

A Maine Audubon/Islandport Press Partnership

WILDLIFE ON THE MOVE

Teaching Guides

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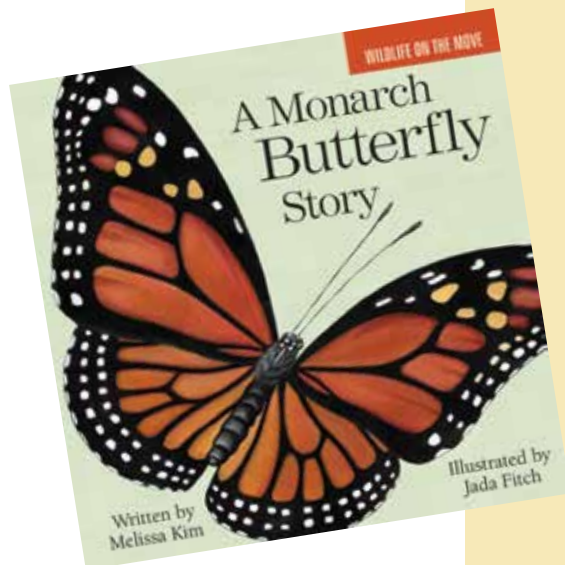
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Introduction

ABOUT MAINE AUDUBON

Maine Audubon is building a community of people who understand that when Maine's wildlife thrives, Maine thrives. Since 1843, we have been connecting people to nature through a science-based approach to conservation, education, and advocacy. The largest Maine-based wildlife conservation organization, Maine Audubon has eight wildlife sanctuaries, 10,000 members, and serves 50,000 people annually.

We work with children, adults, families, and educators to foster environmental literacy and stewardship through science-based and experiential education programs.

ABOUT WILDLIFE ON THE MOVE

Wildlife On the Move started with a great story. In January 2014, a Snowy Owl got stuck in an abandoned building in downtown Portland, Maine, and Maine Audubon staff were called on to assist. Both on scene that day and in the days following, we saw a fantastic opportunity in this front page story to explain basic wildlife ecology, why animals venture far from home, and what positive human intervention looks like. Our friends at Islandport Press agreed, and together we set to work developing a series of books that would help introduce and expand upon these important themes for families and classrooms in Maine and beyond. Not only did the trapped Snowy Owl get a happy ending, but we hope that her and other stories will live on to benefit and inspire generations of young naturalists and conservationists to come.

Why these species? The species chosen for the Wildlife on the Move project are iconic, charismatic, and most importantly, representative of the challenges facing Maine's wildlife. Even students who have never seen a Snowy Owl, for example, are able to relate to the experience of living in Maine. Though the story of each species is unique, they explore similar themes of animal movement, human interactions with wildlife, animal adaptations, seasonal changes, and habitat requirements.

Why this format? The Wildlife on the Move books are written for preschool-aged children through second graders, with simple prose supported by a strong foundation of scientifically accurate content and illustrations. This allows educators, aided by these curriculum guides, to dig deeper into the underlying scientific concepts and to challenge older students to take on a greater load of the cognitive work. The

smaller board books allow students of all ages to explore the books at their own pace and practice reading skills, while the large teacher editions allow for large group reading and discussion while inviting further interaction with the detailed illustrations.

HOW TO USE THIS GUIDE

Like the books in the Wildlife on the Move series, these companion teaching guides can be used in multiple ways. It is certainly possible to choose a standalone unit or lesson from one teaching guide, or to use them to provide context and background information to inform your own usage of the Wildlife on the Move books.

However, we hope that your interactions with this book series will go deeper than that. Taken as a whole, the Wildlife on the Move series provides an opportunity to explore multiple themes related to ecology, geography, and stewardship throughout each season and from multiple angles. This seasonal focus also provides an excellent starting point for incorporating outdoor exploration and field work into your teaching. You'll find tips for that in this guide, too.

Finally, we are proud to have put together a set of books that truly speak to a wide range of ages—from preschool to second grade. If you have the opportunity to work with multiple age groups, we hope you'll take advantage of this by spiraling back to the Wildlife on the Move books as your students grow. Not only will they be glad to revisit these familiar stories, but you'll be prepared to help them delve deeper into the ecological themes contained within the books.

Acknowledgments Maine Audubon and the Wildlife On The Move project have benefitted from many partners and collaborators. These guides include contributions from teachers at Portland Public Schools and Opportunity Alliance, and were funded by the Jane B. Cook 1992 Charitable Trust and Edward H. Daveis Benevolent Fund. We especially thank Melissa Kim at Islandport Press for her tireless support.

In each guide, you'll find these sections:

Background information This section will give you the context and background knowledge necessary to teach these books confidently! It's certainly not necessary to have all of the answers, but knowing where to look for more information is important. If this section doesn't answer all of your (or your students') questions, the resources listed at the end of the guide should point you in the right direction.

Discussion Questions Part of what makes these books work for a wide range of ages is their careful balance between scientific accuracy and conciseness. This gives educators the opportunity to highlight certain ideas and themes in the books by asking well-chosen open-ended questions before, during, and after a read aloud. This section contains examples and ideas for all three.

Lessons and Activities We've provided a range of lessons and activities in each guide organized around several themes and guiding questions. Though each works as a standalone, we think that they work best when bundled. This allows you to explore a topic in different ways, address multiple learning styles, and incorporate other subjects.

Standards Addressed For the purpose of these teaching guides, we've chosen to focus on the Next Generation Science Standards (NGSS). The reason for this is twofold; first, while many of the lessons and activities in this guide integrate multiple subject areas, we believe that it is their accurate and accessible science content that sets the Wildlife on the Move books apart.

Secondly, the NGSS align with Common Core State Standards for Math and English Language Arts. These Common Core connections are listed for each NGSS performance expectation and accessible on the NGSS website.

