

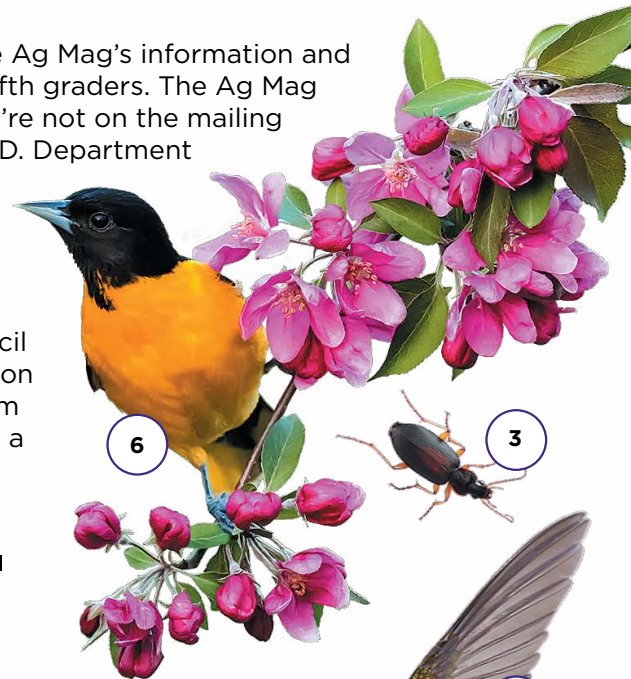


Pollinators

This issue of the Ag Mag focuses on North Dakota's pollinators. The Ag Mag's information and activities are geared primarily toward the state's third, fourth and fifth graders. The Ag Mag is distributed three times per year. Subscriptions are free, but if you're not on the mailing list or if you know someone who wants to be added, contact the N.D. Department of Agriculture at 1-800-242-7535 or ndda@nd.gov.

The magazine also is on the web at www.ag.ndsu.edu/agmag or through the North Dakota Agriculture in the Classroom website at www.nd.gov/ndda/ag-classroom/ag-mag.

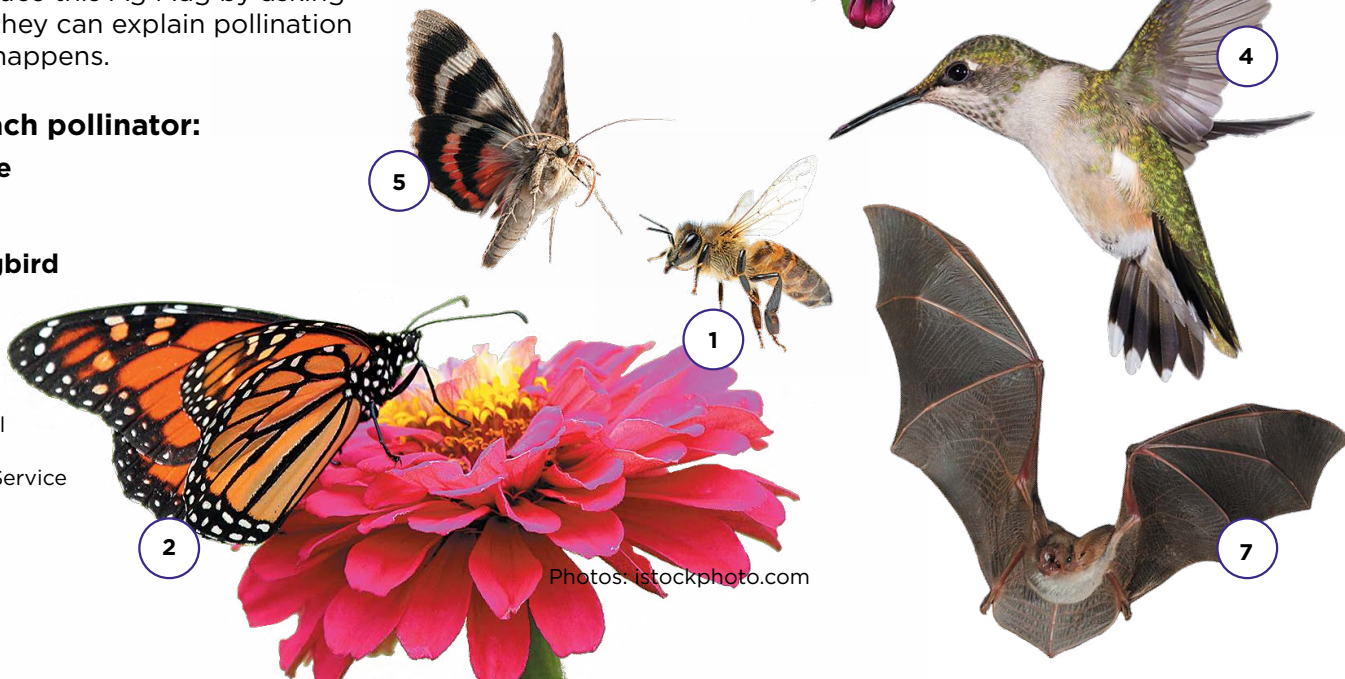
This magazine is one of the N.D. Agriculture in the Classroom Council activities that helps you and other K-12 teachers integrate information and activities about North Dakota agriculture across your curriculum in science, math, language arts, social studies and other classes. It's a supplemental resource rather than a separate program.



