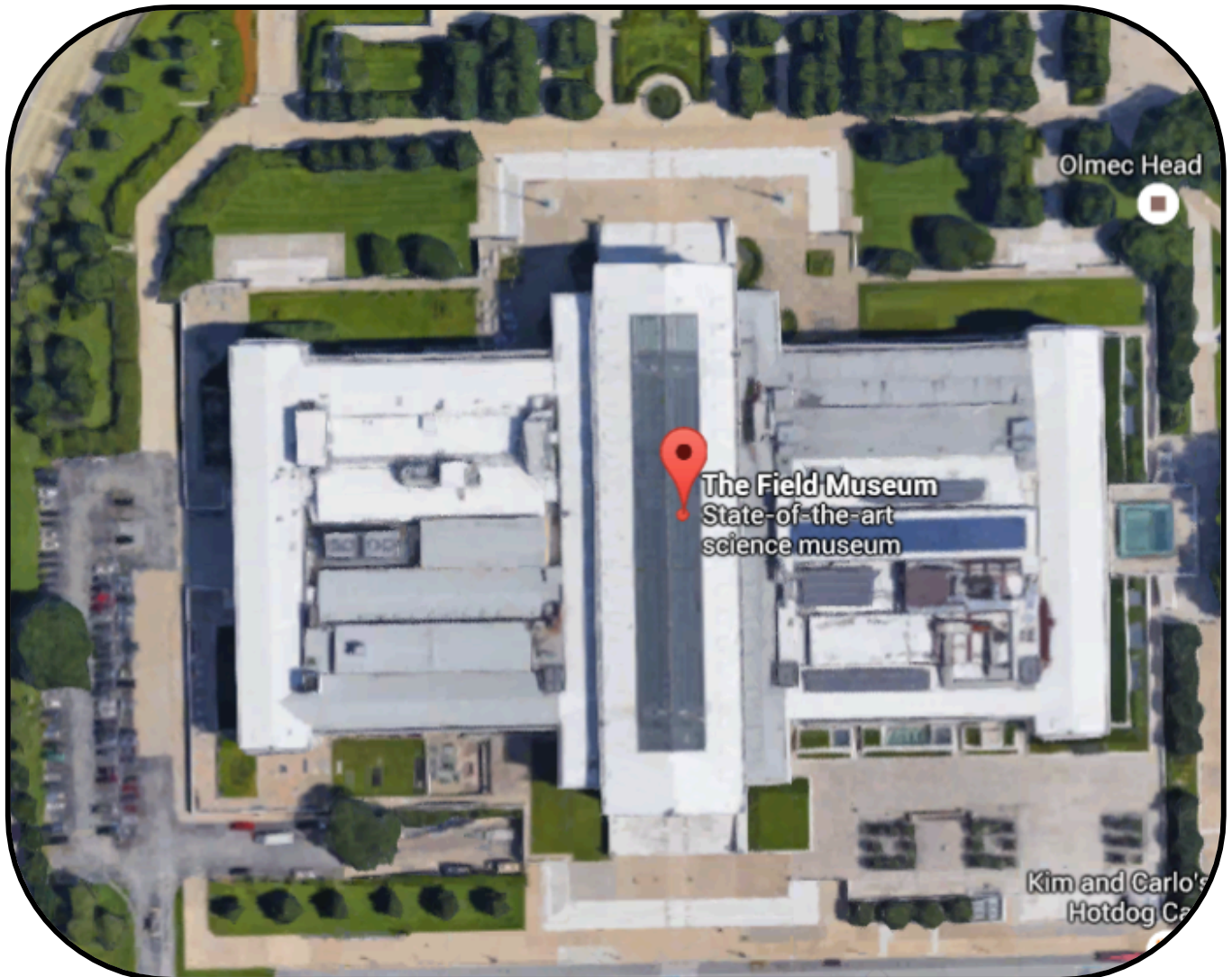
1. Ask student pairs to compare their finished images and answers, and discuss any similarities or differences.
2. Allow a few pairs to share their answers with the whole class, and encourage them to use specific evidence to support their answers.
3. Ask students how they could find out if the green spaces around their school provide what monarchs need to survive (nectar, spaces to rest, milkweed for laying eggs and to eat as caterpillars, and water).
4. Solicit student ideas. Hone in on the idea that students could go outside to one of the green spaces to look for elements that meet monarch needs.
5. Guide the class to identify and come to consensus around one small area of green space from the satellite image to investigate further (such as a section of the playground) to explore in more depth outside in the next lesson. Encourage students to select an area that encompasses at least two types of land surfaces (i.e. grass, mulch, cement, asphalt).

