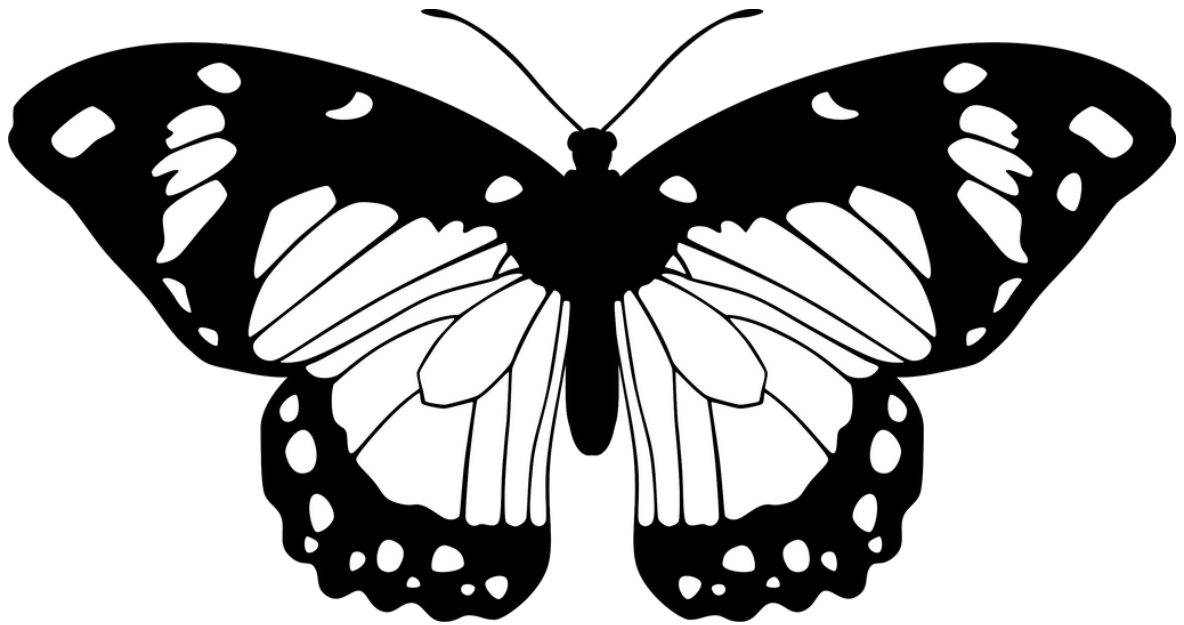




Insects & Pollination

Insects & Pollination



NATIONAL
WILDLIFE
REFUGE SYSTEM



Insects & Pollination Field Trip

Summary of Lessons & Activities

Kindergarten-Second Grade: Incredible Insects

While all insects are bugs, not all bugs are insects. Learn about the physical characteristics that make up an insect and discover some of the incredible role's insects play in keeping the environment healthy.

Third-Fifth Grade: Powerful Pollinators

Insects represent 70% of all animal species found on the planet. In fact, without them, humans and other animals would not be able to survive. Discover some of the species of insects that live at the Refuge and learn about the importance of pollination and how humans can support these essential creatures.

Table of Contents

Tab 1: Incredible Insects Field Trip

- State SEEd Standards
- Field Trip Supporting Activities & Questions

Tab 2: Powerful Pollinators Field Trip

- State SEEd Standards
- Field Trip Supporting Activities & Questions

Tab 3: Background Information

- Insect Features
- Insect Life Cycle
- Common Insect Orders
- Pollination
- Pollinators

Season:

Spring, Summer,
& Autumn

Objectives:

Students will be able to...

- Identify the differences between insects and other common bugs.
- Explore important insect habitat up-close and catch real insects to make observations.
- Discover what pollination is and why pollinators are important.
- Determine the differences between insect species through the discovery of insect orders.

Key Concepts:

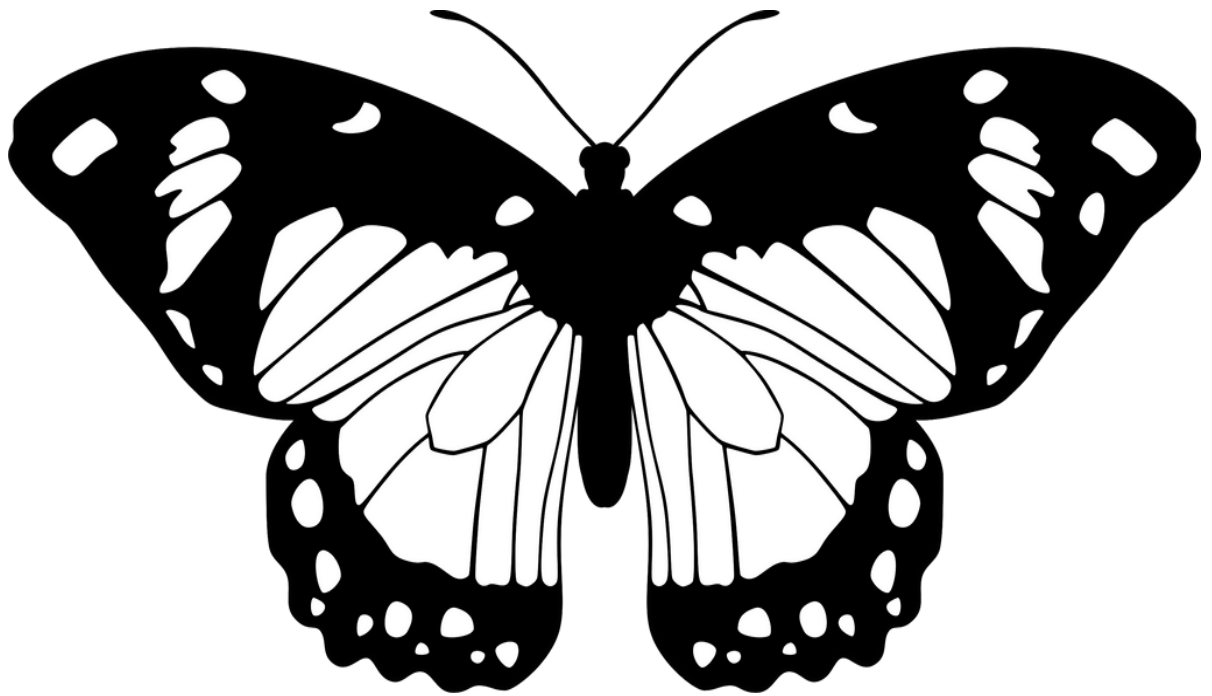
- Insects
- Adaptations
- Metamorphosis
- Pollinators & Pollination
- Insect Orders



Insects & Pollination/Incredible Insects

Incredible Insects

(Kindergarten–Second Grade)





State (SEEd) Standards

Kindergarten

Standard K.2, Living Things And Their Surroundings

Standard K.2.2, Obtain, evaluate, and communicate information about patterns in the relationships between the needs of different living things and the places they live.

Standard K.2.3, Obtain, evaluate, and communicate information about how living things affect their surroundings to survive.

First Grade

Standard 1.2, The Needs Of Living Things And Their Offspring

Standard 1.2.3, Obtain, evaluate, and communicate information about the patterns of plants and nonhuman animals that are alike, but not exactly like, their parents.

Standard 1.2.4, Construct an explanation of the patterns in the behaviors of parents and offspring which help offspring to survive.

Second Grade

Standard 2.2, Living Things And Their Habitats

Standard 2.2.1, Obtain, evaluate, and communicate information about patterns of living things in different habitats.

Standard 2.2.3, Develop and use a model that mimics the function of an animal dispersing seeds or pollinating plants

Standard 2.2.4, Design a solution to a human problem by mimicking the structure and function of plants and/or animals and how they use their external parts to help them survive, grow, and meet their needs.



Incredible Insects

(Kindergarten–2nd Grade)

Time:
2 hours

Season:
Spring, Summer,
& Autumn

Objectives:
Students will be
able to...

- Identify the differences between insects and other common bugs.
- Explore important insect habitat up-close and catch real insects to make observations.
- Discover what pollination is and why pollinators are important.

Key Concepts:

- Insects
- Adaptations
- Metamorphosis
- Pollinators & Pollination

Summary of Lesson

While all insects are bugs, not all bugs are insects. Learn about the physical characteristics that make up an insect and discover some of the incredible role's insects play in keeping the environment healthy.

Theme

Insects are unique animals that serve important purposes.

Outline of Lesson Activities

1. Introduction (10 minutes)

- Introduce Bear River Migratory Bird Refuge and any important safety or logistical information.
- Ask students to describe what they know about insects.
- Give a brief breakdown of the day's schedule.

2. What Is An Insect Drawing (10 minutes)

- Observe insect artifacts.
- Draw an insect as a whole group and determine the physical characteristics that all insects have.

3. Sweep Netting (30 minutes)

- Search for real insects and observe some of their important features.
- Discover some of the different types of insects living at the Refuge.

4. Nature Explore Classroom (20 minutes)

- Search for pollinators and plants.
- Learn about the many different types of animals that pollinate plants.

5. Pollinator Hike (40 minutes)

- Visit different areas of the hiking trails to search for pollinators.
- Search and listen for signs of other wildlife.

6. Reflection (10 minutes)

- Review the theme and discuss reflection questions.



Introduction

(Kindergarten–2nd Grade)

Welcome students to Bear River Migratory Bird Refuge and introduce yourself. Discuss the importance of the Refuge and why it was created. Ask if any of the students have visited the Refuge before.

Explain to the students that you will be their teacher for the day and that the Refuge is their classroom, so it is important to respect the Refuge just as they would with their classroom at school. Discuss any important safety/logistical items and concerns before talking about the theme of the day.

Theme

Insects are unique animals that serve important purposes.

Introduction Questions & Activities

- Ask students to describe what they know about insects.
- Ask students if all bugs are insects.
- List examples of bugs that are insects and bugs that are not insects.
- Give a brief overview of the schedule for the day and some of the activities they will get to try out.

Assess Student Knowledge

Knowledge levels of a topic between different classes can greatly vary. Assess the knowledge level of your group at the beginning of the day in order to determine how deeply to discuss topics and what to teach the class.



What Is An Insect Drawing

(Kindergarten-2nd Grade)

This activity is a large group introduction to the theme of the field trip and many of the key adaptations that make-up insects.

