

## Life Science: Environments and Habitats

<b>Standard 3.L.5:</b> The student will demonstrate an understanding of how the characteristics and changes in environments and habitats affect the diversity of organisms.	
<b>3.L.5A. Conceptual Understanding:</b> The characteristics of an environment (including physical characteristics, temperature, availability of resources, or the kinds and numbers of organisms present) influence the diversity of organisms that live there. Organisms can survive only in environments where their basic needs are met. All organisms need energy to live and grow. This energy is obtained from food. The role an organism serves in an ecosystem can be described by the way in which it gets its energy.	
<b>Performance Indicator</b>	<b>3.L.5A.1:</b> <u>Analyze and interpret data</u> about the characteristics of environments (including salt and fresh water, deserts, grasslands, forests, rain forests, and polar lands) to describe how the environment supports a variety of organisms.
<b>Science and Engineering Practice</b>	<b>3.S.1A.4:</b> <u>Analyze and interpret data</u> from observations, measurements, or investigations to understand patterns and meanings.
<b>Crosscutting Concepts</b>	The following Crosscutting Concepts may be applied to the content of this indicator. For more information see page 6.  Patterns Cause and Effect

### Essential Learning Experiences:

It is essential that students collect, analyze, and interpret data from various sources, including informational texts, online resources, videos, pictures, expert speakers, field studies, etc... to describe the characteristics of different environments and to explain how the environments are able to support the organisms that live there. For example:

- Organisms survive best in certain environments in which their physical factors (light, temperature, water, soil, and space for shelter and reproduction) are present. Each environment has a unique combination of these factors that allows certain organisms to survive there.
- Saltwater:
  - Oceans
    - Oceans are large bodies of salt water divided by continents. Since ocean water is constantly moving, the characteristics of the water are constantly changing. The amount of sunlight varies by depth, hence temperature also varies by depth. The amount of salt, other minerals and additives also varies based on what lives within the water and sometimes what pollution has been placed in the water.

- Most organisms live in the shallow portion of the ocean because sunlight can penetrate the shallow parts of the ocean are drifters (jellyfish or seaweed), swimmers (fish), crawlers (crabs), and those anchored to the sea floor (corals).
- Some organisms live in the open ocean, near the surface of the ocean, or in the deep ocean bottom. Plankton float in the upper regions of the water. Some organisms swim to the surface for food or air (whales, turtles, dolphins) while other organisms stay closer to the bottom of the ocean (octopus).
- Estuaries:
  - Estuaries are found where freshwater rivers and salt water meets.
  - Estuaries are saltier than a river but not as salty as the ocean. The amount of salt (salinity) changes with the tides.
  - Estuaries contain salt marshes with grasses and marsh plants adapted to this changing water. Examples of animals that live in the estuaries/salt marshes include crabs, shrimp, birds (i.e. blue heron and egrets), and muskrats
- Fresh Water:
  - Lakes and Ponds
    - Lakes and ponds are bodies of freshwater that are surrounded by land.
    - Ponds are usually shallower than lakes and the temperature of the water usually stays the same from top to bottom.
    - Plants and algae usually grow along the edges where the water is shallow.
    - Examples of animals that live in freshwater include fish, amphibians, ducks, turtles, or beavers.
  - Rivers and Streams
    - Rivers and streams are moving bodies of water that can be found in warm or cold areas.
    - The water in rivers and streams can be fast or slow moving.
    - The speed of the water flow determines the types of plants and animals that live in or use the rivers and streams.
    - There are many plants (bushes and trees) along the banks as well as plants growing in the water.
    - Many animals (i.e. fish, crayfish, snakes, worms, and insects) use these plants for food or shelter.
  - Swamps
    - Swamps are located in areas with warm temperatures.
    - Since swamps have thick plant growth such as ferns and reeds, small bushes and small trees do not thrive due to lack of sunlight.
    - The surviving trees are very tall, reaching for sunlight. Standing water causes the trunks of the trees to spread out to provide support.
      - For example the cypress, a tree found in the swamp, has “knees” or roots that come to the surface.
    - The animals that live in the swamp are very adapted to a water environment (i.e. alligators, turtles, ducks, and egrets).

