

## Overviews of Life Science Lessons

Below are overviews of Cody Outdoor Classroom's life science lessons. Please note each lesson specifies the grades it is designed for. Some lessons can be tailored to include additional grades; please contact us for more information regarding this.

NGSS, MA, and NH science standards for the lessons are listed in an Appendix below the overviews.

### **Lookin' for Life**

#### **Discovering and Observing Biodiversity in Your Backyard!**

Grades: 2<sup>nd</sup>, 3<sup>rd</sup>

Hidden in the bushes, grasses, and trees of schoolyards are numerous plant, insect, bird, and mammal species. Through hands-on guided exploration, students explore this new frontier of biodiversity. They learn how to make scientific observations using their eyes, ears, and tools such as magnifying glasses and bug nets. Safely, they find various forms of life that exist in their schoolyard and categorize the life forms based on observable differences such as color, physical features, and animal or plant. Students work collaboratively to construct an argument that highlights why specific traits help animals survive in their environments.

### **Build-a-Plant**

#### **Exploring the Structure and Function of Plants**

Grades: 4<sup>th</sup>, 5<sup>th</sup>

All plants need sun, water, and nutrients to survive and reproduce. Through experiential hands-on activities, students explore basic internal and external plant structures, evaluating how they help plants survive and reproduce. Students also determine how the needs of plants and animals differ. Collaborating to create a new, unique plant to survive in an environment of their choosing, students will then share arguments regarding how the structures of their new plant supports its function.

### **Connect the Dots**

#### **Impact of Abiotic Factors on the Biotic World**

Grades: 6<sup>th</sup>, 7<sup>th</sup>

Environmental systems are comprised of both abiotic and biotic components. Through hands-on collaboration, students explore how a change in one part of an environmental system can have widespread effects across the system. For example, abiotic forces, such as fire or climate change, can impact the health and population of the plants and animals in the ecosystem. Students will analyze and interpret real data to predict the impact of changes on a system.

## **Surviving the Winter Freeze**

### **Analyzing the Adaptations of New England Organisms**

Grade: 8<sup>th</sup>

New England organisms have adapted to survive the cold, long harsh winters. Students explore how various abiotic factors (such as long winters) impact survival, adaptations, and natural selection over time. Creating a model to describe these processes, students also address factors that influence the likelihood of a species passing on genetic traits and information. Students use this knowledge to design a “super-animal” that is best equipped to survive a New England winter. Students predict how other environmental factors, such as drought, heat, and habitat loss, might affect the physical and behavioral traits of a species over time.

**See next page for Appendix: Science Standards.**

## Appendix: Science Standards

### Lookin' for Life

#### Discovering and Observing Biodiversity in Your Backyard!

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

**NGSS:** 3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

**MA:** 2-LS4-1. Use texts, media, or local environments to observe and compare (a) different kinds of living things in an area, and (b) differences in the kinds of living things living in different types of areas.

**MA:** 3-LS4-3. Construct an argument with evidence that in a particular environment some organisms can survive well, some survive less well, and some cannot survive.

**NH:** S:LS1:2:1.1 Differentiate between living and nonliving things; and categorize objects in each group using the significant observable characteristics they share, such as color, shape and size.

**NH:** S:LS1:2:1.2 Recognize plants and animals as living things and describe how they are alike and different.

**NH:** S:LS1:4:1.1 Recognize and identify the various ways in which living things can be grouped.

**NH:** S:LS1:4:1.2 Sort/classify different living things using similar and different characteristics; and describe why organisms belong to each group or cite evidence about how they are alike or not alike.

**NH:** S:LS5:4:2.1 Demonstrate the use of appropriate tools and simple equipment, such as thermometers, magnifiers and microscopes to gather data and extend the senses.

**NH:** S:SPS1:2:1.3 Ask questions about objects, organisms and events in their immediate environment.

**NH:** S:SPS1:2:1.5 Sort and classify object materials and events based on one or more attributes; and explain the methods used for sorting.

**NH:** S:SPS1:2:2.2 Suggest a plan and describe a sequence of events for conducting an exploration.

**NH:** S:SPS3:2:2.1 Use observation skills to describe the area around their homes and school.

### Build-a-Plant

#### Exploring the Structure and Function of Plants

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

**NGSS:** 5-LS1-1. Support an argument that plants get the materials they need for growth chiefly from air and water.

**MA:** 4-LS1-1. Construct an argument that animals and plants have internal and external structures that support their survival, growth, behavior, and reproduction.