All students are brought to a large gathering area (either outside or inside depending on the weather). One large whiteboard or other portable drawing easel will need to be set up previously in the gathering area. This can also be substituted with chalk if there is enough space outside. Insect artifacts, such as Riker Boxes with insect mounts, should also be spread out throughout the gathering area.

After introducing the Refuge and discussing what students know about insects during the Introduction activity, have students spend a few minutes observing the insect mounts found in the Riker Boxes. Ask students to observe some of the similarities between the different insects in their box.

After allowing time for students to make observations, start discussing with students some of the actual features or adaptations all insects have that make them different than other bugs.

Insect Features

1. Three Body Segments (Head, Thorax, and Abdomen)
2. Exoskeleton
3. Antennae
4. Compound Eyes
5. Mouth Parts
6. Wings (Most have this, but not all)

As students list off what they noticed about the mounted insects, have student volunteers come forward to start drawing a “class insect” based off of what they noticed. This insect may not look like a real insect species, but the most important part is allowing the students to be creative as long as their insect has the key features.

After finishing the insect drawing, ask students to think about some of the insects they may see while exploring the Refuge today.



Sweep Netting

(Kindergarten–2nd Grade)

Walk with students to an open area where grasses and plants are easily accessible. Bring sweep netting materials including...

1. Sweep Nets (For Each Student)
2. White Canvas Sheet
3. Small Plastic Collection Jars

Before distributing supplies to each student, review safety instructions and give a general overview of the activity.

Safety Instructions

- Always walk in areas where the ground is uneven.
- When sweep netting, students must be careful and always watch for others when raising their sweep nets above their heads.
- Students should not raise their sweep net above their head unless they can actively see an insect flying above them.

Overview of Activity

Students will discover many of the different types of insects found within the wetland ecosystem of the Refuge. After discussing the safety instructions, describe how to properly use a sweep net by brushing it back and forth through the grasses and plants in a figure-eight motion. This is the easiest method to collect insects.

After sweeping their net back and forth a few times, students can come back to the large white canvas sheet and dump out their findings onto the sheet. The white sheet will easily contrast with the insects they found. If students want to take a closer look at what they found, they can temporarily put their insects into a small plastic collection jar to take a closer look.

After allowing students a good amount of time to sweep net, have students release all insects back into their natural habitat. Ask students about what they observed during that activity. Did all of the insects look the same?

Discuss the life cycle of an insect and the process of metamorphosis. Show students what this looks like for a butterfly using the “Monarch Life Cycle Zipper Puppet.” After discussion, gather all materials before leaving the sweep netting site.



Nature Explore Classroom

(Kindergarten–2nd Grade)

Walk with students to the Nature Explore Classroom and gather in an area with flowers or plants that pollinators can be seen or are often found. Discuss what pollination is and talk about why it is so important.

Fun Fact: According to the U.S. Forest Service, of the 1,400 food-related crop plants grown around the world, 80% of those plants require pollination by animals. Without pollination humans and many of Earth's living beings would not survive.

Ask students if they can name different types of insects that help to pollinate plants.

Insect Pollinators

1. Bees and Wasps
2. Butterflies and Moths
3. Flies
4. Beetles

Ask students if they can think of other animals besides insects that are important pollinators. Show them pictures of what some of these other animals look like.

Non-Insect Pollinators

1. Hummingbirds
2. Bats
3. Sugar Gliders
4. Honey Possums
5. Lemurs
6. Lizards (very few)

Bring students to a patch of milkweed. Discuss what insect species (monarch butterflies) relies on the plant and why it is so important to protect milkweed. Discuss the important role butterflies play in pollination.

With extra time, allow students to explore the Nature Explore Classroom and search the plants for pollinators or to test out the fun activities in the outdoor classroom area.



Pollinator Hike

(Kindergarten-2nd Grade)

Key Concepts:
Insects,
Pollination, &
Pollinators

You have 40 minutes to choose your own adventure on this hike. Depending on the season, try to hike to places on the trail where water and flowers can be seen. This will improve your chances of encountering wildlife and pollinators in action. Listen and look for signs of insects, birds, and other wildlife along the way.

Suggestions For The Hike

- Search for milkweed, aster, gum plant, rabbit brush, and sunflowers along the trail.
- Search for signs of pollinators and wildlife along the trail.
 - This may include bird songs, insect noises, mammal tracks, etc.
- Take a look at the Kestrel bird boxes along the trail.
- Hike to the Photo Blind on Marsh Meander Trail (1.5 miles).
- Hike to the boardwalk on Bulrush Bridge Trail (3/4 mile).
- Hike to the dock on Wetland Wonders Trail (1/2 mile).
- Hike to the Nature Explore Classroom Area and spend some time exploring.



Reflection

(Kindergarten–2nd Grade)

Return to the large group gathering area from the beginning of the day. Discuss what students learned and some of their favorite activities of the day. Review the overall theme of the day. Talk through some of the reflection questions.

Theme

Insects are unique animals that serve important purposes.

Reflection Questions

1. What is the most surprising thing you learned or discovered about insects and pollinators today?
2. What is one adaptation all insects have that make them different than other bugs?
3. Why is pollination so important and how can you protect pollinators?
4. What is your favorite thing you did today?