- Terrestrial:
  - Deserts
    - Are dry with extreme temperature ranges.
    - Some deserts are covered with sand.
    - In some deserts during the day, it is very hot, whereas the nights are very cold.
    - Most of the plants (i.e. cacti) and animals (i.e. lizards, scorpions, and rabbits) have ways to conserve moisture; are able to go long periods without water; or can withstand the extreme temperature changes.
    - Most of the animals are active during the night when temperatures are cooler.
  - Grasslands
    - Have fertile soil and are covered with tall grasses.
    - They usually get a moderate amount of rain, but less than forests.
    - Temperatures may also vary depending on where the grassland is located.
    - Some examples of animals that live in the grasslands are prairie dogs, bison, and grasshoppers.
  - Forests
    - Have many trees (with needles or with leaves), shrubs, grasses and ferns, and a variety of animals.
    - They usually get more rain than grasslands.
    - Temperatures in the forests may vary depending on where the forest is located.
  - Rainforests
    - Are very humid and warm and have an abundance of rain that leads to lush plant growth (for example, tall trees, vines, ferns, orchids, and other colorful flowering plants).
    - Animals that live in the rainforest are often very colorful, to match the varieties of plants (for camouflage)
    - Many animals are also tree dwellers (i.e. birds and lizards), moving across the canopy rather than traveling on the ground.
  - Polar Lands
    - Are usually very cold and the amount of daylight varies throughout the year.
    - Winters are mostly dark with only moonlight and starlight, whereas in the summers, there is up to 24 hours of daylight. There is little variety of plant life (mosses, for example).
    - Animals that live in the polar region (for example, reindeer, seals, polar bears, arctic foxes, and penguins) are adapted to these conditions by having extra fat or thick fur for insulation.

Summary of Characteristics of Distinct Environments

	Temperature	Water	Light	Plant Life (examples)	Animal Life (examples)
<b>Oceans</b>	cold to warm (depending on location)	extremely salty	lots of light near the surface, less light at depth	plankton	whales, turtles, sharks, jellyfish, crabs
<b>Estuaries/ Salt Marsh</b>	cold to warm (depending on location)	brackish (partially salty)	abundant light on land surfaces; light is filtered through water	cordgrass, trees, shrubs	crabs, shrimp, water birds, deer, snails
<b>Lakes and Ponds</b>	cold to warm (depending on the location)	freshwater	lots of light near the surface, less light at depth	algae, shallow water grasses	fish, amphibians, ducks, turtles, beavers
<b>Rivers and Streams</b>	cold to warm (depending on location)	freshwater	abundant light on land surfaces; light is filtered through water	bushes, trees on banks, water plants	fish, crayfish, snakes, insects
<b>Swamps</b>	warm-hot	freshwater	light is filtered through trees to the swamp floor	cypress trees, ferns, water lilies	alligators, water birds, turtles
<b>Deserts</b>	hot and dry during the day, cold at night	dry, limited rainfall	abundant light	cactus	lizards, scorpions, rabbits
<b>Grasslands</b>	cool to warm (depending on location)	medium amount of rain	abundant light	grasses	prairie dogs, bison, grasshoppers
<b>Forest</b>	cold to warm (depending on location)	medium amount of rain	abundant light on tree canopy; less light is filtered to the forest floor through the trees	trees with leaves or needles, shrubs, grasses, ferns	birds, foxes, rabbits, bears, snakes, deer
<b>Tropical Rainforest</b>	hot and humid	frequent rain; large amounts	abundant light on tree canopy; less light is filtered to the forest floor through the trees	abundant trees, vines, lush growth	birds, frogs, monkeys, snakes

<b>Polar Lands</b>	cold	dry/frozen	amount of daylight varies throughout the year	lichens, mosses	seals, polar bears (Arctic), penguins (Antarctic)
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### Extended Learning Experiences:

The following knowledge and learning experiences are not essential to the success of this learning goal but can be used by teachers to extend the depth and rigor of student engagements.

- Students may collect data from additional habitats in addition to those listed above.
- Students may collect data to distinguish between variations of specific environments, such as different types of forests, different zones within the ocean, etc.

### Assessment Guidelines:

Students should engage in multiple science and engineering practices when interacting with the content outlined in this performance indicator. For further information please see SEP Support Guide at:

[https://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete\\_2014SEPsGuide\\_SupportDoc2\\_0.pdf](https://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf)