We have also taken the Maine Early Learning Developmental Standards into account for those educators working with preschoolers. You'll find a list of the science standards most relevant to this guide in the Appendix.

Objectives The importance of firsthand observation and hands-on, sensory experiences in nature cannot be overstated, especially for young children. Throughout this guide, you will notice that many of the lesson objectives reflect that by going beyond knowledge and skills to include experiences and actions.

Extensions Each lesson includes extension options and ideas for incorporating other subjects, specialties, and areas of your classroom. These are just a starting point—consider working with other teachers at your school or parents to fully integrate Wildlife on the Move themes into other areas.

Take Learning Outside Research has shown that students are happier, healthier, and more engaged when they are given opportunities to play, learn, and explore outside. Authentic experiences in nature support students' learning, but also their social, emotional, and physical growth and development.

Focusing on the seasonal themes of each Wildlife on the Move book can be a great springboard for taking your students outside, and many of these lessons include outdoor exploration and observation components. Consider allowing extra time outdoors for students to explore and play on their own, too. Unstructured time in nature often leads to unexpected teachable moments and gives your students a chance to relate to you—and each other—in new and positive ways.

Take Action The final part of this section describes ways that you and your students can take meaningful action to help wildlife. We know that time and resources vary from school to school and we have included projects that vary accordingly. Maine Audubon is committed to helping schools take action, so let us know if we can be of help.

Appendix In this section are the following resources:

- Maine Early Learning and Development Standards
- Book lists, including children's books, teacher resources, and classroom-friendly field guides
- Songs and fingerplays
- Reproducibles, including graphic organizers and graphics used in lessons

Access online resources at maineaudubon.org/WOTM.



Background Information

LIFE HISTORY

Metamorphosis Many insects go through distinct developmental stages as they grow in a process called metamorphosis. Metamorphosis can be either complete or incomplete, depending on the number of stages. Butterflies and moths go through complete metamorphosis, which includes four stages (egg, larva, pupa, and adult), while other insects such as grasshoppers and dragonflies go through three stages (egg, nymph, adult) of incomplete metamorphosis.

Monarch life cycle Monarchs lay their eggs on the underside of milkweed leaves. When a caterpillar (larva) hatches from the egg, it begins by eating the eggshell and then moves on to eating the leaf itself.

The caterpillar continues to eat milkweed, pausing only to shed its skin. It does so by attaching one end to a leaf, and then wriggling free. The last step is shedding its face mask. The time span between each skin shedding is known as an instar. A Monarch caterpillar will ultimately go through five instars over the course of about 10-14 days before moving onto the next developmental phase.

By this time, the caterpillar is approximately 2.5-4.5 cm long. It leaves the milkweed to find a sturdy branch or leaf, hangs in a J-shape, and creates a silk pad to anchor itself to. As it sheds its skin one last time, it hooks a body part called the cremaster to the silk pad. The larva has now become a pupa and creates a protective chrysalis around itself.

After another 10-14 days and when the Monarch is close to adulthood, the chrysalis will become clear and the pattern of the butterfly's wings will be visible. Butterflies usually emerge in the morning; the chrysalis splits down one side and the new butterfly climbs out and hangs on the empty shell. At this moment, the newly emerged butterfly's wings are wet and crumpled, leaving it extremely vulnerable. It is unable to fly until its wings have dried and hardened enough to support flight.

Adult Monarchs drink nectar from a variety of flowers. Most adults live 2-5 weeks and must mate and lay eggs during that time.

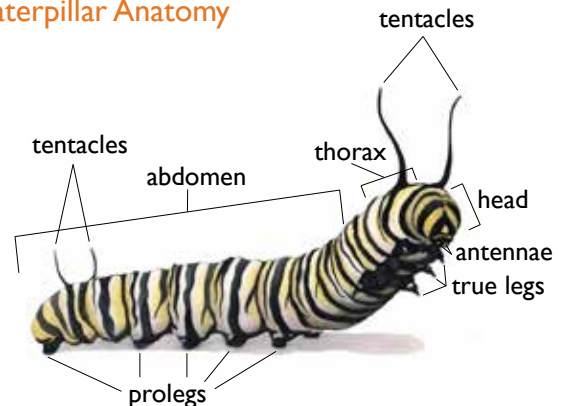
Migration The last generation of adult Monarchs to emerge in late summer/early fall is a unique one. Rather than mate right away, these butterflies fly south to overwintering grounds in Mexico. To complete this long journey, the Monarchs store fat in their abdomens and cluster together in trees to stay warm. Once in Mexico, they again hang from trees in clusters.

In the spring, the Monarchs that survived the winter become active again. They mate and lay eggs in the southern U.S., and the caterpillars that hatch become the next generation of Monarchs to continue the northward migration.

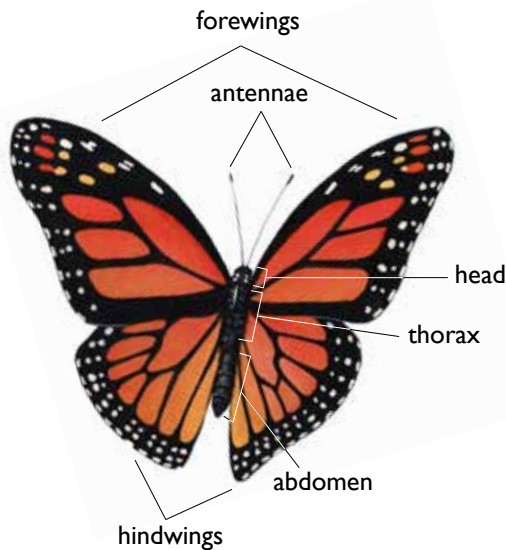
During both parts of the migration, timing and habitat availability are crucial. Monarchs flying south in the fall need to avoid freezing temperatures and rely on late-blooming flowers for the energy to continue flying. In the spring, Monarchs heading north need to find milkweed so they can lay their eggs before they reach the end of their lifespan.