Thank the students for visiting the Refuge today and tell them about upcoming events they can come back for. Let them know about other activities they can come back and try out with their parents (Jr. Ranger, Nature Explore Area, Exhibit Hall, Auto Tour, Jr. Duck Stamp Contest).

Activities To Do With Extra Time/Longer Field Trip

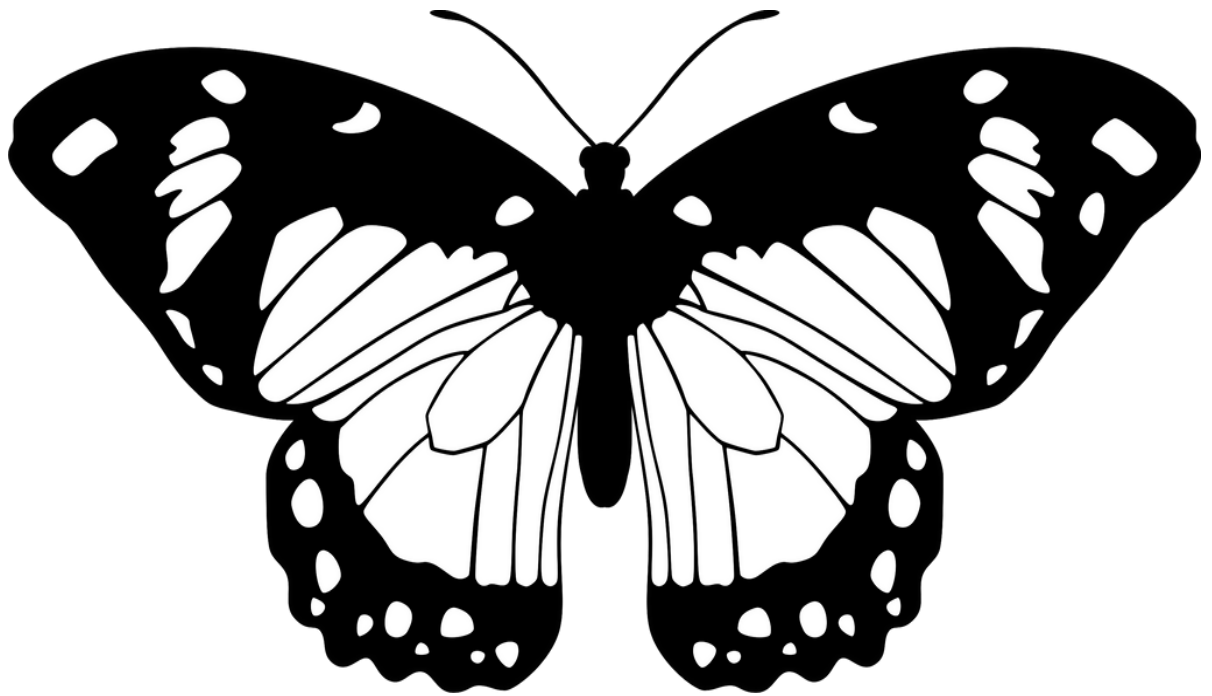
- Explore Nature Explore Classroom
- Explore Exhibit Hall (Exhibit Hall Bingo)
- Puppet Show About Insects & Pollination



Insects & Pollination/Powerful Pollinators

Powerful Pollinators

(Third–Fifth Grade)





State (SEEd) Standards

Third Grade

Standard 3.2, Effects Of Traits On Survival

Standard 3.2.3, Construct an explanation that the environment can affect the traits of an organism.

Standard 3.2.5, Engage in argument from evidence that in a particular habitat (system) some organisms can survive well, some survive less well, and some cannot survive at all.

Standard 3.2.6, Design a solution to a problem caused by a change in the environment that impacts the types of plants and animals living in that environment.

Fourth Grade

Standard 4.1, Organisms Functioning In Their Environment

Standard 4.1.1, Construct an explanation from evidence that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Standard 4.1.2, Develop and use a model of a system to describe how animals receive different types of information from their environment through their senses.

Fifth Grade

Standard 5.3, Cycling Of Matter In Ecosystems

Standard 5.3.2, Obtain, evaluate, and communicate information that animals obtain energy and matter from the food they eat.

Standard 5.3.3, Develop and use a model to describe the movement of matter among plants, animals, decomposers, and the environment.

Standard 5.3.4, Evaluate design solutions whose primary function is to conserve Earth's environments and resources.



Powerful Pollinators

(3rd–5th Grade)

Time:
2 hours

Season:
Spring, Summer,
& Autumn

Objectives:
Students will be
able to...

- Explore important insect habitat up-close and catch real insects to make observations.

- Determine the differences between insect species through the discovery of insect orders.

- Discover what pollination is and why pollinators are important.

Key Concepts:

- Insects
- Insect Orders
- Adaptations
- Pollinators & Pollination

Summary of Lesson

Insects represent 70% of all animal species found on the planet. In fact, without them, humans and other animals would not be able to survive. Discover some of the species of insects that live at the Refuge and learn about the importance of pollination and how humans can support these essential creatures.

Theme

Insects and the process of pollination are essential to all life on Earth.

Outline of Lesson Activities

1. Introduction (10 minutes)

- Introduce Bear River Migratory Bird Refuge and any important safety or logistical information.
- Review important characteristics of insects.
- Give a brief breakdown of the day's schedule.

