Quinton Township School
Second Grade
Science- Unit 1

Key: Technology Careers Interdisciplinary Studies

Unit 1 Summary- Relationships in Habitats-Marking Period 3 - 27 Days
Why do we see different living things in different habitats? **In this unit of study, students develop an understanding of what plants need to grow and how plants depend on animals for seed dispersal and pollination.Students also 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. Students demonstrate grade-appropriate proficiency in** *planning and carrying out investigations* **and** *developing and using models***. Students are also expected to use these practices to demonstrate understanding of the core ideas.** **This unit is based on 2-LS4-1, 2-LS2-1, 2-LS2-2, and K-2-ETS1-1.** **Other standards covered: 8.1, W.2.6, W.2.7, W.2.8, MP.2, MP.4, MP.5, 2.MD.D.10, SL.2.5, RI.2.1, 9.2.4.A.1, 9.2.4.A.2, K-2-ETS1-3**
Student Learning Objectives
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.]** **(2-LS4-1)**
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.***] (2-LS2-1)**
Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.* (2-LS2-2)

Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)

Objectives Aligned with National Geographic Resources: Approximate Time Frame: 27 Days

Day 1

- **Identify what plants need to live and grow**

Day 7-14

- **Observe and recognize that plants depend on water and light. Predict and investigate the growth of plants when the amount of light is altered.**

Day 15-20

- **Plan and conduct an investigation to determine whether plants need water to grow. Use evidence from an investigation to explain what happens if plants do not get water.**

Day 21-22

- **Explain how plants depend on animals for pollination.**
- **Explain why plants and humans depend on bees for pollination. Recognize why a decline in the bee population is a problem and identify possible solutions.**
- **Describe how animals help move a plant's seed.**

Day 23-24

- **Develop a model that shows how animals disperse seeds. Conduct an investigation using the model and revise the model as necessary.**

Day 25

- **Recognize that living things exist everywhere. Identify some living things that live on land and in water.**
- **Describe the living and nonliving things on the sandy coast.**
- **Describe how living things depend on their habitat for survival.**
- **Describe a wetland habitat. Identify living things in a wetland.**

Day 26

- **Describe a grassland habitat and some living things that are found there.**
- **Observe and interpret a map to compare the diversity of living things in different African habitats.**

Day 27

- **Connect the concepts of wildlife and habitat conservation with the work of a field biologist.**

Quick Links

Unit Sequence

Part A: *How does the diversity of plants and animals compare among different habitats?*

Concepts	Formative Assessment

● People 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.	*Students who understand the concepts can:* ● **Look for patterns and order when making observations about the world.** ● **Make and record observations (firsthand or from media) to collect data that can be used to make comparisons.** ● **Make and record observations of plants and animals to compare the diversity of life in different habitats.** *(Note: The 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.)*

Unit Sequence	
Part B: *What do plants need to live and grow?*	
Concepts	**Formative Assessment**

● Events have causes that generate observable patterns. ● Plants depend on water and light to grow.	*Students who understand the concepts can:* ● **Observe and record 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.** *(Note: Assessment is limited to one variable at a time.)*
Unit Sequence	
Part C: *Why do some plants rely on animals for reproduction?*	
Concepts	**Formative Assessments**
● **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.**	*Students who understand the concepts can:* ● **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.**

	● **Exit Tickets** ● **Journal Responses** ● **End of Unit Assessment**

What It Looks Like in the Classroom	

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 thfunction 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. Usinfirsthand 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, inwater, 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 plant 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 bees pollinating flowers.**

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.

Connecting with English Language Arts/Literacy and Mathematics

English Language Arts/Literacy

English Language Arts can be leveraged 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 in 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.

Mathematic

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 withouwatering 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.

Modifications

(Note: Teachers identify the modifications that they will use in the unit. See NGSS Appendix D: All Standards, All Students/Case Studies for vignettes and explanations of the modifications.)

- Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustration graphs, charts, data tables, multimedia, modeling).
- Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies).
- Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiprepresentation and multimodal experiences).
- Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate the understandings.
- Use project-based science learning to connect science with observable phenomena.
- Structure the learning around explaining or solving a social or community-based issue.
- Provide ELL students with multiple literacy strategies.
- Collaborate with after-school programs or clubs to extend learning opportunities.
- Restructure lesson using UDL principles (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA).

Research on Student Learning
Lower elementary-school students can understand simple food links involving two organisms. Yet they often think of organisms as independent of each other but dependent on people to supply them with food and shelter. Students of all ages think that some populations of organisms are numerous in order to fulfill a

demand for food by another population (NSDL, 2015).

Prior Learning

Kindergarten Unit 1: Pushes and Pulls

- 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.

Kindergarten Unit 4: Basic Needs of Living Things

- Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.
- 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.

Future Learning

Grade 3 Unit 6: Organisms and the Environment

● For any particular environment, some kinds of organisms survive well, some survive less well, and some

cannot survive at all. Grade 3 Unit 7: Using Evidence t Understand Change in the Environment

● Populations live in a variety of habitats, and change in those habitats affects the organisms living there.

Grade 5 Unit 3: Energy and Matter in Ecosystems

● 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 (both plants or plants parts and animals) and therefore operate as "decomposers." Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environmentsin 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 relativelystable web of life. Newly introduced species can damage the balance of an ecosystem.

Connections to Other Units

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.