Teacher Resource 4.1.A

Example Coded Satellite Image

The Field Museum

Image Key: ☐ Developed land ☐ Green space ☐ Trees



Circle the phrase below that best describes the types of land in the image:

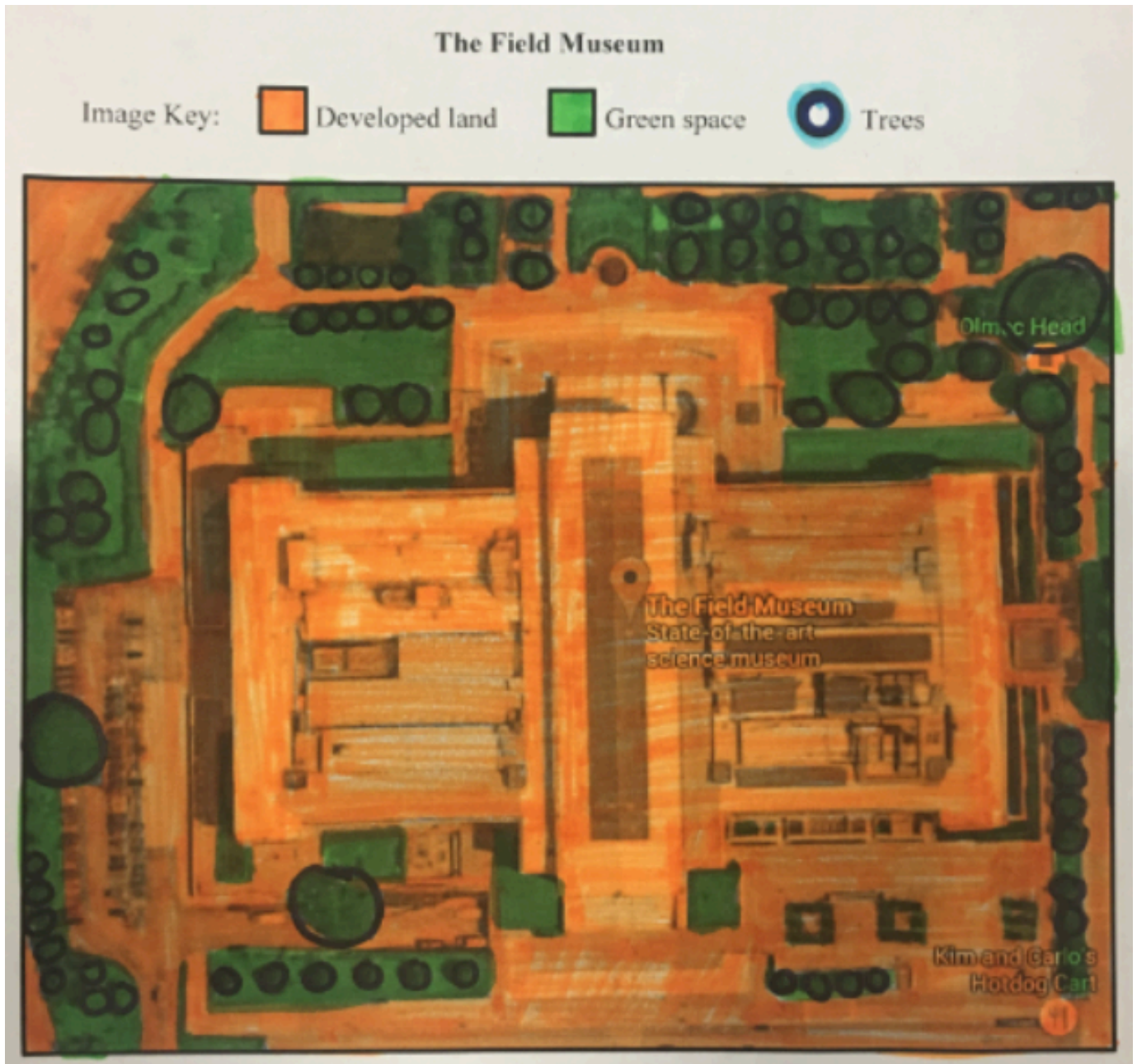
*There is more **developed land***

*There is more **green space***

*There is the **same amount** of developed land and green space*

Teacher Resource 4.1.B

Example Coded Satellite Image



Circle the phrase below that best describes the types of land in the image:

There is more **developed land**

There is more **green space**

There is the **same amount** of developed land and green space

Teacher Resource 4.1.C**Obtaining a Google Image of your school**

The following steps can be taken to capture a satellite image of your school and the surrounding environment:

1. Go to [Google Maps](#)
2. Type in the school name or address into the search bar
3. Switch the image to satellite view (found in the bottom left hand corner of the map display)
4. Zoom in on your school so that details such as building, green space, or streets are clearly visible in the map
5. Your zoomed in map should be no larger than a block surrounding your school
6. Once zoomed in, use your preferred method to take a screenshot of the satellite image of your school
7. Copy and paste this image into a word document to be printed out as a student resource and as a tool for the teacher to project during the lesson

Name(s): _____

Image Key: ☐ Developed land ☐ Green space ☐ Trees

Insert your school satellite image here!

Circle the phrase below that best describes the types of land in the image:

*There is more **developed land***

*There is more **green space***

*There is the **same amount** of developed land and green space*

Investigation 4: Where Can Monarchs Stop Near Our School?**Lesson 4.2: Mapping Green Space Outside Our School****Lesson Description****40 minutes**

Students will investigate one area around their school and use a monarch habitat assessment tool to determine how well it currently meets monarch butterflies' needs during migration. Students will create a map highlighting the land features that are relevant to monarch survival within the area.

Objective

Students will be able to determine the extent to which an area around their school meets monarch survival needs by using a monarch habitat assessment tool. Students will record this information in a table and create a coded map of the area.

Guiding Questions

How well does a specific green space near our school provide what monarchs need to survive?

Materials**Per Class**

- Teacher Resource 4.2.A: Native Milkweed Images
- Camera (optional but recommended)
- Chicago plant field guide (optional)
- 4 Flags, traffic cones, rocks, or other objects that can be used to mark the corners of the area of observation.

Per Group of 3-4 Students

- Student Resource 4.2.A: Monarch Habitat Assessment Tool
- Student Resource 4.2.B: Monarch Habitat Rating and Recommendations
- Clipboards (optional)

Materials Preparation

- Print one copy of Student Resources 4.2.A and 4.2.B for each group of 3-4 students
- Prepare to project or display Teacher Resource 4.2.A
- Gather cones or other materials to mark habitat investigation zone

New Vocabulary

Investigate – examine for research

Investigation 4: Where Can Monarchs Stop Near Our School?

Lesson 4.2: Mapping Green Space Outside Our School

Engage

15 minutes

Before class, go outside and use traffic cones or other markers to designate an area outside the school that students will investigate.

1. Remind students of the previous lesson in which they selected an area around their school to investigate to determine how well it provides what monarch butterflies need. Project the satellite image from the previous lesson and point out the area that students chose to investigate further.
2. Tell students that they will go outside to explore the area and make a map to represent it.
3. Pass out **Student Resource 4.2.A**.
4. Ask students to name some features they think they will see when they explore the outdoor area (trees, bushes, sidewalk, grass, flowers, etc.) and create symbols to pre-populate the key with some of the anticipated features. Make sure that at least 2 types of land covering (grass, cement) are included. Students can ignore the “improvements” section of the map key for now.
5. Project **Teacher Resource 4.2.A** to show students what the varieties of Milkweed native to the Midwest look like.

Investigate

15 minutes

1. Bring the class outside to the designated investigation area. Point out the boundaries of the area.
2. Review the steps on **Student Resource 4.2.A** that students will take to create their map.
3. Circulate and provide guidance to students as they create their maps of the habitat.
Optional teaching tip: take photos of the area for future reference in the classroom.
4. When students have finished sketching the features on their map, lead them back inside.
5. In the classroom, pass out coloring utensils and instruct students to color in the map elements that they identified and the key accordingly.