2. Sweep Netting (25 minutes)

- Discover some of the different types of insects living at the Refuge.
- Determine which order insects belong to.

3. Nature Explore Classroom (20 minutes)

- Search for pollinators and plants.
- Learn about the many different types of animals that pollinate plants.

4. Pollinator Hike (40 minutes)

- Visit different areas of the hiking trails to search for pollinators.
- Search and listen for signs of other wildlife.

5. Pollinator Seed Balls (15 minutes)

- Create a mini pollinator habitat.
- Learn how to help pollinators at home.

6. Reflection (10 minutes)

- Review the theme and discuss reflection questions.



Introduction

(3rd-5th Grade)

Welcome students to Bear River Migratory Bird Refuge and introduce yourself. Discuss the importance of the Refuge and why it was created. Ask if any of the students have visited the Refuge before.

Explain to the students that you will be their teacher for the day and that the Refuge is their classroom, so it is important to respect the Refuge just as they would with their classroom at school. Discuss any important safety/logistical items and concerns before talking about the theme of the day.

Theme

Insects and the process of pollination are essential to all life on Earth.

Introduction Questions & Activities

- Ask students to describe what they know about insects.
- Ask students to list examples of insects found near their own homes.
- Ask students to describe what pollination is.
- Give a brief overview of the schedule for the day and some of the activities they will get to try out.

Assess Student Knowledge

Knowledge levels of a topic between different classes can greatly vary. Assess the knowledge level of your group at the beginning of the day in order to determine how deeply to discuss topics and what to teach the class.



Sweep Netting

(3rd-5th Grade)

Key Concepts:
Insects, Insect
Orders, &
Adaptations

Walk with students to an open area where grasses and plants are easily accessible. Bring sweep netting materials including...

1. Sweep Nets (For Each Student)
2. White Canvas Insect Orders Sheet
3. Small Plastic Collection Jars
4. Worksheets With Images & Information Describing Insect Orders

Before distributing supplies to each student, review safety instructions and give a general overview of the activity.

Safety Instructions

- Always walk in areas where the ground is uneven.
- When sweep netting, students must be careful and always watch for others when raising their sweep nets above their heads.
- Students should not raise their sweep net above their head unless they can actively see an insect flying above them.

Overview of Activity

Students will discover many of the different types and orders of insects found within the wetland ecosystem of the Refuge. After discussing the safety instructions, describe how to properly use a sweep net by brushing it back and forth through the grasses and plants in a figure-eight motion. This is the easiest method to collect insects.

After sweeping their net back and forth a few times, students can come back to the large white canvas sheet and dump out their findings onto the sheet. The white sheet will easily contrast with the insects they found. If students want to take a closer look at what they found, they can temporarily put their insects into a small plastic collection jar to take a closer look.

In this version for older students, students should try to determine which order of insects each of their findings belongs within by comparing their insect with images and listed information. Students can then place their insect (inside of a jar so it does not fly/run/hop away) in the correctly labeled section of the white canvas sheet.

After allowing students a good amount of time to sweep net, have students release all insects back into their natural habitat. Ask students about what they observed during that activity. What insect order was represented the most? Is this order made-up of pollinators?

After discussion, gather all materials before leaving the sweep netting site.



Nature Explore Classroom

(3rd-5th Grade)

Walk with students to the Nature Explore Classroom and gather in an area with flowers or plants that pollinators can be seen or are often found. Discuss what pollination is and talk about why it is so important.

Fun Fact: According to the U.S. Forest Service, of the 1,400 food-related crop plants grown around the world, 80% of those plants require pollination by animals. Without pollination humans and many of Earth's living beings would not survive.

Ask students if they can name different types of insects that help to pollinate plants.

Insect Pollinators

1. Bees and Wasps
2. Butterflies and Moths
3. Flies
4. Beetles

Ask students if they can think of other animals besides insects that are important pollinators. Show them pictures of what some of these other animals look like.

Non-Insect Pollinators

1. Hummingbirds
2. Bats
3. Sugar Gliders
4. Honey Possums
5. Lemurs
6. Lizards (very few)

Bring students to a patch of milkweed. Discuss what insect species (monarch butterflies) relies on the plant and why it is so important to protect milkweed. Discuss the important role butterflies play in pollination.

With extra time, allow students to explore the Nature Explore Classroom and search the plants for pollinators or to test out the fun activities in the outdoor classroom area.



Pollinator Hike

(3rd-5th Grade)

Key Concepts:
Insects,
Pollination, &
Pollinators

You have 40 minutes to choose your own adventure on this hike. Depending on the season, try to hike to places on the trail where water and flowers can be seen. This will improve your chances of encountering wildlife and pollinators in action. Listen and look for signs of insects, birds, and other wildlife along the way.

Suggestions For The Hike

- Search for milkweed, aster, gum plant, rabbit brush, and sunflowers along the trail.
- Search for signs of pollinators and wildlife along the trail.
 - This may include bird songs, insect noises, mammal tracks, etc.
- Take a look at the Kestrel bird boxes along the trail.
- Hike to the Photo Blind on Marsh Meander Trail (1.5 miles).
- Hike to the boardwalk on Bulrush Bridge Trail (3/4 mile).
- Hike to the dock on Wetland Wonders Trail (1/2 mile).
- Hike to the Nature Explore Classroom Area and spend some time exploring.