Butterfly and Caterpillar Anatomy Monarchs are insects, which means that they have three body parts and six legs. Caterpillars appear to have more than six legs, but actually have three pairs of true legs on their thorax and five pairs of prolegs, or false legs, on their abdomen. Caterpillars have poor vision, and instead rely on two pairs of tentacles that serve as sense organs, as well as a pair of short antennae.

Caterpillar Anatomy



Butterfly Anatomy



Adult butterflies see with large compound eyes, smell with their antennae, and taste with their feet. They drink nectar by uncoiling their straw-like tongue, which is called a proboscis. Butterflies have two forewings and two hindwings, making four wings total. Males can be distinguished by the black spot on each of their hindwings, which is a scent pouch used to attract females.

Monarchs and Milkweed There are three species of Milkweed native to Maine: Common Milkweed, Swamp Milkweed, and Butterfly-weed. All serve as a larval host plant for Monarchs, meaning it is the only plant adults will lay eggs on because it is the only type of plant Monarch caterpillars eat.

Milkweed also plays a role in their defense against predation. As they consume milkweed, Monarchs accumulate chemical compounds found in milkweed that are poisonous to vertebrates. Although not all vertebrates are affected, many would-be predators learn to associate a Monarch's bright warning coloration with a bad taste or a memory of getting sick.

WHAT IS A POLLINATOR?

Pollination is the movement of pollen grains from the anther to the stigma of a flower, thus allowing the plant to produce seeds. Although some flowers are self-pollinating, many rely on other factors such as insects or the wind to move pollen between flowers of the same species. Animals and insects that

help (often inadvertently) with the pollination process are known as pollinators and include bees, moths, butterflies, bats, and hummingbirds. These creatures visit a flower to forage for nectar or pollen and may get pollen grains attached to their bodies in the process. As they continue to forage, they move that pollen from flower to flower.

Many pollinators and plants have co-evolved, resulting in flowers that attract effective pollinators or flower shapes that make it difficult to reach the nectar without first brushing against the flower's anthers.

In addition to the vital ecosystem services they perform in wild areas, pollinators are also essential to the reproduction of more than two-thirds of the world's food crops.

MONARCH CONSERVATION STATUS

Monarchs are particularly vulnerable to habitat destruction for several reasons. As with all migratory species, they rely on habitat availability over a wide geographic range. Monarchs are dependent on milkweed throughout this range, but many people consider the plant a nuisance. Furthermore, the overwintering grounds used by Monarchs are limited and specialized—most of the Monarch population east of the Rocky Mountains funnels into the same small area in Mexico. Development in these areas reduces not only the amount of space available for overwintering butterflies, but can also degrade the remaining habitat.

The U.S. Fish and Wildlife Service is currently conducting an assessment and review to determine if Monarchs should be listed under the Endangered Species Act. A decision is expected in June 2019.

GLOSSARY

Metamorphosis: the transformation from an immature to adult form that happens in distinct phases

Larva: the active immature form of an insect (for butterflies, a caterpillar)

Pupa: the inactive immature form of an insect (for butterflies, a chrysalis)

Instar: the phase between molts

Migration: the seasonal movement of animals from one region to another



Discussion Questions

Before Reading

Show the cover and/or the title pages and ask:

- What do you think this story will be about?
- What do you know about Monarchs?

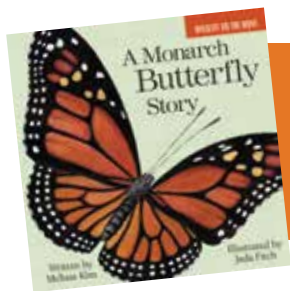
During

- What kinds of seeds did Leo's grandfather send him?
- If the children want to help Monarchs, what should they include in their butterfly garden?

After Reading

- What kinds of plants did the Monarch look for in the garden?
- When did the butterfly get to Maine? Did it stay in Maine?
- Give the students a chance to look more closely at the map on the last page. Where did Leo's grandparents live? Where does Leo live?
- Why are there three arrows pointing north, and one pointing south?





Lessons & Activities

Unit I: Monarch Life Cycle

GUIDING QUESTIONS

**How do Monarchs grow?
What do they need to survive?**

NGSS Performance Expectations

K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.

K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

1-LS2-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.

1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.

Butterfly Life Cycle

Objectives: Students will observe, describe, and sequence the life cycle of a Monarch from egg to butterfly. Students will revise and refine their descriptions based on observation and research.

Materials: butterfly life cycle cards (see appendix), large sheets of paper, glue sticks

Procedure:

1. Revisit the pages in *A Monarch Butterfly Story* that depict the butterfly life cycle. Print the butterfly life cycle cards and have students work in small groups to put the cards in the correct order, glue them on a large piece of paper, and label each stage.

2. Give the students opportunities to observe the butterfly life cycle firsthand. Ideally, you can do this by raising caterpillars in the classroom (see the note on raising caterpillars in the Take Action section for more details) or by researching and watching time-lapse videos online (see online resources). Encourage the students to notice details not included in the original life cycle cards.
3. Give the students opportunities to revisit and revise their original models based on the observations made in step 2. Additional details may include the caterpillar eating the egg after hatching, the number of times it sheds its skin, how the appearance of the chrysalis changes over time, and/or approximately how long each stage takes.

Extension: Act out the life cycle by guiding students through a series of movements/stretches/yoga poses that symbolize each stage of the life cycle (egg, caterpillar, chrysalis, butterfly). Alternatively, you could ask small groups of students to create and perform skits for the rest of the class.

Life Cycle Comparison

Objectives: Students will research and compare the Monarch life cycle to that of other familiar animals. Students will research and compare the needs of animals and their offspring.