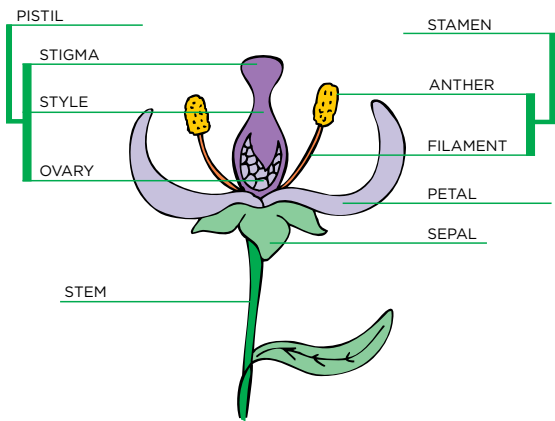
Idea: Introduce this Ag Mag by asking students if they can explain pollination and how it happens.

Identify each pollinator:

- 1. honey bee
- 2. butterfly
- 3. beetle
- 4. hummingbird
- 5. moth
- 6. bird
- 7. bat



Source: Natural Resources Conservation Service



Flower Power

Idea: Have students complete the Flower Power lesson by Utah Agriculture in the Classroom where students observe physical characteristics of flowers and explore principles of pollination. Flower Power has two activities of 40 minutes each. <https://agclassroom.org> and search for “Flower Power” under Curriculum Matrix

Idea: This 2-minute “Introduction to Pollination” video provides an animated illustration of the pollination of a flower. It also teaches flower anatomy to explain the role each part of the flower plays in pollination. www.youtube.com/watch?v=26oq5tWrb2Q&feature=youtu.be

Monarch Butterflies

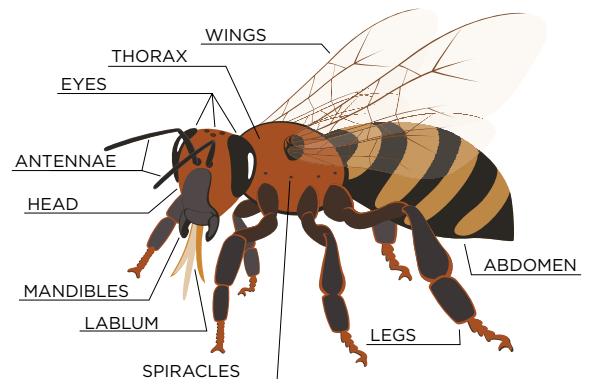
Some animals that migrate in winter include birds (hummingbirds, Canada geese, sandhill cranes, American robins, etc.); whales (humpback, blue); fish (Chinook salmon); deer; moose; elk

Parts of the Honey Bee

Idea: Complete Honey Bees: A Pollination Simulation developed by Utah Agriculture in the Classroom at <https://agclassroom.org> and search for the title. The Honey Bee PowerPoint illustrates the parts and life cycle.