Reflect and Share

15 minutes

1. When students have finished their maps, encourage them turn and talk to a partner to discuss how well the area meets monarch needs based on the elements present in the environment.
2. Tell students that in the next class, they will look even more closely at their maps in order to determine the extent to which monarch needs are met in the area.

**Teacher Resource 4.2.A
Native Milkweed Images**



Common Milkweed

Photo Credit: H. Price, Wikimedia Commons, 2006



Whorled Milkweed

Photo Credit: F. Reynolds, Wikimedia Commons 2013



Swamp Milkweed

PDH, Wikimedia Commons, 2014

Name(s): _____

Draw Your Habitat Map

1. Outline of the shape of the land area.
2. Draw and label different types of land covering (sand, grass, cement, etc.)
3. Draw and label water sources (water fountains, puddles, hoses, etc.)

Map Key**Improvements**

Investigation 4: Where Can Monarchs Stop Near Our School?**Lesson 4.3: Local Habitat Analysis****Lesson Description****40 minutes**

Students will analyze how well the local habitat that they previously mapped meets monarch survival needs. To do so, they will use a Habitat Rubric to score the area according to each monarch need, creating a monarch survival report card for the area.

Objective

Students will be able to create a Habitat Report Card by analyzing how well a local habitat currently meets monarch survival needs.

Guiding Questions

How well does our local habitat help monarchs survive? What might we change to improve it for monarchs?

Materials**Per Student**

- Student Resource 4.3.A
- Student Resource 4.3.B

Per Class

- Teacher Resource 4.3.A

Materials Preparation

- Make copies of the student resources
- Gather students' previously created maps (Student Resource 4.2.A) for use in this lesson

Investigation 4: Where Can Monarchs Stop Near Our School?**Lesson 4.3: Local Habitat Analysis****Engage****5 minutes**

1. Remind students about the maps they created in the previous class and tell them that today they will use those maps to determine whether the area is well suited to support monarchs' needs.
2. Prompt students to recall and think-pair-share about what monarchs need to survive (*nectar, water, milkweed for laying eggs for their offspring (caterpillars) to eat, and places to land and rest*). Record student responses on the board.
3. Tell students that they will analyze the map using a Monarch Habitat Report Card based on how many milkweed plants, nectaring (or flowering) plants, and water sources are in the area.

Investigate**15 minutes**

1. Project or display a copy of **Student Resource 4.3.A**. Examine the information that students should look for on their maps (number of milkweed plants, number of flowering plants, number of water sources) to determine how well the area might support monarch survival. Review the scoring system on the handout.
2. Pass out copies of **Student Resource 4.3.A**. Instruct students to review the features on their maps to count and record the number of milkweed plants and nectaring plants to complete the handout (best guesses are acceptable).
3. If students are unsure whether they saw milkweed, display **Teacher Resource 4.2.A** and review the Midwest native milkweed varieties.

Optional Teaching Tip: project a photo of the area to clear up any student confusion.

Reflect and Share**15 minutes**

1. Project **Student Resource 4.3.B**. Model how students can score each category to determine the total points for each section.
2. Pair students and direct them to work together to determine how many points to give each category, based on the number of resources counted. Instruct pairs to find the sum of all the categories.
3. Allow each pair to share the score they calculated with the whole class. Encourage groups to reference specific evidence to support their score. If there are slight discrepancies, calculate the average of all scores. If there are significant discrepancies, ask further questions to help identify any mistakes made in the scoring process.
4. Distribute **Student Resource 4.3.B** to each pair of students. Guide pairs to use the scoring tool to determine a rating for the habitat.
5. Prompt student pairs to brainstorm ways they could improve the habitat for monarch butterflies, and record them on the worksheet. Then, allow groups to share their ideas with the whole class.
6. Ask students to think about how they might represent their proposed changes on their existing habitat map. Tell students that next time they will determine a method for documenting these proposed habitat changes.