Sample of Open Education Resources

National Geographic Learning- Teacher's Guide- "What Plants Need" pages 44-45

National Geographic Learning- Teacher's Guide- Investigation- "Plants and Light" pages 46-47

National Geographic Learning-Teacher's Guide- "Animals Pollinate Flowers" pages 50-51

National Geographic Learning-Teacher's Guide- Think Like an Engineer- "Save the Bees!" pages 52-55

National Geographic Learning-Teacher's Guide- "Animals Spread Seeds" pages 56-57

National Geographic Learning-Teacher's Guide- Think Like a Scientist- "Develop a Model" pages 58-61

National Geographic Learning-Teacher's Guide- "Living Things are Everywhere" pages 62-63

National Geographic Learning-Teacher's Guide- "Living Things on the Coast" pages 64-63

National Geographic Learning-Teacher's Guide- "Living Things in a Wetland" pages 66-67

National Geographic Learning-Teacher's Guide- "Living Things in a Grassland" pages 68-69

National Geographic Learning-Teacher's Guide- Think Like a Scientist- "Make Observations" pages 70-71

National Geographic Learning-Teacher's Guide- Science Career- "Field Biologist" pages 58-61

Teacher Professional Learning Resources

Resources from the National Geographic Kit:

Radish seeds; masking tape; plastic spoons; potting soil; clear plastic cups; rulers; hand lenses; water

Hook tape; feather; fake feather or felt squares or vinyl (any smooth fabric) (9” x 9”); leather

Enhancement Resources:

Black construction

Velcro; pipe cleaners

Teaching NGSS in Elementary School—Second Grade

The presenters were Carla Sembal-Saul, Professor of Science Education at Penn State University, Mary Starr, Executive Director at Michigan Mathematics and Science Centers Network, and Kathy Renfrew, K-5 Science Coordinator, VT Agency of Education and NGSS Curator introduced the NGSS Web seminar Series for K-5 educators.

The seminar was introduced by Ted Willard, NSTA's Director for *NGSS*, on how Elementary School standards - and specifically for the Second Grade - fit into the framework in terms of core ideas and performance expectations. Carla, Mary and Kathy engaged with participants to gauge their familiarity with *NGSS* for the second grade, and provided a number of example activities and videos on how to implement it, e.g., explaining how solids and liquids respond in the presence of a heat source. The web seminar was then wrapped up by Ted Willard, who suggested a number of resources and events for participants to further develop their understanding of *NGSS* for the Second Grade, as well as other grade levels.

Visit the resource collection.

Continue discussing this topic in the community forums.

NSTA Web Seminar: Teaching NGSS in K-5: Constructing Explanations from Evidence

Carla Zembal-Saul, Mary Starr, and Kathy Renfrew, provided an overview of the *NGSS* for K-5th grade. The web seminar focused on the three dimensional learning of the *NGSS*, while introducing CLAIMS-EVIDENCE-REASONING (CER) as a framework for introducing explanations from evidence. The presenters highlighted and discussed the importance of engaging learners with phenomena, and included a demonstration on using a KLEWS chart to map the development of scientific explanations of those phenomena.

To view related resources, visit the resource collection.

Continue discussing this topic in the community forums.

NGSS Core Ideas: Earth’s Systems

The presenter was Jill Wertheim from National Geographic Society. The program featured strategies for teaching about Earth science concepts that answer

questions such as "What regulates weather and climate?" and "What causes earthquakes and volcanoes?"

Dr. Wertheim began the presentation by introducing a framework for thinking about content related to Earth systems. She then showed learning progressions for each concept within the Earth's Systems disciplinary core idea and shared resources and strategies for addressing student preconceptions. Dr. Wertheim also talked about changes in the way NGSS addresses these ideas compared to previous common approaches. Participants had the opportunity to submit questions and share their feedback in the chat.

Continue the discussion in the community forums.

Appendix A: NGSS and Foundations for the Unit

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.] (2-LS4-1)**

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

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

Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)

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 ● Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(2-LS2-1) **Planning and Carrying Out Investigations** ● Make observations (firsthand or from media) to collect data that can be used to make comparisons. (2-LS4-1) **Developing and Using Models** ● Develop a simple model based on evidence to represent a proposed object or tool. (2-LS2-2) **Asking Questions and Defining Problems** ● Ask questions based on observations to find more information about the natural and/or designed world(s). (K-2-ETS1-1) ● Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)	**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) **LS2.A: Interdependent Relationships in Ecosystems** ● Plants depend on water and light to grow. (2-LS2-1) ● 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)* **ETS1.A: Defining and Delimiting Engineering Problems** ● A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1) ● Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1)	● Scientists look for patterns and order when making observations about the world. (2-LS4-1)

English Language Arts	Mathematics

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.2.7 Recall information from experiences or gather information from provided sources to answer a question. (2-LS2-1),(K-2-ETS1-1) W.2.8 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) S L.2.5 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (K-2-ETS1-1) W.2.6 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (K-2-ETS1-1) RI.2.1	MP.2 Reason abstractly and quantitatively. (2-LS2-1), (K-2-ETS1-1) MP.4 Model with mathematics. (2-LS2-1),(2-LS2-2),(K-2-ETS1-1) MP.5 Use appropriate tools strategically. (2-LS2-1),(K-2-ETS1-1) 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 using information presented in a bar graph. (2-LS2-2) 2.MD.D.10