Materials: adult/juvenile animal cards (see appendix), Venn diagram printables (see appendix), field guides or other resources for research

Procedure:

1. As a large group, work together to create a Venn diagram comparing Monarch caterpillars and butterflies. What do they look like? What are their bodies like? How do they move? What do they eat?
2. Split students into pairs or small groups, and assign each grouping an animal from the adult/juvenile card set. Have them complete their own Venn diagrams, beginning with details they notice from looking at the cards, and moving onto more in-depth research into behavior, food needs, size, etc.

3. As a large group, explore the observations the students made in their small groups by sorting the animal cards into different categories. Some possible categories include animals that change color as they grow vs. stay the same, animals whose diet changes vs. stays the same, etc.
4. Introduce term metamorphosis. Animals that go through metamorphosis change form as they become adults, and go through distinct stages as they develop. Categorize the cards one last time according to whether they go through metamorphosis or not.

Extension: Ask students to bring in baby pictures of themselves and create posters that show the pictures and list some ways they've changed as they have grown, and some things that have stayed the same. Display the posters and give the students a chance to view them. Can they guess who is who?

Butterfly/Host Plant Match-up

Objectives: Students will practice matching common butterfly and moth species with their larval host plants. Students will understand that some species (such as Monarchs) specialize in one host plant, while others are generalists.

Materials: butterfly/host plant cards (see appendix). For younger students, mount the cards on colored paper for easier matching. You may need to print multiple copies, enough to give each student a butterfly card, and to have multiple copies of the host cards.

Procedure:

1. Begin by reviewing the relationship between Monarch butterflies and milkweed. Why do Monarchs need milkweed? Emphasize that while adult Monarchs can drink nectar from a variety of flowers, their caterpillars only eat milkweed and therefore it is the only plant on which Monarchs will lay their eggs. Milkweed is the larval host plant for Monarch Butterflies.
2. Give each student a butterfly card and give them a minute to familiarize themselves with it. Then, introduce the different host plant cards one at a time. Have students raise their hand for each one that their butterfly uses (for younger student, point out that the colors of the cards match and have them raise hands accordingly).
3. Explain that you are a gardener who will plant some or all of these plants in a designated garden bed. When you are done planting, invite the butterflies to fly around the garden and find a suitable host plant—one butterfly per plant. When they do, they should pick up their card and stay in that spot (as still as a butterfly egg!) until all butterflies are done searching and laying eggs.
4. If all butterflies were successful in finding a place to lay their eggs, they can return the plant cards to the gardener and prepare for another round. If not, butterflies that were unsuccessful can either become assistant gardeners or you can give them an alternate butterfly card for one of species that did successfully reproduce.
5. Repeat steps 3 and 4 several times, trying out a few different scenarios. For example, in one round the gardener may decide that a certain plant is a weed and remove it from the garden. In another, an invasive plant may take over the whole garden, or the gardener may decide to plant only nonnative plants.
6. End with a discussion of the butterflies' experiences. Which butterflies had a hard time finding the right plants? Did some have an easier time? What was realistic about the game? Unrealistic? Why is it important to have lots of different plants growing in gardens and wild areas?

Extension: This activity pairs well with *Waiting for Wings* by Lois Elhert. After reading the story, show students the “Butterfly Identification” pages at the end of the book, which depict butterflies, their caterpillars, and a leaf from their larval host plants. Use this page as inspiration for students as they create Lois Elhert-style collages of the butterflies and host plants they were in the game.



Lessons & Activities

Unit II: Monarch Habitat

GUIDING QUESTIONS

**What do Monarchs need to survive?
Why do Monarchs migrate?
Where do they go?**

NGSS Performance Expectations

K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.

K-ESS2-1. Use and share observations of local weather conditions to describe patterns over time.

K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.

1-ESS1-2. Make observations at different times of year to relate the amount of daylight to the time of year.

2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.

Habitat Evaluation

Objectives: Students will list and describe the components important to Monarch habitat. Students will use their list to evaluate a local outdoor area.

Materials: chart paper, clipboards, paper, and writing utensils

Procedure:

1. As a class or in small groups, create a list of the important components of Monarch habitat. Make sure they consider a Monarch's needs during each stage of the life cycle (milkweed for caterpillars to eat, nectar for butterflies, etc.). You may wish to do this as a culminating activity, so that students can refer back to their observations and research from previous activities and lessons.
2. Visit one or several outdoor spaces and have students explore and observe while referring to the list created in step 1.

3. Come back together as a large group to share observations. What was present in this habitat? What was missing? Is it a good place for Monarchs? What other animals might live here?

Extension: Take steps to make the area you visited a better habitat for Monarchs by planting native plants, removing invasives, posting signage, etc. See the Take Action section for more details



Migration Hopscotch

Objectives: Students will experience the need for habitat connectivity and make connections between this experience and that of animals that migrate or occupy large ranges.

Materials: Carpet squares, sidewalk chalk, or some way of marking/creating pathways for students to walk/jump on.

Procedure:

1. Begin by reviewing the components a habitat must include to meet an animal's basic needs (food, water, shelter). What happens if an animal accidentally travels to an unsuitable habitat?
2. Use carpet squares or sidewalk chalk to create a long path or hopscotch setup. Explain to the students that they are Monarchs traveling between Maine and Mexico, and that the path represents suitable Monarch habitat. To make the journey successfully, they must stay on the path.
3. After one or several successful journeys, begin to take away or cross out sections of the path. You can explain that the milkweed in that area was converted to crops, the area was paved, pesticides were used, etc. Let students attempt to make it through by jumping over the disconnects as you continue to make the path more difficult.
4. When the route becomes impassable, pause the game to debrief. What happened when a gap became too large to jump? How did that affect the Monarch populations on either side? You may need to point out that Monarchs that get stuck in suitable habitat in Maine/Mexico will only find the habitat suitable until the weather gets colder/hotter—which is why they migrate in the first place!
5. Finish by brainstorming some ways to restore the habitat that was lost. Maybe a town can plant milkweed in its parks, or a school can create a butterfly garden. Return the squares and allow the butterflies to make one last successful trip.