<b>Learning Connections</b>	<p><b>Previous Learning Connections (K-2):</b></p> <p><b>K.L.2A.2:</b> Conduct structured investigations to determine what plants need to live and grow (including water and light).</p> <p><b>K.L.2A.5:</b> Construct explanations from observations of what animals need to survive and grow (including air, water, nutrients, and shelter).</p> <p><b>K.L.2A.6:</b> Obtain and communicate information about the needs of organisms to explain why they live in particular areas.</p> <p><b>1.L.5B.1:</b> Conduct structured investigations to answer questions about what plants need to live and grow (including air, water, sunlight, minerals, and space).</p> <p><b>1.L.5B.2:</b> Develop and use models to compare how the different characteristics of plants help them survive in distinct environments (including deserts, forests, and grasslands).</p> <p><b>2.L.5B.1:</b> Obtain and communicate information to describe and compare how animals interact with other animals and plants in the environment.</p> <p><b>2.L.5B.2:</b> Develop and use models to exemplify characteristics of animals that help them survive in distinct environments (such as salt and freshwater, deserts, forests, wetlands, or polar lands).</p> <p><b>Future Learning Connections (4-8):</b></p> <p><b>5.L.4A.1:</b> Analyze and interpret data to summarize the abiotic factors (including quantity of light and water, range of temperature, salinity, and soil composition) of different terrestrial ecosystems and aquatic ecosystems.</p> <p><b>5.L.4A.2:</b> Obtain and communicate information to describe and compare the biotic factors (including individual organisms, populations, and communities)</p>
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of different terrestrial and aquatic ecosystems.

**5.L.4B.3:** Construct explanations for how organisms interact with each other in an ecosystem (including predators and prey, and parasites and hosts).

**5.L.4B.4:** Construct scientific arguments to explain how limiting factors (including food, water, space, and shelter) or a newly introduced organism can affect an ecosystem.

**7.EC.5A.3:** Analyze and interpret data to predict changes in the number of organisms within a population when certain changes occur to the physical environment (such as changes due to natural hazards or limiting factors).

**7.EC.5B.1:** Develop and use models to explain how organisms interact in a competitive or mutually beneficial relationship for food, shelter, or space (including competition, mutualism, commensalism, parasitism, and predator-prey relationships).

**7.EC.5B.3:** Analyze and interpret data to predict how changes in the number of organisms of one species affects the balance of an ecosystem.

**7.EC.5B.4:** Define problems caused by the introduction of a new species in an environment and design devices or solutions to minimize the impact(s) to the balance of an ecosystem.

## Life Science: Environments and Habitats

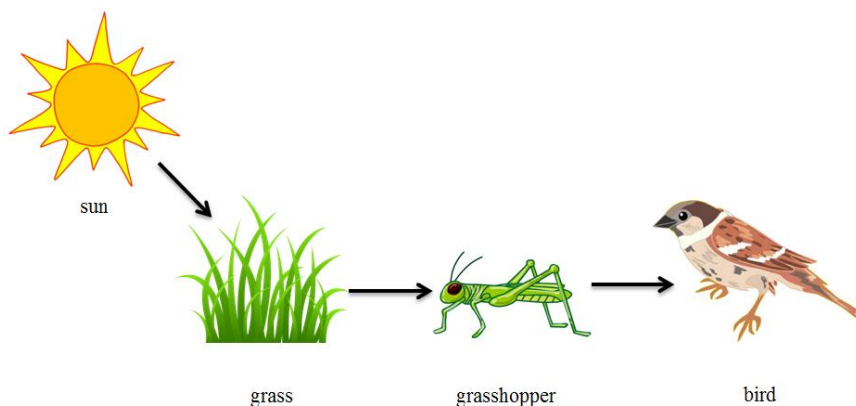
<b>Standard 3.L.5:</b> The student will demonstrate an understanding of how the characteristics and changes in environments and habitats affect the diversity of organisms.	
<b>3.L.5A. Conceptual Understanding:</b> The characteristics of an environment (including physical characteristics, temperature, availability of resources, or the kinds and numbers of organisms present) influence the diversity of organisms that live there. Organisms can survive only in environments where their basic needs are met. All organisms need energy to live and grow. This energy is obtained from food. The role an organism serves in an ecosystem can be described by the way in which it gets its energy.	
<b>Performance Indicator</b>	<b>3.L.5A.2:</b> <u>Develop and use a food chain model</u> to classify organisms as producers, consumers, and decomposers and to describe how organisms obtain energy.
<b>Science and Engineering Practice</b>	<b>3.S.1A.2:</b> <u>Develop, use, and refine models</u> to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.
<b>Crosscutting Concepts</b>	The following Crosscutting Concepts may be applied to the content of this indicator. For more information see page 6.  Systems and System Models Energy and Matter

### Essential Learning Experiences:

It is essential that students obtain information from different sources, including observations, habitat data, informational texts, videos, pictures, expert speakers, field studies, etc. about how organisms obtain their energy and develop food chain models that can be used to illustrate how different organisms obtain their energy and to classify organisms as producers, consumers, and decomposers. For example:

- All organisms need energy to survive. Energy gives the organism its ability to do the things it needs to do to survive. In most habitats, the sun provides the initial energy for the plants, which is passed from plants (producers) to animals (consumers) when animals eat the plants.
- Food Chains:
  - When scientists describe the way energy is passed from one organism to another they use a model called a food chain.
  - A food chain uses arrows to show the direction of energy flow and usually contains no more than six organisms.
  - Example of a grassland food chain
- Classification of plants and animals in a food chain:
  - Producers: Plants that use energy from the Sun to make their own food are classified as producers.