Pollinator Seed Balls

(3rd-5th Grade)

Key Concepts:
Insects,
Pollinators, &
Pollination

Gather the group in a large seating area. Before starting the activity, discuss with students some of the ways they can help pollinators and insects in their own backyards or near their own homes. Talk with students about the effectiveness of growing native wildflowers.

After discussing the importance of pollinators and how to help them, explain to the students that they will be creating their own “Pollinator Seed Ball” which will contain native wildflower seeds which they can plant near their own homes to help pollinators.

Before handing out materials, demonstrate to the students how to create one...

Pollinator Seed Ball Instructions

1. Roll damp clay-like soil into a small ball-like shape.
2. If larger seeds are being used, press 2-3 larger seeds into the ball and re-roll until they are mostly covered.
3. If smaller seeds are being used, press 6-8 small seeds into the surface of the seed ball.

*** Both large and small seeds can be used if both are available.**

Once students are finished creating their pollinator seed balls, explain to students that they can plant these in their own gardens at home, or they can even plant it in a flowerpot if they do not have a yard or a place to plant them.

Explain to students that these plants need the same things as other plants to successfully grow including sunlight and water, so students can take care of their plants by placing them in a location that would provide both.

Reiterate with students the importance of pollinators and why we do activities like this to help them.



Reflection

(3rd-5th Grade)

Key Concepts:
Insects,
Pollinators, &
Pollination

Gather all of the students together in one large area. Discuss what students learned and some of their favorite activities of the day. Review the overall theme of the day. Talk through some of the reflection questions.

Theme

Insects and the process of pollination are essential to all life on Earth.

Reflection Questions

1. What is the most surprising thing you learned or discovered about insects and pollinators today?
2. Why is pollination so important and what are some ways that you can protect pollinators near your own homes?
3. What is your favorite thing you did today?

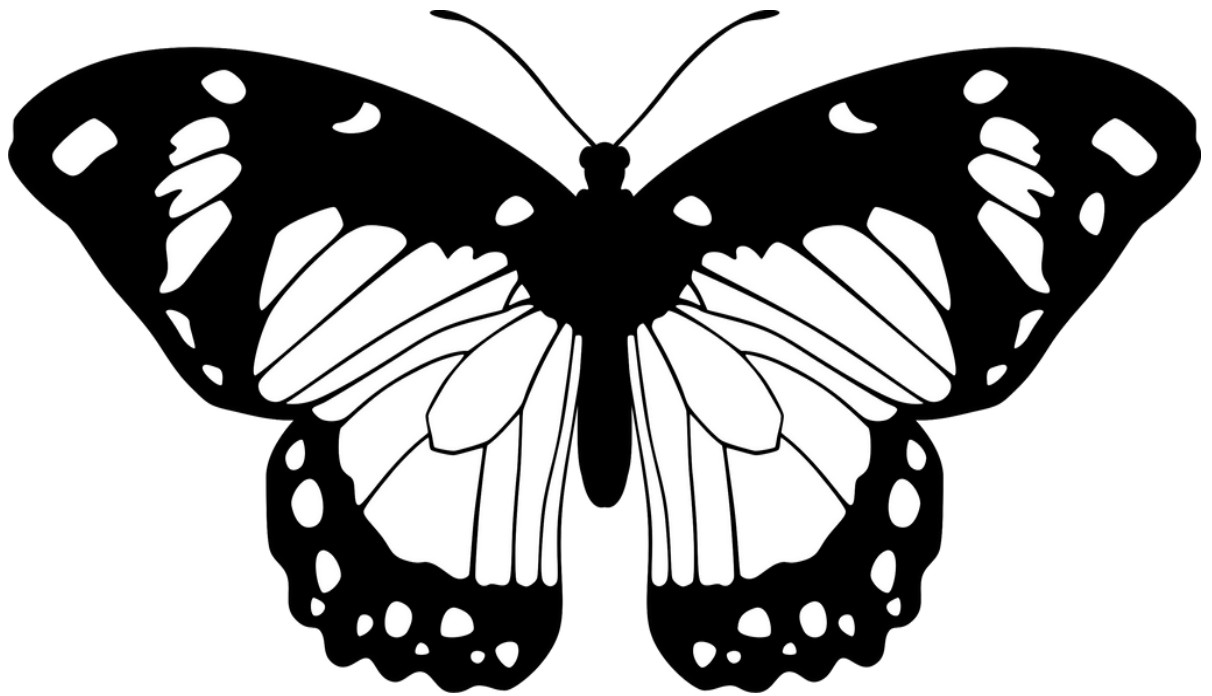
Thank the students for visiting the Refuge today and tell them about upcoming events. Let them know about other activities they can come back and try out with their parents (Jr. Ranger, Nature Explore Area, Exhibit Hall, Auto Tour, Jr. Duck Stamp Contest).

Activities To Do With Extra Time/Longer Field Trip

- Explore Nature Explore Classroom
- Explore Exhibit Hall (Exhibit Scavenger Hunt)
- Watch “Wings of Thunder”



Background Information





Insect Features

All insects have similar features that make them different than other types of bugs. These features are important to the lifestyles each insect lives including what habitat they are found in and what types of food they prefer to eat. These important insect features include...