Name(s): _____

Part 1: Monarch Habitat Report**Milkweed****How many milkweed plants do you see in the area?** _____

0 milkweed plants = 0 points

Between 1 and 5 milkweed plants = 5 points

More than 5 milkweed plants = 10 points

Total Points: _____**Nectaring Plants** (Flowers, fruit trees, some shrubs, etc.)**How many nectaring plants do you see in the area?** _____

0 nectaring plants = 0 points

Between 1 and 5 nectaring plants = 5 points

More than 5 nectaring plants = 10 points

Total Points: _____**Water Sources** (Hoses, puddles, bird baths, water fountains, etc.)**How many water sources do you see in the area?** _____

0 water sources = 0 points

Between 1 and 5 water sources = 5 points

More than 5 water sources = 10 points

Total Points: _____**Sum of all points:** _____

Student Resource 4.3.B**Habitat Map****Name(s):** _____**Total possible points: 30**Your habitat total points
(SUM of all points): _____

Total Points	Habitat Rating	What This Means
0-5	Poor	You'll need to do some work to attract and keep monarchs in your site, but there are lots of ways to do this!
6-10	Fair	Nice start! You can make some site improvements, but monarchs are getting some benefits from your site
11-20	Good	Monarchs are definitely getting benefits from your site! You can make it even better by adding some more monarch resources.
21-25	Great	Thanks for all you're doing for monarchs and other organisms. You can probably turn your site into a fantastic habitat with a few improvements!
26-30	Fantastic!	You're a monarch habitat rock star! Enjoy your site, and share your expertise with others!

Name(s): _____

1. What would you plan to do to improve this monarch habitat? Be specific!

2. If you made all of the changes in your plan, what would the new habitat rating be?

Investigation 5: How Can We Improve Monarch Habitats Around Our School?**Lesson 5.1: Mapping Habitat Improvements****Lesson Description****55 minutes**

Students will use the map they previously created of a small area of potential monarch habitat near their school and add improvements to it that will support the survival of monarch butterflies. On the map and map key, students will indicate proposed changes that they would make to improve the quality for monarch butterflies.

Objective

Students will be able to represent different types of land and water by creating a map of an area near their school. Students will indicate different map features by creating a map key.

Guiding Questions

How can we represent proposed changes to improve our local monarch habitat?

Materials**Per Class**

- Colored pencils, markers, or crayons
- Rulers (optional)
- Any photos of the investigation area taken in Lesson 3.2
- Tape
- Teacher Resource 5.1.A: Example Habitat Map (before and after changes)

Per Student

- Printed Copy of Student Resource 5.1.A
- Completed Student Resource 4.2.A: Mapping of School environment from the previous lesson
- Completed Student Resource 4.3.A

Materials Preparation

- Have student created maps (Students Resource 4.2.A) developed in previous lessons ready for students to use in this lesson
- Also have completed Student Resource 4.3.A available for use
- Review and prepare to project or display Teacher Resource 5.1.A: Example Habitat Map

Investigation 5: How Can We Improve Monarch Habitats Around Our School?**Lesson 5.1: Mapping Habitat Improvements****Engage****10 minutes**

1. Remind students of the previous lesson in which they proposed a plan and outlined the changes they would make in order to make the area near their schoolyard a better habitat for monarch butterflies. Connect back to the original purpose of the unit (support the declining monarch population) and reflect on all the work they have done to investigate monarchs, their needs, and habitats in the area that support these needs.
2. Pass out **Student Resources 4.2.A** and **4.3.A** from the previous lessons (the student-created map and key of school, and the student monarch habitat rating).
3. In pairs, prompt students to think about what they did to create their maps, what elements or components are represented in them, and what rating they gave this habitat in regard to monarch support.

Investigate**30 minutes**

1. Explain that students will use the map that they previously made of the monarch habitat at their school (**Student Resource 4.2.A**) to add additional elements to improve the habitat for monarchs (such as water sources, nectaring flowers, and milkweed). Refer to the rubric so students know what will be expected of them.
2. Display **Teacher Resource 5.1.A** as an example of how improvements to a habitat may look on a changed map. Remind students that they should reflect any additions made on the map itself on the map key.
3. Give students time to add, on their map and map key, the elements they identified that they would plan to change in the habitat to improve it for monarchs.
4. If students need more space, they can use additional paper to complete their map key. After students have finished documenting the changes to their map, pass out **Student Resource 5.1.A** and encourage them to explain their reasoning behind the changes they made. Use **Teacher Resource 5.1.B** to score student work.