Extension: Once the students realize how important it is to restore/steward Monarch habitat at all points along their migration route, they may wish to spread the word! Create letters and/or posters to send to friends or family — this is what Leo's grandfather does in *A Monarch Butterfly Story*.

Migration Mapping

Objectives: Students will compare Monarch butterfly migration to their own experiences traveling long distances

Materials: *A Monarch Butterfly Story*, maps or atlases

Procedure:

1. Revisit the end pages of *A Monarch Butterfly Story* that show the Monarch migration route and review how Monarch migration works (they migrate north in the spring but it takes 2-3 generations to reach the northeast; the last adult Monarchs in the fall make the full trip down to Mexico).
2. Lead the students in a discussion around traveling long distances, using this map as a starting point. Who has been on a long trip? How did they get there?
3. Research other animals that migrate. How far do they travel? Look at maps that show their migration routes or destinations.

Extension: Work with students to explore some of the ways scientists track and study migratory animals. The *Journey North* website is a good place to start, and includes a real-time map showing reported Monarch sightings. See the online resources section for more details.



Lessons & Activities

Unit III: People and Monarchs

GUIDING QUESTIONS

**How do Monarchs help people?
How can people help Monarchs?**

NGSS Performance Expectations

K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.

K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to fit their needs.

K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.

2-LS2-2. Develop a simple model that mimics the function of an animal dispersing seeds or pollinating plants.

2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.

Pollination Observation

Objectives: Students will examine and describe the different parts of a flower, observe pollinators at work, and act out the pollination process.

Materials: cut flowers with easily observable parts (tulips, irises, or any large simple flower works well; please note that lilies can be used, but are poisonous if ingested), hand lenses, tweezers, flower diagrams, pom poms or other colorful tokens

Procedure:

1. Introduce the idea of pollination with a book such as *The Reason for a Flower* by Ruth Heller or *From Seed to Plant* by Gail Gibbons. Just as plants need water, soil, and sun to grow, they also need pollination to occur in order to produce seeds (and the fruit/pods that contain those seeds).
2. Give the students a chance to closely observe cut flowers in pairs or in small groups. If possible, ask them to match what they see with the flower diagram. After they have had a chance to observe the intact flowers, they may use tweezers to carefully dissect their flowers. Encourage students to try to shake pollen off an anther and to feel the sticky top of the stigma. They may also wish to count the number of petals, sepals, anthers, etc.
3. If possible, take students to a garden or meadow to observe pollinators in action. What types of animals are visiting the flowers? How do they behave? Is there pollen visible? While firsthand observation is best, you may also supplement with photos or videos of pollinators if necessary. Begin with the links included in the online resources section.
4. Finish with a pollination game! Set out bowls of pom poms sorted by color around a playing field or open area—the bowls are flowers and the pom poms are their pollen. Students can decide what type of pollinator they would like to be (butterfly, bee, etc.) and can move between the flowers like that pollinator. When they visit each flower, they can pretend to drink some nectar, and should also always take one grain of pollen and leave another in its place. Let the pollinators play for a few minutes, then bring them together and collect the bowls of pom poms. Are they still sorted by color? What happened? Will these flowers be able to produce seeds now?

Extension: In the garden or meadow you visited in Step 3, give the students a chance to try pollinating flowers with paintbrushes that can mimic the fuzzy body parts of many pollinators. Review where on the flower they can find pollen (anthers) and where it needs to go (stigma of that flower or another of the same species). Remind students to only pollinate empty flowers—if it's a sunny day, many may already be occupied!



Pollinator Match-up

Objectives: Students will be able to describe flower characteristics favored by certain pollinators and will match those pollinators to native Maine flower species that have those characteristics.

Materials: pollinator/flower cards (see appendix), paper, crayons or markers

Procedure:

1. Ask students what they would need to host a party. After they've shared a few ideas, explain that since plants need pollinators to visit them, they grow flowers that use many of the same strategies:
 - a. Food/treats = nectar (and sometimes extra pollen)
 - b. Decorations = color and nectar guides
 - c. Invitations = smell
2. Just as we would plan a party with our friends' preferences in mind, many plants are most attractive to certain types of pollinators. Introduce each pollinator, along with its preferences:
 - a. **Bees** like blue, purple, and yellow flowers with abundant pollen
 - b. **Butterflies** like orange, red, and purple flowers that provide a space to land
 - c. **Moths** and bats like sweet-smelling flowers that are light-colored and bloom at night
 - d. **Flies** like flowers that look and smell like rotting meat
 - e. **Hummingbirds** like the colors red and orange and can hover while drinking nectar from long, tubular flowers
3. In pairs or small groups, give students sets of the pollinator/flower cards. Once they have successfully matched each pollinator to the correct flower, they can draw a flower of their own design. What kind of pollinator will it attract?



Extension: Introduce students to other native flower species, or have them flip through a regional wildflower field guide. Which pollinators would be found on those flowers? Visit a local garden or meadow to see if their predictions are correct.



Take Action

Grow native plants, including milkweed and flowers. You can start seeds indoors and then transplant them to an outdoor space or have students take them home to grow. Consider partnering with other local organizations that might like to incorporate native plantings and give them some of the seeds you've started. See the online resources section for more details and where to purchase seeds.

Work with your school to create Monarch habitat! This could look like a cultivated pollinator garden or a restored meadow area. Students can help design and monitor the habitat, work on gardening tasks, and create informational signage.

Make seed bombs to plant in the spring or to distribute to others. Seed bombs are round balls created by mixing powdered clay, soil, and water and shaping the mixture around one or several seeds. When dry, they can be thrown into areas where it is hard to plant seeds otherwise—always a fun activity! See the online resources section for more detailed instructions.