1. Three Body Segments

- **Head:** First body segment including eyes, antennae, and mouth parts.
- **Thorax:** Second body segment which attaches to the legs and wings.
- **Abdomen:** Third body segment with digestive/reproductive organs.

2. Exoskeleton

- The exoskeleton of an insect is made-up of a substance called **chitin**. This is also the same substance that makes up the exoskeleton of crabs, spiders, ticks, and other related animals. Chitin is similar to keratin which makes up the fingernails of a human. The exoskeleton protects insects from injuries and desiccation.

3. Antennae

- The antennae are the sensory organs of an insect. Antennae are sensitive to touch as well as smell and sound for some insect species.

4. Compound Eyes

- Compound eyes act as the visual organs for insects. These can consist of thousands of **ommatidia** which act as tiny independent photoreception units consisting of a cornea, lens, and photoreceptors cells. This helps insects to distinguish light and color.

5. Mouth Parts

- The mouth parts of an insect widely differ depending on the species. The most common mouth parts are...

1. Biting/Chewing: Grasshoppers, Crickets, Beetles
2. Piercing/Sucking: Mosquitos
3. Sponging: Flies
4. Siphoning: Butterflies and Moths

6. Wings

- Not all insects have wings, such as ants and aphids, but a large majority do have wings that they depend on for survival.



Insect Life Cycle

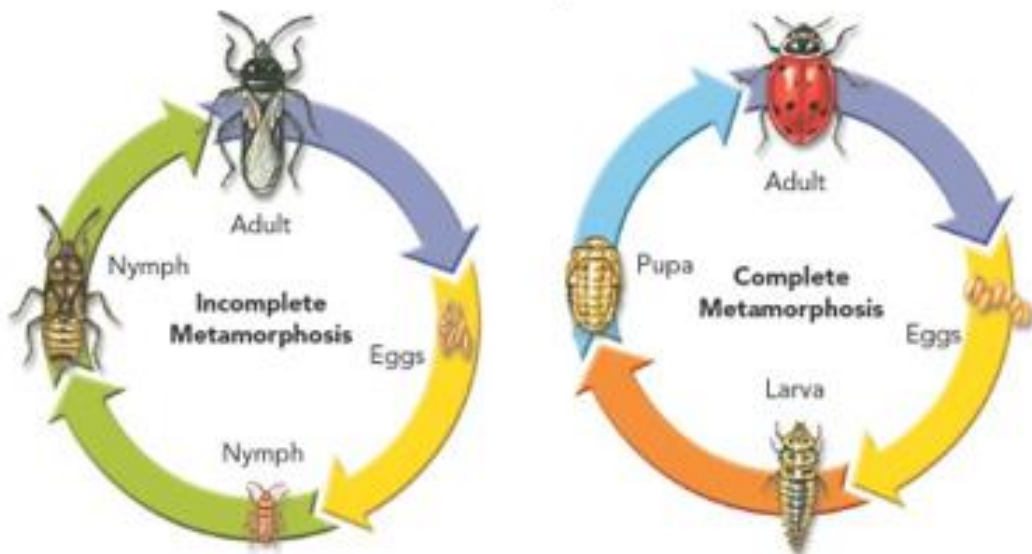
All insects undergo the process of **metamorphosis** or life cycle changes. However, metamorphosis does not look the same for every insect. Some insects go through **complete metamorphosis** which contains four different life stages: egg, larva pupa, and adult. This differs from insects that go through **incomplete metamorphosis** which is completed in three stages: egg, nymph, and adult.

One way to tell if an insect goes through complete or incomplete metamorphosis is to compare the larva or nymph with the adult. **Nymphs** will often appear as a miniature version of their adult form while **larvae** looks completely different than their adult form.

Complete Metamorphosis Aquatic Insects: Beetles, Dobsonflies, Caddisflies, Mosquitos.

Incomplete Metamorphosis Aquatic Insects: Dragonflies, Damselflies, Mayflies.

Complete vs. Incomplete Metamorphosis





Common Insect Orders

Classification

Kingdom: Animalia

Phylum: Arthropoda

Class: Insecta

Order: (see below)

* Note there are many more insect orders, so if you find an insect that doesn't seem to belong to any of the orders listed below – you are probably right!

Diptera

- Large compound eyes
- Small and soft-bodied
- One pair of wings for flying
- Hind wings (halteres) are small knobby structures used for balance
- Mouth parts for sucking, piercing, sponging, and lapping



Odonata

- Two pairs of long outstretched wings
- Front and hind wings are similar in shape and size
- Large compound eyes make up most of the head.
- The immature stages are aquatic while the adults spend much of their time flying.