Reflect and Share**15 minutes**

1. Post students' completed maps around the room with tape.
2. Encourage students to walk around the room and observe all of the proposed changes to improve the local habitat for monarch butterflies.
3. After reviewing the proposed changes, have students brainstorm next steps they might take to actually make these changes. These could include: communicating proposed changes to stakeholders, organizing a fundraiser to raise money for the changes, writing a letter to explain the problem to others, talking to people or organizations that have made positive changes to their habitats, or researching community science projects to help track monarch sightings.
4. Optional: take steps to carry out some or all of the proposed changes to the habitat.

Name(s): _____

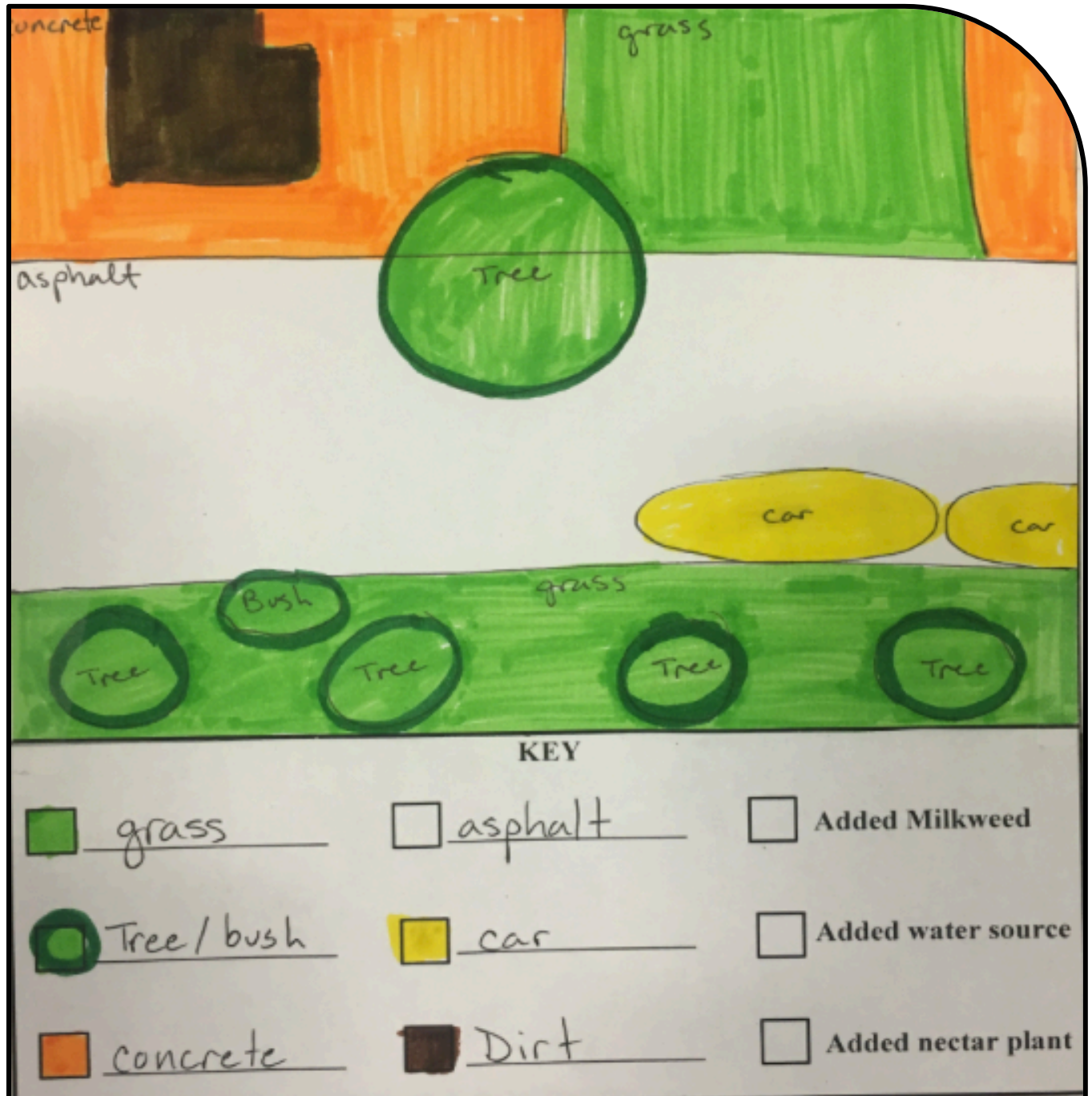
1. Explain your map.