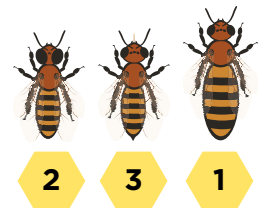
Idea: Show students the time-lapse video of bees hatching (1:08) from National Geographic at www.youtube.com/watch?v=f6mJ7e5YmnE

Idea: Watch “Silence of the Bee: Inside the Hive,” a 2:41 video produced by PBS showing an inside look at a honeybee hive, including the labors of the queen, worker bees and drones. www.youtube.com/watch?v=IE-8QuBDkkw&feature=youtu.be



Types of Honey Bees

Identify the
1. queen, 2. drone
and 3. worker bees.



Wind Pollination

Answers to Wind Pollination

- They are not **scented** because there is no need to attract insects.
- They have small, **faint** flowers because there is no need for **bright** colors to attract insects.
- They have no **nectar**.
- They produce **pollen** that is very light in texture, so it is easily **blown** in the wind to increase the chance of pollination.
- Many of the world’s most important crop plants are wind-pollinated. These include **wheat**, rice, corn, rye, barley and oats.
- Most **conifer** trees also are pollinated by the wind.
- Many people are **allergic** to ragweed when its pollen is blowing in the wind.

Honey Bees by the Numbers

1. If a worker bee lives 42 days, how many weeks does it live? $42 \text{ days} / 7 \text{ days per week} = \mathbf{6 \text{ weeks}}$
2. If a queen bee lays an egg on April 4 and a worker bee develops in 20 days, when will the adult bee come out of its cell? **April 24**
3. Queen bees lay about 1,500 eggs each day. How many eggs will she lay in a year? $1,500 \text{ eggs per day} \times 365 \text{ days per year} = \mathbf{547,500 \text{ eggs}}$
4. A worker bee flies 15 miles per hour. How far could it fly in 20 minutes? $60 \text{ minutes per hour} / 20 \text{ minutes} = 3$; $15 \text{ miles per hour} / 3 = \mathbf{5 \text{ miles}}$
5. A worker bee makes $1/12$ teaspoon of honey in its life. How much honey will 12 bees make in their lifetimes? $1/12 \text{ teaspoon per bee} \times 12 \text{ bees} = \mathbf{1 \text{ teaspoon honey}}$
6. A hive of bees must fly 55,000 miles to produce a pound of honey. How far must they fly to produce 5 pounds of honey? $55,000 \text{ miles} / \text{pound} \times 5 \text{ pounds} = \mathbf{275,000 \text{ miles}}$
7. If one bee colony produces 75 pounds of honey per year, how much honey will it produce in five years? $75 \text{ pounds per year} \times 5 \text{ years} = \mathbf{375 \text{ pounds}}$
8. If a hive has 50,000 bees, but 10% of them die, how many bees are left? $50,000 \times .10 = 5,000$; $50,000 - 5,000 = \mathbf{45,000}$
9. A 12-ounce container of honey costs \$4.50 at your grocery store. How much does it cost per ounce? $\$4.50 / 12 \text{ ounces} = \mathbf{\$0.375 \text{ per ounce}}$
10. The 16-ounce (1 pound) container costs \$5.60. How much does it cost per ounce? $\$5.60 / 16 \text{ ounces} = \mathbf{\$0.35 \text{ per ounce}}$
11. Which container costs less per ounce? **The 16-ounce container at \$0.35 per ounce costs less than the 12-ounce at \$0.375 per ounce.**
12. Your recipe calls for 2 tablespoons of honey, and you want to double the recipe. How much honey do you need? What portion of a cup is that? (Hint: 1 cup = 16 tablespoons) **2 tablespoons \times 2 = 4 tablespoons; 4 tablespoons / 16 tablespoons = 0.25 cup or $1/4$ cup**

Career Corner

Idea: If a beekeeper lives in your area, invite him or her to speak to your class. See the North Dakota bee map at <https://beemap.ndda.nd.gov/map>.