Create informational posters or flyers for your school or local display cases about the importance of connected habitat for pollinators, or the importance of milkweed for Monarchs.



CATERPILLARS ⁱⁿ the CLASSROOM

Reading about the butterfly life cycle is one thing, but seeing it happen is another! Raising caterpillars in the classroom gives students the opportunity to observe this amazing phenomenon first hand.

To do so in an ecologically responsible way, consider the following:

Choose caterpillars carefully. Not all butterfly kits contain species that are found in your area. Monarch Watch (monarchwatch.org) sells affordable Monarch Rearing Kits.

Keep them fed. You'll need a readily available source of fresh milkweed to keep your caterpillars thriving. A long stalk of milkweed in a jar of water will last several days. Use plastic wrap around the top of the jar to keep caterpillars from falling in the water.

Release butterflies promptly. After adult butterflies have emerged, their wings will take several hours to dry. Since butterflies typically emerge in the morning, you should be able to safely release them in the afternoon in a warm, sunny place where flowers are readily available. If your butterfly emerges in the afternoon, wait until the next day to release it.



Take Learning Outside

To extend your study of butterflies and their habitat to the outdoors, try some of these ideas:

Spring

- Begin gardening projects by planting seeds, making and dispersing seed bombs, or designing a garden space.
- Observe a natural area as it transitions from winter to spring. What is changing? Consider marking a plant or branch with ribbon so that you can check on it from week to week or day to day.
- Keep an eye out for the first springtime blooms—a sign that creatures that eat nectar are soon to follow!

Summer

- Observe pollinators in action by visiting gardens and meadows.
- Look for butterflies and caterpillars. Can you identify any of them? (Note: some caterpillars, such as Browntail Moth, can cause dermatitis. Avoid handling fuzzy caterpillars and areas that are heavily infested with those that cause rashes.) Report adult Monarch sightings to Journey North to contribute to their real-time maps.

Fall

- Plants that have been pollinated are going to seed! Look for seeds that disperse in different ways (floating on the wind, clinging to animal fur, being digested, etc.).
- Late-blooming flowers are important food sources for Monarchs preparing for a long flight to Mexico. What flowers can you find that are still in bloom?

Winter

- What animals can you observe that are still active in the winter? How are other animals surviving?
- Winter is an excellent time to plant many native seeds, which require a period of colder temperatures in order to germinate.

The BENEFITS

The benefits of taking your students outside are multi-fold. Getting students moving and exploring in different settings offers physical benefits and gives them a chance to recharge. Connecting what you do outside with what happens in the classroom provides opportunities for students to excel and engage in different ways. Perhaps most importantly, it also provides a framework of shared experiences from which you can all work. Young children learn best from firsthand experience, but may not have ever looked under a fallen log or followed a bee from flower to flower.

These benefits are magnified if you make outdoor learning a regular habit. Going outside and, if possible, visiting the same location throughout the year will highlight seasonal changes and spark lines of questioning that link to bigger ecological concepts. For example, hibernation and migration make much more sense if you've noticed insects and flowering plants getting scarcer and felt temperatures getting colder throughout the fall. Furthermore, as you and your students become more comfortable with the routines and expectations associated with outdoor learning, it will get easier and you'll be better able to take advantage of teachable moments as they arise.

The ideas here are only a starting point. At Maine Audubon, we want all educators to feel confident and supported in creating these types of experiences for their students. We provide this support through classroom visits that can serve to introduce content, field trips and field studies at our sanctuaries or local parks, curricular coaching, teacher workshops, and rentable materials through our Educator Resource Center. Visit maineaudubon.org for more information.



Appendix

Maine Early Learning and Development Standards

Earth Science:

- Demonstrates, through observation and investigation, an understanding that human action impacts the earth (i.e., use of resources and recycling, the process from cutting trees to recycling paper)

Life Science:

- Uses senses to observe and describe properties of familiar plants and animals
- Uses vocabulary for naming plants and animals moving beyond generic labels (e.g. “bug”) to names of specific creatures (e.g. “ant,” “beetle”) and uses symbols/icons to identify where they see such creatures
- Develops plans, based on observations and guided inquiry, to care for plants and animals in the classroom and surrounding area
- Observes and describes animals in his/her immediate environment to learn what they need to live
- Uses nature journals, tally sheets and resource materials, with support, to summarize observations (e.g., make connections between the types and numbers of birds coming to a feeder in summer or winter by counting and categorizing)
- Listens to accounts and discusses pictures found in fictional or non-fictional books or media to enhance vocabulary and concept knowledge of living things and their environments
- Identifies problems affecting the lives of plants and animals (including themselves) and generates possible solutions
- With teacher support, creates drawings or models for possible solutions
- Compares tools or solutions and reflects on what works well
- Designs and creates materials to change the behavior or incidence of creatures (e.g. bird feeders, butterfly gardens) in places

Book Lists: Children’s Books

Butterflies and the Butterfly Life Cycle

- *Waiting for Wings* by Lois Ehlert: covers the butterfly life cycle and includes several species of butterfly with their host plants with Ehlert’s classic collage illustrations and rhythmic text
- *Bob and Otto* by Robert O. Bruel: a sweet tale of friendship between a caterpillar and a worm, despite changes that come between them
- *Ten Little Caterpillars* by Bill Martin Jr.: engaging and somewhat silly rhyming text complemented by illustrations from Lois Ehlert that feature and identify common caterpillar and plant species
- *Are You a Butterfly?* by Judy Allen and Tudor Humphries: part of an excellent series that engages the reader in imagining life as butterfly (and other small invertebrates)
- *A Butterfly is Patient* by Diana Hutts Aston: the main text is simple but accompanied by more detailed subtext and gloriously detailed illustrations of butterflies from around the world

