Grade 2 Science, Unit 1

Relationships in Habitats

Overview

Unit abstract

In this unit of study, students are expected to develop an understanding of what plants need to grow and how plants depend on animals for seed dispersal and pollination. Students are also expected to compare the diversity of life in different habitats. The crosscutting concepts of cause and effect and structure and function are called out as organizing concepts for these disciplinary core ideas. In the second grade performance expectations, students are expected to demonstrate grade-appropriate proficiency in planning and carrying out investigations and developing and using models. Students are expected to use these practices to demonstrate understanding of the core ideas.

Essential questions

- What do plants need to grow?
- How many types of living things live in a place?

Bristol–Warren, Central Falls, Cranston, Tiverton, and Woonsocket, with process support from The Charles A. Dana Center at the University of Texas at Austin

Written Curriculum

Standards[1]

2.Interdependent Relationships in Ecosystems

Students who demonstrate understanding can:

2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.
[Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.]
[Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. ▪ Make observations (firsthand or from media) to collect data which can be used to make comparisons. (2-LS4-1) **----------** ***Connections to Nature of Science*** **Scientific Knowledge is Based on Empirical Evidence** ▪ Scientists look for patterns and order when making observations about the world. (2-LS4-1)	**LS4.D: Biodiversity and Humans** ▪ There are many different kinds of living things in any area, and they exist in different places on land and in water. (2-LS4-1)	▪ N/A

Connections to other DCIs in second grade: N/A

Articulation of DCIs across grade-levels: **3.LS4.C** (2-LS4-1); **3.LS4.D** (2-LS4-1); **5.LS2.A** (2-LS4-1)

Common Core State Standards Connections:

ELA/Literacy –

W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-LS4-1)

W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-LS4-1)

Mathematics –

MP.2 Reason abstractly and quantitatively. *(2-LS4-1)*

MP.4 Model with mathematics. *(2-LS4-1)*

2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems. *(2-LS4-1)*

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2. Interdependent Relationships in Ecosystems

Students who demonstrate understanding can:

2-LS2-1. Plan and conduct an investigation to determine if plants need sunlight and water to grow.
[Assessment Boundary: Assessment is limited to testing one variable at a time.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. ▪ Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-LS2-1)	**LS2.A: Interdependent Relationships in Ecosystems** ▪ Plants depend on water and light to grow. (2-LS2-1)	**Cause and Effect** ▪ Events have causes that generate observable patterns. (2-LS2-1)

Connections to other DCIs in second grade: N/A

Articulation of DCIs across grade-levels: **K.LS1.C** (2-LS2-1); **K-ESS3.A** (2-LS2-1) **5.LS1.C** (2-LS2-1)

Common Core State Standards Connections:

ELA/Literacy –

W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-LS2-1)

W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-LS2-1)

Mathematics –

MP.2 Reason abstractly and quantitatively. *(2-LS2-1)*

MP.4 Model with mathematics. *(2-LS2-1)*

MP.5 Use appropriate tools strategically. *(2-LS2-1)*

2. Interdependent Relationships in Ecosystems

Students who demonstrate understanding can:

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

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions. ▪ Develop a simple model based on evidence to represent a proposed object or tool. (2-LS2-2)	**LS2.A: Interdependent Relationships in Ecosystems** ▪ Plants depend on animals for pollination or to move their seeds around. (2-LS2-2) **ETS1.B: Developing Possible Solutions** ▪ Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. *(secondary to 2-LS2-2)*	**Structure and Function** ▪ The shape and stability of structures of natural and designed objects are related to their function(s). (2-LS2-2)

Connections to other DCIs in second grade: N/A

Articulation of DCIs across grade-levels: **K.ETS1.A** (2-LS2-2); **5.LS2.A** (2-LS2-2)

Common Core State Standards Connections:

ELA/Literacy –

SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. *(2-LS2-2)*

Mathematics –

MP.4 Model with mathematics. *(2-LS2-2)*

2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems. *(2-LS2-2)*

K-2. Engineering Design

Students who demonstrate understanding can:

K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions. ▪ Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)	**ETS1.B: Developing Possible Solutions** ▪ Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (K-2-ETS1-2)	**Structure and Function** ▪ The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2)