- Consumers: Animals that get their energy by eating other plants and/or animals are classified as consumers.
- Decomposers: Organisms that get their energy by breaking down dead plants and animals are classified as decomposers. Mushrooms are a type of fungi that are classified as decomposers.
  - Decomposers are not always illustrated on a food chain model because decomposers can get their energy from many different producers and consumers on a particular food chain.



*Figure 2. Food chain (SCDE, 2018).*

### Extended Learning Experiences:

The following knowledge and learning experiences are not essential to the success of this learning goal but can be used by teachers to extend the depth and rigor of student engagements.

- Students may develop multiple food chain models to illustrate how together they form a food web.
- Students may use their models to identify the specific role of consumers based on what they eat (herbivores, carnivores, omnivores).
- Students may use their models to identify consumers are primary, secondary, tertiary consumers.
- Students may use their models to identify specific relationships, such as predator-prey.

### Assessment Guidelines:

Students should engage in multiple science and engineering practices when interacting with the content outlined in this performance indicator. ([See SEP Support document.](#))

<b>Learning Connections</b>	<p><b>Previous Learning Connections (K-2):</b></p> <p><b>K.L.2A.2:</b> Conduct structured investigations to determine what plants need to live and grow (including water and light).</p> <p><b>K.L.2A.5:</b> Construct explanations from observations of what animals need to survive and grow (including air, water, nutrients, and shelter).</p> <p><b>1.L.5B.1:</b> Conduct structured investigations to answer questions about what</p>
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plants need to live and grow (including air, water, sunlight, minerals, and space).

**2.L.5B.1:** Obtain and communicate information to describe and compare how animals interact with other animals and plants in the environment.

**Future Learning Connections (4-8):**

**5.L.4B.1:** Analyze and interpret data to explain how organisms obtain their energy and classify an organisms as producers, consumers (including herbivore, carnivore, and omnivore), or decomposers (such as fungi and bacteria).

**5.L.4B.2:** Develop and use models of food chains and food webs to describe the flow of energy in an ecosystem.

**5.L.4B.3:** Construct explanations for how organisms interact with each other in an ecosystem (including predators and prey, and parasites and hosts).

**7.EC.5B.1:** Develop and use models to explain how organisms interact in a competitive or mutually beneficial relationship for food, shelter, or space (including competition, mutualism, commensalism, parasitism, and predator-prey relationships).

**7.EC.5B.2:** Develop and use models (food webs and energy pyramids) to exemplify how the transfer of energy in an ecosystem supports the concept that energy is conserved.

## Life Science: Environments and Habitats

<b>Standard 3.L.5:</b> The student will demonstrate an understanding of how the characteristics and changes in environments and habitats affect the diversity of organisms.	
<b>3.L.5B. Conceptual Understanding:</b> When the environment or habitat changes, some plants and animals survive and reproduce, some move to new locations, and some die. Fossils can be used to infer characteristics of environments from long ago.	
<b>Performance Indicator</b>	<b>3.L.5B.1:</b> <u>Obtain and communicate information</u> to explain how changes in habitats (such as those that occur naturally or those caused by organisms) can be beneficial or harmful to the organisms that live there.
<b>Science and Engineering Practice</b>	<b>3.S.1A.8:</b> <u>Obtain and evaluate</u> informational texts, observations, data collected, or discussions to (1) generate and answer questions, (2) understand phenomena, (3) develop models, or (4) support explanations, claims, or designs. <u>Communicate</u> observations and explanations using the conventions and expectations of oral and written language.
<b>Crosscutting Concepts</b>	The following Crosscutting Concepts may be applied to the content of this indicator. For more information see page 6.  Cause and Effect Stability and Change

### Essential Learning Experiences:

It is essential that students obtain information from various sources, including observations, informational texts, videos, pictures, expert speakers, field studies, etc... to construct explanations for how some changes in habitats can be beneficial to the organisms that live there and some changes in habitats can be harmful to the organisms that live there. For example:

- Habitats change due to natural causes or actions of organisms and those changes may be helpful or harmful to the organisms that live there. All organisms (including humans) change the environment in helpful or harmful ways (see table below). Natural changes in the environment include floods, fires (due to lightning), droughts, landslides, volcanic eruptions, and earthquakes. Changes to an environment can also be caused by human carelessness, urbanization, pollutants, or the introduction of non-native species.