Monarchs

- *Monarch and Milkweed* by Helen Frost: a detailed, poetic ode to the relationship between these two species
- *Monarch Butterfly* by Gail Gibbons: a detailed and clearly illustrated look at Monarch life history
- *When Butterflies Cross the Sky: The Monarch Butterfly Migration* by Sharon Katz Cooper: follow a Monarch on its journey to Mexico
- *Hurry and the Monarch* by Antoine O Flatharta: a Monarch crosses paths with a tortoise in Texas and their interactions shed light on the differences in the animals’ lives and perspectives

Migration

- *The Journey: Stories of Migration* by Cynthia Rylant: six tales of animals that migrate: locusts, whales, eels, butterflies, caribou, and terns
- *Home at Last: A Song of Migration* by April Pulley Sayre: short, poetic descriptions of a variety of animal migrations

Plants and Pollination

- *The Reason for a Flower* by Ruth Heller: a playful look at a flower's role in seed production, though it may be over younger kids' heads
- *From Seed to Plant* by Gail Gibbons: a detailed and clearly illustrated description of the plant life cycle

Book Lists: Field Guides

Butterflies and Caterpillars

- *Take-Along Guide: Caterpillars, Bugs, and Butterflies* by Mel Boring: illustrated accounts of common insects that each include three sections: "What it looks like," "What it eats," and "Where to find it"

Wildflowers

- *National Audubon Society First Field Guide: Wildflowers*: profiles of 50 common wildflowers that include large photos and also similar species and "lookalikes"
- *Peterson First Guides: Wildflowers*: each two-page spread describes several species and includes color illustrations of each. Organized by color and sections are color coded so you can flip to the correct one

Adult Resources

- *Balanced and Barefoot: How Unrestricted Outdoor Play Makes for Strong, Confident, and Capable Children* by Angela Hanscom: written by a pediatric occupational therapist (and founder of TimberNook), an easily accessible description of the developmental benefits of outdoor play. A good one to recommend to parents.
- *Nature Preschools and Forest Kindergartens: The Handbook for Outdoor Learning* by David Sobel: engaging accounts from existing programs along with guidance on everything from curriculum development to risk assessment
- *Hug a Tree and Other Things to Do Outdoors with Young Children* by Robert Rockwell, Elizabeth Sherwood, and Robert Williams: a classic compilation of outdoor activities for young children
- *Project Seasons: Hands-on Activities for Discovering the Wonders of the Natural World* by Deborah Parrella: a compendium of seasonal activities
- *Bringing Nature Home* by Doug Tallamy: the book that inspired Maine Audubon's expanded work to restore biodiversity by planting native plants

Songs and Fingerplays

My Friendly Little Caterpillar (fingerplay)

My friendly little caterpillar (inch finger up arm)
Made a chrysalis one day (put two fists together)
It turned into a butterfly (open hands and link thumbs)
And then it flew away (flap hands and move them away from body)

Butterfly Life Cycle (to the tune of "Frere Jacques")

I'm an egg, I'm an egg
On a leaf, on a leaf
Soon I'll be a caterpillar, soon I'll be a caterpillar
Watch me eat! Watch me eat!

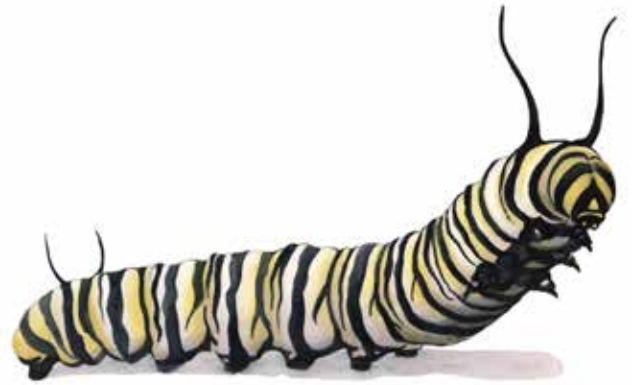
I'm a caterpillar, I'm a caterpillar
With growing to do, with growing to do
Eating lots of milkweed, eating lots of milkweed
Chew, chew, chew! Chew, chew, chew!

I'm a chrysalis, I'm a chrysalis
Warm and dry, warm and dry
Changing on the inside, changing on the inside
Into a butterfly, into a butterfly

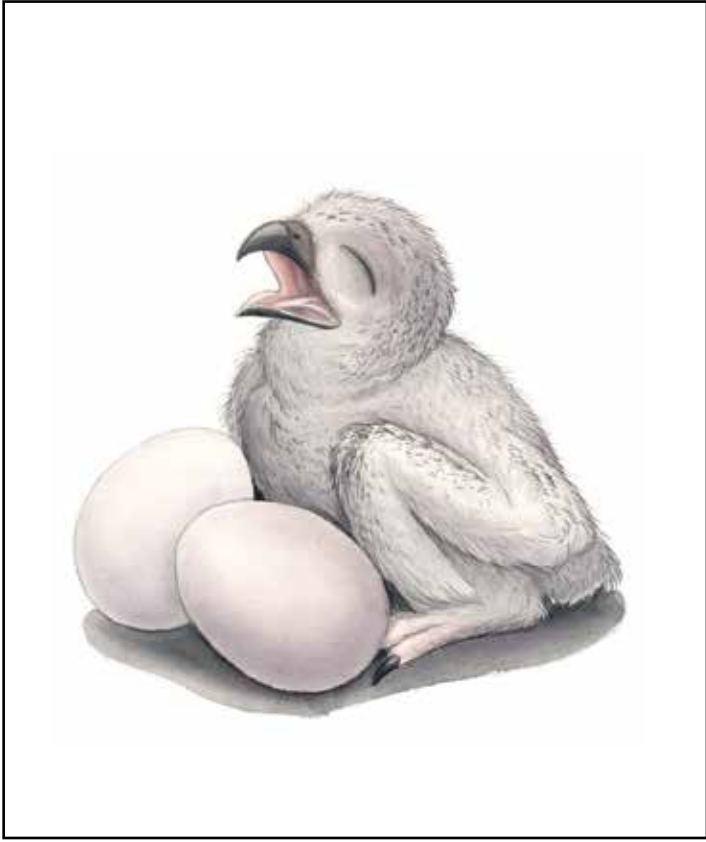
I'm a butterfly, I'm a butterfly
Flying all around, flying all around,
Searching for a flower, searching for a flower
Looking up and down, looking up and down