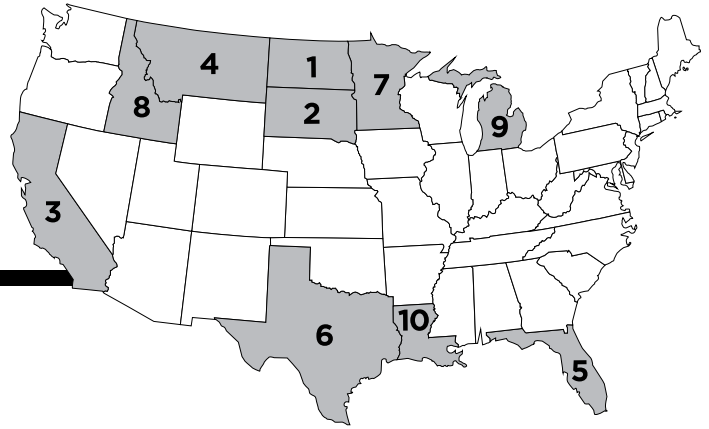
Idea: Have students read the story of Mikaila Ulmer, 13, who started her own business of selling lemonade with honey and a nonprofit for supporting bee research at www.beeeculture.com/all-the-buzz-in-bee-kids-corner/

Beekeepers

1. **Wear Proper Protection** – Wear a bee suit that covers your body, including your head and hands.
 2. **Smoke the Bees** – Smoking helps keep the bees calm during harvest. Using a smoker that burns grass, twigs or paper allows you to open the hive and does not harm the bees.
 3. **Pull Frames Out of Hive** – Using a hive tool, lift the frames out of the hives.
 4. **Brush Bees Off the Frames** – Using a soft-bristled brush, brush off any bees that may still be on the frames.
 5. **Remove the Wax Caps** – When the bees fill a comb with honey in a frame, they place wax from their bodies over the hexagonal openings to keep the honey from spilling out. You need a sharp, warm knife to cut off the wax caps.
 6. **Extract the Honey** – Place the frames in an extractor that spins the honey from the frames. When the honey is removed from the outer portion of the frames, flip the frame and repeat the process.
 7. **Filter the Honey** – Pour the honey through a mesh filter to remove wax or other debris.
- Idea:** “How It’s Made: Honey” is a 4:45-minute video that illustrates the steps in making honey from field to factory – www.youtube.com/watch?v=5R33ByiqxPE
- Idea:** “The Honey Files: A Bee’s Life” is a 16:22-minute video produced by the National Honey Board that explores all aspects of honey production and includes fun facts, such as how much honey a single worker bee makes in its lifetime – www.youtube.com/watch?v=VZV8Jq3ka4s&feature=youtu.be

Top 10 Honey-Producing States

Source: USDA - NASS 2017



Fun Facts about Honey

Bees must visit about **2 million flowers** to gather enough nectar to make one pound of honey

Ancient **Greek** civilizations regarded honey as a symbol of blessings and happiness.

To share information about the best food sources, bees perform a **waggle dance**. When the worker returns to the hive, it moves in a figure eight and waggles its body to indicate the direction of the food source.

Bees collect nectar from flowers within a radius of around **4 miles** and take this nectar to their hive.

If the queen bee dies, workers will create a new queen by selecting a young larva (a newly hatched young insect) and feeding it a special food called **royal jelly**. This enables the larva to develop into a fertile queen.

Honey keeps indefinitely in a jar. However, it can react to cool temperatures by **crystallizing**.

Rameses III, an ancient Egyptian pharaoh, offered a river god a honey sacrifice by dumping **30,000 pounds** of honey into the Nile River.

Honey is the only food made by an **insect** and eaten by both the insect and humans.

In 1791, when the **French** government demanded a record of all hives for collecting taxes, their owners destroyed many hives.

A typical beehive houses about **60,000 bees**, most of them workers, busily making honey and the honeycombs in which it is stored.

Bees have glands that secrete an **enzyme** that is mixed with nectar the bee collects in the bee's mouth.