**2. What did you add to your map to make it a better habitat for monarch butterflies?
Why did you choose to add those features?**

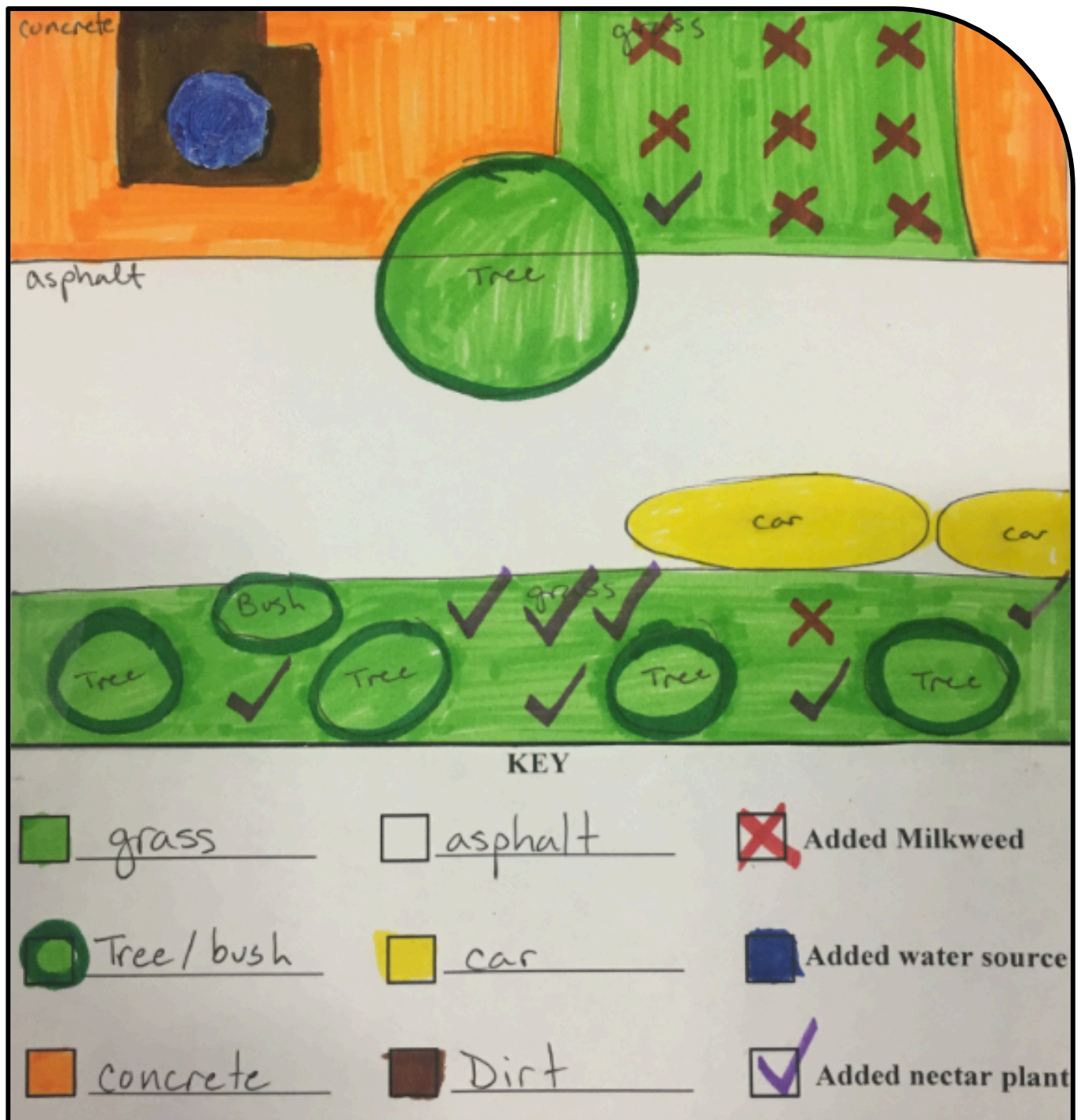
**3. How do you think these changes will affect monarch butterflies in your
neighborhood?**

Teacher Resource 5.1.A
Example Improvement Map

Example of Map Before Habitat Changes at The Field Museum



Example of Map After Habitat Changes



Teacher Resource 5.1.B

Student Name: _____ Total Score: _____ / 11pts.