Find a flower, find a flower
Open to the sky, open to the sky
It has lots of nectar, it has lots of nectar
For all the butterflies, for all the butterflies

BUTTERFLY LIFE CYCLE CARDS



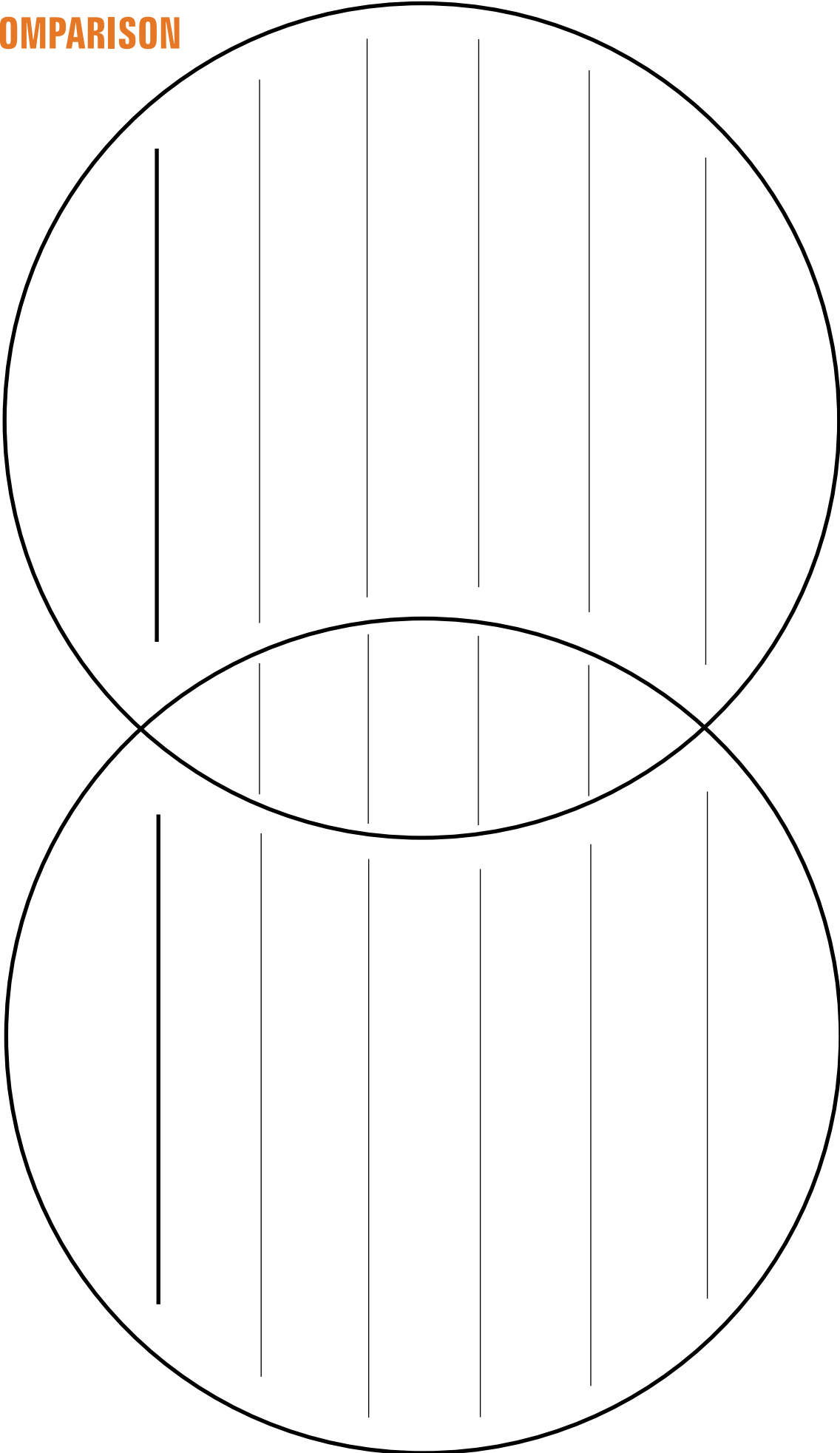
ADULT/JUVENILE CARDS



ADULT/JUVENILE CARDS



LIFE CYCLE COMPARISON



BUTTERFLY/HOST PLANT CARDS



BUTTERFLY/HOST PLANT CARDS



Answer Key

- Canadian Tiger Swallowtail: Paper Birch
Quaking Aspen
- Isabella Tiger Moth: Paper Birch
New England Aster
American Elm
- Great Spangled Fritillary: Birdfoot Violet
- Monarch: Butterfly Milkweed
- Mourning Cloak: Paper Birch
Quaking Aspen
American Elm

POLLINATOR/FLOWER CARDS



POLLINATOR/FLOWER CARDS



Honeybee



Fly

Photo: Allen Watkins, Flickr



Monarch



Evening Primrose Moth

Photo: Identiflythaplant.com



Ruby-throated Hummingbird

Answer Key

Honeybee: Birdfoot Violet

Monarch: New England Aster

Ruby-throated Hummingbird: Jewelweed

Fly: Jack-in-the-pulpit

Evening Primrose Moth: Evening Primrose