Lepidoptera

- Scales on wings, come off like dust if handled
- Mouth parts are usually for sucking
- In some species adults don't have mouth parts and can't eat at all!
- Mouth parts usually long and coiled
- They have relatively large compound eyes



Orthoptera

- Relatively long antennae
- Ears are located on front legs near knees (looks like a small swelling)
- Long rear legs for jumping
- Large plate covering the thorax
- Large compound eyes



Hemiptera

- Thin, delicate back wings
- Base of front wings is thick and leathery
- Front wings cover the back wings, forming an X on insect's back
- Mouth parts are for piercing and sucking
- Compound eyes



Coleoptera

- Often brightly colored.
- Antennae threadlike or clubbed
- Tough armor-like front wings that cover membranous hind wings used for flying
- Large prominent compound eyes
- Chewing mouthparts



Hymenoptera

- Many are social insects
- Four membranous wings
- Hind wings are smaller than front wings
- Row of tiny hooks attach back and front wings like velcro
- Some have no wings at all (eg. ants)
- Mouth parts are for chewing or sucking





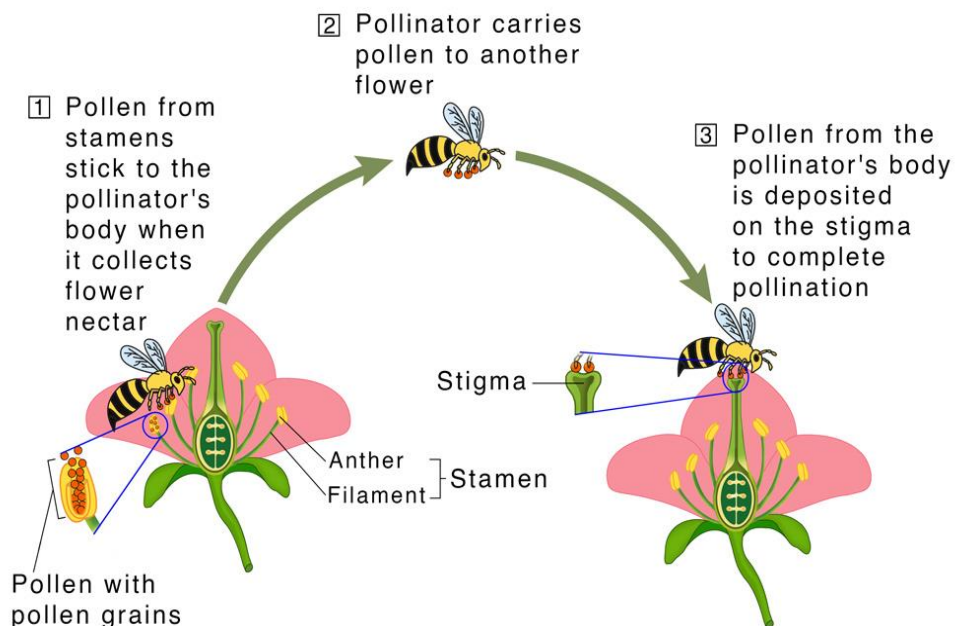
Pollination

Almost all of Earth's plants need some form of **pollination** in order to successfully grow. With that said, pollination is an essential ecological survival function. Without **pollinators** enabling this critical process, all of Earth's terrestrial ecosystems, as well as humans, would fail to survive. In fact, according to the U.S. Forest Service, of the 1,400 food-related crop plants grown around the world, 80% of those plants require pollination by animals.

Pollination is a vitally important process that benefits Earth's ecosystems in many ways. To start, pollination enables clean air. Flowering plants produce **oxygen** by taking in **carbon dioxide**. This benefit is critical to all of Earth's ecosystems because as carbon dioxide levels continue to increase in Earth's atmosphere with the burning of fossil fuels and loss of forests, flowering plants can hopefully reduce some of these negative effects.

Furthermore, pollination also helps plants to reproduce enough seeds for adequate dispersal which helps plants to maintain genetic diversity. These important processes also help plants to develop adequate fruits which entice animals that disperse seeds and assist in the spread of plant populations.

Pollination





Pollinators

While insects serve as one of the largest groups of animals that assist in the pollination of Earth's plants, there are many other types of animals that also help with the process of pollination. Here are some of the animals that assist in pollinating Earth's plants...

Insect Pollinators

1. Bees and Wasps

- Many bumblebee species are native to North America and assist through "Buzz Pollination."
- European honeybees are not native to North America but help pollinate \$15 billion worth of crops in the U.S. each year.

2. Butterflies and Moths

- Monarch butterflies, which rely on milkweed plants to lay their eggs, pollinate wildflowers while drinking nectar.
- Butterflies and moths pick-up pollen on their legs/bodies while drinking nectar and pollinate by transferring it from flower to flower.

3. Flies

- Pollinate similar to bee species by traveling from flower to flower.

4. Beetles

- Beetle pollinators will often eat their way through flower petals and then defecate within flowers making them, "mess and soil" pollinators.

Non-Insect Pollinators

1. Hummingbirds

- Many flowers, in tropical regions, are adapted to be specifically pollinated by hummingbirds.

2. Bats

- Bat pollination is called chiropterophily.
- Plants that are pollinated by bats are often pale and are nocturnal flowers.

3. Sugar Gliders

- Sugar gliders eat many sweet foods including nectar, native fruits, and even pollen.



Pollinators

4. Honey Possums

- Because honey possums have such a high metabolic rate, they need to consume nectar continuously in order to survive.

- These animals pollinate the flowers they eat nectar from by transferring pollen collected on their heads and bodies.

5. Lemurs

- Lemurs use their hands to pull open the tops of tough flowers. After pulling open flowers, they will stick their long tongues and snouts deep inside the flower which causes pollen to collect on their noses and fur.

6. Lizards (very few)

- Of the nearly 7,000 species of lizards around the world, only 37 are found to pollinate.