Source: www.buzzaboutbees.net and www.natgeokids.com/au/discover/animals/insects/honey-bees

Resources

- The Urban Pollinator Program Curriculum Guide K-12 from North Dakota Game and Fish includes background information, hands-on activities, worksheets and more <https://gf.nd.gov/gnf/education/docs/instructor-resources/upp-curriculum.pdf>
- Conserving Pollinators: A Primer for Gardeners explains the importance of pollinators, how to encourage pollinators to visit your garden, bee decline, pollinator gardening and urban beekeeping <https://articles.extension.org/pages/19581/conserving-pollinators-a-primer-for-gardeners>
- The Great Sunflower Project is a citizen science activity that asks students and others to count and record pollinators www.greatsunflower.org/
- Butterflies, Moths, Dragonflies, and Damselflies – North Dakota Game and Fish Department — <https://gf.nd.gov/publications/506>
- Butterfly Gardening in North Dakota – NDSU Extension — www.ag.ndsu.edu/publications/lawns-gardens-trees/butterfly-gardening-in-north-dakota
- Pollinators – North Dakota Game and Fish Department — <https://gf.nd.gov/wildlife/pollinators>
- www.monarch-butterfly.com/index.html
- Moth Pollination – U.S. Forest Service — www.fs.fed.us/wildflowers/pollinators/animals/moths.shtml
- Pollinator Partnership — <https://pollinator.org/learning-center>

North Dakota Agriculture in the Classroom Activities

This **Ag Mag** is just one of the North Dakota Agriculture in the Classroom Council projects. Each issue of the Ag Mag focuses on an agricultural commodity or topic and includes fun activities, bold graphics, interesting information and challenging problems. See past issues at www.ag.ndsu.edu/agmag.

Send feedback and suggestions for future Ag Mag issues to:

Becky Koch
NDSU Agriculture Communication
701-231-7875
becky.koch@ndsu.edu

Another AITC teacher resource is **Project Food, Land & People** (FLP). Using the national FLP curriculum, N.D. Ag in the Classroom provides credit workshops in person and online for teachers to instruct them in integrating hands-on lessons that promote the development of critical thinking skills so students can better understand the interrelationships among the environment, agriculture and people of the world. Teachers are encouraged to adapt their lessons to include North Dakota products and resources.

Project Food, Land & People (FLP) is a curriculum with many lessons developed for K-12 educators to integrate easily into the classroom. The instructional units address core content and North Dakota state standards and benchmarks with inquiry-based learning activities.

Participants receive the entire curriculum plus North Dakota specific materials and information about available resources.

See details at www.ndfb.org/edusafe/flp.

For information, contact:

Jill Vigesaa
FLP Coordinator
701-799-5488
jill.vigesaa@gmail.com

Educators may apply for **mini-grants** for up to \$500 for use in programs that promote agricultural literacy. The Agriculture in the Classroom Council, working with the N.D. FFA Foundation, offers these funds for agriculture-related projects, units and lessons used for school-age children. The mini-grants fund hands-on activities that develop and enrich understanding of agriculture as the source of food and/or fiber in our society. Individuals or groups such as teachers, 4-H leaders, commodity groups and others interested in teaching young people about the importance of North Dakota agriculture are welcome to apply.

Examples of programs that may be funded: farm safety programs, agricultural festivals, an elementary classroom visiting a nearby farm and ag career awareness day. Grant funds can be used for printing, curriculum, guest speakers, materials, food, supplies, etc. More ideas and application information are at www.nd.gov/ndda/ag-classroom. Applications are due Sept. 21 each year.

For information, contact:

Tam Maddock
N.D. FFA Foundation
tmaddock@ndffa.org
www.teamabovo.com/ndffa

The N.D. Geographic Alliance conducts a **two-day Agricultural Tour for Teachers**. The tour includes farm and field visits, tours of agricultural processing plants to see what happens to products following the farm production cycle, and discussions with people involved in the global marketing of North Dakota farm products.

For information, contact:

Jeff Beck
North Dakota Geographic Alliance
701-858-3063
jeff.beck@minot.k12.nd.us

The North Dakota Ag Mag is a project of the North Dakota Agriculture in the Classroom Council, which is organized through the North Dakota Department of Agriculture.