Connections to K-2-ETS1.A: Defining and Delimiting Engineering Problems include:
Kindergarten: K-PS2-2, K-ESS3-2
Connections to K-2-ETS1.B: Developing Possible Solutions to Problems include:
Kindergarten: K-ESS3-3, **First Grade:** 1-PS4-4, **Second Grade:** 2-LS2-2
Connections to K-2-ETS1.C: Optimizing the Design Solution include:
Second Grade: 2-ESS2-1

Articulation of DCIs across grade-bands: **3-5.ETS1.A** (K-2-ETS1-2); **3-5.ETS1.B** (K-2-ETS1-2); **3-5.ETS1.C** (K-2-ETS1-2)

Common Core State Standards Connections:
ELA/Literacy –
SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. *(K-2-ETS1-2)*

Clarifying the standards

Prior learning

The following disciplinary core ideas are prior learning for the concepts in this unit of study. By the end of kindergarten, students know that:

- All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.
- Living things need water, air, and resources from land, and they live in places that have things they need. Humans use natural resources for everything they do.

By the end of the K-2 grade span, students know that:

- A situation that people want to change or create can be approached as a problem to be solved through engineering.
- Asking questions, making observations, and gathering information are helpful in thinking about problems.
- Before beginning to design a solution, it is important to clearly understand the problem.

Progression of current learning

Driving question 1
How does the diversity of plants and animals compare among different habitats?

Concepts	Practices
• Scientists look for patterns and order when making observations about the world. • There are many different kinds of living things in any area, and they exist in different places on land and in water.	• Look for patterns and order when making observations about the world. • Make observations (firsthand or from media) to collect data that can be used to make comparisons. • Make observations of plants and animals to compare the diversity of life in different habitats. (Emphasis is on the diversity of living things in each of a variety of different habitats; assessment does not include specific animal and plant names in specific habitats.)

Driving question 2 What do plants need in order to grow?	
Concepts • Events have causes that generate observable patterns. • Plants depend on water and light to grow.	Practices • Observe patterns in events generated by cause-and-effect relationships. • Plan and conduct an investigation collaboratively to produce data to serve as a basis for evidence to answer a question. • Plan and conduct an investigation to determine whether plants need sunlight and water to grow. (Assessment is limited to one variable at a time.)
Driving question 3 What roles do animals play in plant reproduction?	
Concepts • The shape and stability of structures of natural and designed objects are related to their function. • Plants depend on animals for pollination or to move their seeds around. • Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.	Practices • Describe how the shape and stability of structures are related to their function. • Develop a simple model based on evidence to represent a proposed object or tool. • Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants. • Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Integration of content, practices, and crosscutting concepts

In this unit of study, students explore and compare the diversity of life in different habitats. They develop an understanding of what plants need to grow and how plants depend on animals for seed dispersal and pollination. Students learn about cause-and-effect relationships and how an organism's structures are related to the function that each structure performs. Developing and using models plays an important role in students' understanding of structure/function relationships.

To begin this unit's progression of learning, students observe a variety of plants and animals from a variety of habitats in order to compare the diversity of life. Using firsthand observations and media resources, students explore and collect data about different habitats that exist in the world and how plants and animals have structures that help them survive in their habitats. Students need many opportunities to observe many different kinds of living things, whether they live on land, in water, or both. As students learn about the diversity of life, they begin to look for patterns and order in the natural world. As scientists, students will begin to notice patterns in the structures that enable organisms to support their existence in specific habitats. For example,

webbed feet enable survival in wetlands; gills enable survival in rivers, lakes, and oceans; and blubber enables survival in polar regions.

The learning progresses as students' focus changes from diversity to commonalities among plants—what plants need in order to grow. Students need opportunities to observe that plants depend on water and light to grow. As they begin to understand that changes in the amount of water and light can affect the growth of plants, they begin to understand that all cause-and-effect relationships generate observable patterns. For example, some plants require very little water to survive, most plants will not grow without sunlight, and most plants need an adequate amount of water to thrive. Students might also observe patterns such as the effects of too much or too little water on a plant and too much or too little light on a plant. In order for students to develop these understandings, they should plan and conduct investigations and collect data, which should be used as evidence to support the idea that all events have causes that generate observable patterns.