**MA:** 5-LS1-1. Ask testable questions about the process by which plants use air, water, and energy from sunlight to produce sugars and plant materials needed for growth and reproduction.

**NH:** S:LS1:4:2.1 Recognize that living organisms have certain structures and systems that perform specific functions, facilitating survival, growth and reproduction.

**NH:** S:LS1:4.2.2 Identify and describe the function of the plant structures responsible for food production, water transport, support, reproduction, growth and protection.

**NH:** S:LS1:4.2.3 Identify and explain how the physical structures of an organism (plants or animals) allow it to survive in its habitat/environment (e.g., roots for water; nose to smell fire).

**NH:** S:LS1:4.2.4 Identify the basic needs of plants and animals in order to stay alive (i.e., water, air, food, space).

**NH:** S:LS2:6.2.2 Recognize that one of the most general distinctions among organisms is between plants, which use sunlight to make their own food, and animals, which consume energy-rich foods.

**NH:** S:SPS2:4:2.1 Demonstrate that if something consists of many parts, the parts usually influence one another.

**NH:** S:SPS3:4:1.2 Communicate ideas to others.

**NH:** S:SPS4:4:4.3 Use evidence to construct explanations.

**NH:** S:SPS4:4:6.2 Engage in group decision making activities.

## **Connect the Dots**

### **Impact of Abiotic Factors on the Biotic World**

**NGSS:** MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

**NGSS:** MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

**MA:** 7.MS-LS2-4. Analyze data to provide evidence that disruptions (natural or human-made) to any physical or biological component of an ecosystem can lead to shifts in all its populations.

**NH:** S:LS2:6:3.2 Using food webs, identify and describe the ways in which organisms interact and depend on one another in an ecosystem.

**NH:** S:LS3:6:1.2 Explain how changes in environmental conditions can affect the survival of individual organisms and the entire species.

**NH:** S:LS1:8:2.2 Define a population and describe the factors that can affect it.

**NH:** S:LS2:8:1.1 Explain how changes in environmental conditions can affect the survival of individual organisms and an entire species.

**NH:** S:LS2:8:1.3 Using data and observations, predict outcomes when abiotic/biotic factors are changed in an ecosystem.

**NH:** S:LS3:8:1.1 Describe the type of impact certain environmental changes, including deforestation, invasive species, increased erosion, and pollution containing toxic substances, could have on local environments.

**NH:** S:SPS1:6:1.8 Ask questions about relationships between and among observations.

**NH:** S:SPS1:6:4.4 Identify patterns and relationships in data and formulate basic explanations.

**NH:** S:SPS2:6:1.2 Describe how results of similar and repeated investigations may vary and suggest possible explanations for variations.

**NH:** S:SPS2:6:2.1 Recognize that thinking about things as systems means looking for how every part relates to others.

**NH:** S:SPS2:6:2.3 Estimate or predict the effect that making a change in one part of the system will have on other parts, and on the system as a whole.

## **Surviving the Winter Freeze**

### **Analyzing the Adaptations of New England Organisms**

**NGSS:** MS-LS4-4. Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.

**MA:** 8.MS-LS4-4. Use a model to describe the process of natural selection, in which genetic variations of some traits in a population increase some individuals' likelihood of surviving and reproducing in a changing environment. Provide evidence that natural selection occurs over many generations.

**NH:** S:LS3:8:3.3 Explain how individual organisms with certain traits are more likely than others to survive and have offspring.

**NH:** S:LS3:8:3.5 Cite examples supporting the concept that certain traits of organisms may provide a survival advantage in a specific environment and therefore, an increased likelihood to produce offspring.

**NH:** S:SPS2:8:1.3 Realize that knowledge, based on science, is subject to modification as new information challenges prevailing theories and as a new theory leads to looking at old observations in a new way.

**NH:** S:SPS2:8:3.2 Know that different models can be used to represent the same thing; what kind of model is used and how complex it should be depends on its purpose; and the usefulness of a model is one of the instances in which intuition and creativity come into play in science, mathematics and engineering.

**NH:** S:SPS3:8:1.1 Work effectively within a cooperative group setting, accepting and executing assigned roles and responsibilities.