Question	Points	Total Points
Q1. Draw your habitat map	Student draws a map of all or part of their schoolyard. 1pt. Student draws and labels at least TWO different types of land covering (sand, grass, cement, etc.). 1pt. Student draws and labels at least ONE water source (water fountain, bird bath, puddles, hoses, etc.) 1pt. Student draws and labels at least ONE other feature (trees, playground, cars, bushes, etc.) 1pt.	____ / 4pt
Q2. Create a map key	Student creates a map key that accurately explains all components of their drawing. The map key should include a symbol, pattern, or color-coding system that explains all of the components represented in the drawing. 2pt. If the key is only partially filled in*, 1pt. <i>*Note: students do not need to fill in the entire key to earn full points. For instance, if they only have 5 elements in their map, they should earn full points. Only dock points if there are elements represented on the map that are not represented on the key.</i>	____ / 2pt
Q3. Add components to the map and key	Student adds at least TWO elements to improve the habitat for monarch butterflies to the map (milkweed, water source, or nectar plants) AND adds these elements to the key, as well.	____ / 1pt
Q4. Explain your map	Students describe at least ONE feature, element or aspect of their map.	____ / 1pt
Q5. What did you add to your map to make it a better habitat for monarch butterflies? Why did you add those features?	Student describes what elements they added (milkweed, water source, and/or nectar plants) 1pt. Student addresses why they added them to a particular part of the schoolyard (to improve the landscape/help the butterflies). 1pt.	____ / 2pt
Q6. How do you think these changes will affect monarch butterflies in your neighborhood?	Student response indicates that adding these elements will positively impact (help, grow) the monarch butterfly population.	____ / 1pt

Glossary

Agriculture – land that is used for growing crops and raising livestock

Developed area – land changed for human living and use

Dune – a mound of sand formed by the wind, especially on the coast or in a desert

Green space – an area of grass, trees, or other vegetation in an otherwise urban environment.

Investigate – examine for research

Map Key – symbols and/or colors used to make sense of a map

Migration – seasonal movement of animals from one region to another

Milkweed – an American plant with milky sap

Nectar – a sugary fluid secreted by plants, especially in flowers

Population – the total number of a particular type of animal living in one area

Prairie – a large, open, flat area of grassland

Pre-Settlement – the time period before people arrived in an area

Satellite imagery – pictures of Earth or other planets captured by satellites

Wetlands – muddy land where the ground is covered or soaked in water

Woodlands – land covered in trees and forest

Connections to Museum Resources

Museum Resource Information

If you are interested in using museum resources in your classroom to support this unit, review the information below and consider bringing in museum objects and/or specimens based on the suggested recommendations.

N. W. Harris Learning Collection at the Field Museum: From a skunk specimen to SUE's tooth to a ceremonial mask from Cameroon, the *N. W. Harris Learning Collection at The Field Museum* gives educators and parents a chance to take the Museum's collection to their classroom or home. Visit: harris.fieldmuseum.org

Teacher Leadership Center at the Peggy Notebaert Nature Museum: The Teacher Leadership Center's popular loan program includes the following materials which can be borrowed free of charge for two weeks at a time: Inquiry Kits from the Illinois Department of Natural Resources (IDNR) and the Nature Museum, EnviroScapes, and National Geographic Book Packs. Visit: naturemuseum.org

Suggested Recommendations

Lesson 1.1: The Problem of monarch disappearance

Item: *Butterflies and Moths* experience box; *Monarch Butterfly* exhibit case from the *N. W. Harris Learning Collection* at the Field Museum, and *Butterflies* inquiry kit from The Peggy Notebaert Nature Museum's *Teacher Leadership Center*.

Use: Allow students to gain more firsthand experience with the Monarch Butterfly's traits, behaviors, and life cycle.

Lesson 3.1: Habitat Types

Item: *Prairie Life* experience box from the *N. W. Harris Learning Collection* at the Field Museum.

Use: Gives students greater insight onto the ecosystem of the prairie habitat, the optimal living space for Monarch Butterflies.