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North Dakota Agriculture in the Classroom Council

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Nancy Jo Bateman – N.D. Beef Commission
Sheri Coleman – Northern Canola Growers Association
Kirk Olson – McKenzie County Farm Bureau
Nicole Wardner – NDSU Extension Sheridan County
Statutory Member: Superintendent of Public Instruction Kristen Baesler (Bob Marthaller, representative)



Standards and Benchmarks

English Language Arts and Literacy Content Standards for Reading Informational/Nonfiction Text

- Gr. 3, RI.1 Ask and answer questions to demonstrate understanding of a text (textual evidence), referring explicitly to the text as the basis for the answers.
- Gr.3, RI.2 Determine the main idea of a text and recount the key details to explain how they support the main idea.
- Gr.3, RI.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.
- Gr.4, RI.1 Refer to details and examples in a text (textual evidence) when explaining what the text says explicitly and when drawing inferences from the text. Summarize the text.
- Gr.4, RI.2 Determine the main idea of a text and explain how it is supported by key details.
- Gr.4, RI.3 Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.
- Gr.5, RI.1 Quote accurately using textual evidence when explaining what the text says explicitly and when drawing inferences from the text. Summarize the text.
- Gr.5, RI.2 Determine two or more main ideas of a text and explain how they are supported by key details.
- Gr.5, RI.3 Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.

Craft and Structure

- Gr.3, RI.4 Determine the meaning of general academic and domain specific words and phrases in a text relevant to a grade 3 topic or subject area.
- Gr.4, RI.4 Determine the meaning of general academic and domain specific words or phrases in a text relevant to a grade 4 topic or subject area.
- Gr.5, RI.4 Determine the meaning of general academic and domain specific words and phrases in a text relevant to a grade 5 topic or subject area.

North Dakota Mathematics Content Standards

Operations and Algebraic Thinking

- 3.OA.8 Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies.
- 4.OA.2 Use drawings and equations with a symbol for the unknown number (variable) to represent the problem. Multiply or divide to solve word problems involving multiplicative comparison, distinguishing multiplicative comparison from additive comparison.

Number and Operations in Base Ten

- 5.NBT.5 Fluently multiply multi-digit whole numbers using strategies flexibly, including the standard algorithm. Mastery of the standard multiplication algorithm is expected at this stage.

Number and Operations-Fractions

- 3.NF.1 Understand a fraction $\frac{1}{b}$ as the quantity formed by 1 part when a whole is partitioned into b equal parts.
- 4.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.
- b. Understand a multiple of $\frac{a}{b}$ as a multiple of $\frac{1}{b}$, and use this understanding to multiply a fraction by a whole number.

Measurement and Data

- 3.MD.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units.
- 4.MD.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit.

ND Social Studies Content Standards

Economics (Taken from First Draft of November 2018)

E3.0.1 Describe how entrepreneurs produce goods and services.

Social Studies Standards 2007 still being used:

Standard 1: Skills and Resources: Resources

Benchmark 3.1.3 Use a variety of resources (e.g., maps, charts, bar graphs, Internet, books) to gather information about people, places, and events

Benchmark 3.1.4 Describe current events using print and electronic media (e.g., newspaper, children's news magazines, television, Internet).

Benchmark 4.1.4 Interpret current events using print and electronic media (e.g., newspaper, children's news magazines, television, Internet)

Benchmark 5.1.3 Evaluate current events using print and electronic media (e.g., newspaper, children's news magazines, television, Internet.)

Standard 3: Economic Concepts:

State Economics

Benchmark 4.3.2 Identify ways that natural resources (e.g. soil, people, trees) contribute to the economy of the local community and of North Dakota.

Benchmark 4.3.4 Identify principal exports of North Dakota (e.g., crops, energy, livestock).

Science Content Standards

From Molecules to Organisms: Structures and Processes

Performance Standard 3-LS1-1 Develop models to describe that organisms have unique and diverse life cycles but all experience birth, growth, reproduction, and death.

Performance Standard 4-LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Performance Standard 4-LS1-2 Form an explanation to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.

Ecosystems: Interactions, Energy, Dynamics

Performance Standard 3-LS2-1 Construct an argument that some animals form groups that help members survive.