Finally, students investigate the roles that animals play in plant reproduction. Students learn that many types of plants depend on animals for pollination and/or for the dispersal of seeds. As students begin to explore the interdependent relationships among plants and animals, they learn that the shape and stability of the structures of organisms are related to their function. For example,

- As bees collect nectar, portions of their body are designed to collect and then carry pollen from plant to plant.
- Some seeds are designed to stick to animal fur so that animals can carry them from place to place.
- Animals eat fruits containing seeds, which are then dispersed through animals' body waste.

Second graders will need multiple opportunities to develop an understanding of the important relationship between structure and function, because they are expected to use engineering design to plan and develop simple models that mimic the function of an animal in dispersing seeds or pollinating plants. Students can use sketches, drawings or physical models to illustrate how the shape of the model helps it function as needed, and they should use evidence to support their design choices. Some common examples of models could include the following:

- Using Velcro "seeds" and furry material to model how seeds with hooks adhere to animal fur.
- Using pipe cleaners to gather and distribute "pollen" in a way similar to hoq bees pollinate flowers.

Integration of engineering

In this unit of study, students learn that designs can be conveyed through sketches, drawings, or physical models, and that these representations are useful in communicating ideas for a problem's solutions to other people. As described in the narrative above, students develop simple sketches, drawings, or models that mimic the function of an animal in dispersing seeds or pollinating plants in order to illustrate how the shape of an object helps it function as needed to solve a given problem.

Integration of DCI from other units within this grade level

The following connections to disciplinary core ideas in Engineering, Technology, and Applications of Science occur in Unit 2, Properties of Matter, and Unit 5, Changes to Earth's Land.

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.
- Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

- A situation that people want to change or create can be approached as a problem to be solved through engineering.
- Asking questions, making observations, and gathering information are helpful in thinking about problems.
- Before beginning to design a solution, it is important to clearly understand the problem.

Integration of English language arts and mathematics

English language arts

The CCSS for English Language Arts can also be incorporated in this unit in a number of ways. Students can participate in shared research using trade books and online resources to learn about the diversity of life in different habitats or to discover ways in which animals help pollinate plants or distribute seeds. Students can record their findings in science journals or use the research to write and illustrate their own books. Students can also learn to take notes in their journals order to help them recall information from experiences or gather information from provided sources. They can add drawings or other visual displays to their work, when appropriate, to clarify ideas, thoughts, and feelings.

Mathematics

Throughout this unit of study, students need opportunities to represent and interpret categorical data by drawing picture graphs and/or bar graphs (with a single-unit scale) to represent a data set with up to four categories. This will lead to opportunities to solve simple put-together, take-apart, and compare problems using information presented in these types of graphs. For example, students could create bar graphs that show the number of seedlings that sprout with and without watering or that document plant growth. They could also create a picture graph showing the number of plant species, vertebrate animal species, and invertebrate animal species observed during a field trip or in a nature photograph. As students analyze the data in these types of graphs, they can use the data to answer simple put-together, take apart, and compare problems. This unit also presents opportunities for students to model with mathematics. They can diagram situations mathematically or solve a one-step addition or subtraction word problems. Data collected in bar graphs and picture graphs can easily be used for this purpose.

Future Learning

The following disciplinary core ideas are future learning for the concepts in this unit of study.

In grade 3, students will know that

- For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all.
- Populations live in a variety of habitats, and change in those habitats affects the organisms living there.

In grade 5, students will know that

- Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion.
- Plants acquire their material for growth chiefly from air and water.
- The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (plants or plant parts and

animals) and therefore operate as decomposers. Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem.

In grades 3–5, students will know that

- Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.
- Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.
- At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.
- Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.
- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.

Number of Instructional Days

Recommended number of instructional days: 15 (1 day = approximately 45–60 minutes)

Note—The recommended number of days is an estimate based on the information available at this time. Teachers are strongly encouraged to review the entire unit of study carefully and collaboratively to determine whether adjustments to this estimate need to be made.

Additional NGSS Resources

The following resources were consulted during the writing of this unit:

- NGSS Appendix L, pp. 139, 142.
- NGSS Appendix E, p. 43