<b>Actions of Organisms</b>	<b>Harmful Effect</b>	<b>Beneficial Effect</b>
humans pollute the air with emissions from vehicles and factories	organisms breathing unclean air may become sick or die	None
humans cut down trees to build homes	animals struggle to find trees and plants for food and shelter; there are less trees to clean the air	plants and animals that thrive in grassland areas have new areas for shelter and space
humans pollute the water with toxic chemicals and trash	drinking water for humans and animals is poor quality; plants and animals that live in the water are harmed	None
herd animals (cows, etc) may overgraze the land	land with less or no grass can be easily eroded by wind and water; animals may pollute streams or lakes with their droppings	herd animals fertilize the land with their droppings which lead to new plant growth
humans dig mines in the ground or inside mountains	sinkholes can form, swallowing large areas of land; trees are logged to create areas for dumping debris from the mine; water can be polluted by chemical runoff from mines	Extract metals and minerals to build things; make jewelry; make medicines and materials, etc.
beavers create dams which block the flow of water	water does not reach plants or animals downstream who depend on it for survival	dams create pond environments in which new plants and animals can survive
due to lack of resources, animals migrate to new areas	there is more competition for space and food	None
Farmers/companies replanting fields with the same crop repeatedly	Long term harm – depleting soil of minerals	Short term benefit – provide food and/or resources

<b>Natural Occurrences</b>	<b>Harmful Effect</b>	<b>Helpful Effect</b>
floods	destroys ecosystems on the land which cause animals to struggle to meet basic needs (food, shelter, space, etc.)	floods carry and deposit nutrients that enrich soil so that new plants can grow
fires	destroy plants and trees which are sources of food and shelter	benefits plants by adding nutrients to the soil; removes dead and decaying plants; eliminates dense foliage, allowing seeds to grow and thrive; restores plant nutrients to the soil
droughts	plants and trees may die due to lack of water; organisms that rely on the plants and trees for food may die as a result	in wetlands/marshes, droughts allow these areas to begin to dry out, causing new plant growth
landslides	destroys habitats	makes uninhabitable environments more easily accessible; make new areas for plants and animals to grow
volcanic eruptions	destroy entire ecosystems including all plants and animals; make the air difficult to breathe nearby	volcanic ash contains nutrients that enrich the soil which will help new plants grow; volcanic rocks are often used as building materials
earthquakes	earthquakes can trigger landslides, which can destroy plant and animal habitats	can make natural resources easier to access

NOTE TO TEACHER: Some of the natural changes listed above are covered in **3E.4B.3**.

#### **Extended Learning Experiences:**

The following knowledge and learning experiences are not essential to the success of this learning goal but can be used by teachers to extend the depth and rigor of student engagements.

- Students may obtain information related to other factors that can impact habitats and the organisms that live there, such as climate change, acid rain, etc...
- Students may obtain information related to the specific abiotic and biotic factors for a given habitat.
- Students may obtain information related to the impact of invasive species.
- Students may obtain information related to how changes impact specific limiting factors.

**Assessment Guidelines:**

Students should engage in multiple science and engineering practices when interacting with the content outlined in this performance indicator. For further information please see SEP Support Guide at:

[https://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete\\_2014SEPsGuide\\_SupportDoc2\\_0.pdf](https://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf)

<b>Learning Connections</b>	<p><b>Previous Learning Connections (K-2):</b></p> <p><b>1.L.5B.3:</b> Analyze and interpret data from observations to describe how changes in the environment cause plants to respond in different ways (such as turning leaves toward the Sun, leaves changing color, leaves wilting, or trees shedding leaves).</p> <p><b>2.L.5B.3:</b> Analyze and interpret data from observations to describe how animals respond to changes in their environment (such as changes in food availability, water, or air).</p> <p><b>2.L.5B.4:</b> Construct scientific arguments to explain how animals can change their environments (such as the shape of the land or the flow of water).</p> <p><b>Future Learning Connections (4-8):</b></p> <p><b>5.L.4B.4:</b> Construct scientific arguments to explain how limiting factors (including food, water, space, and shelter) or a newly introduced organism can affect an ecosystem.</p> <p><b>6.L.4B.3:</b> Construct explanations of how animal responses (including hibernation, migration, grouping, and courtship) to environmental stimuli allow them to survive and reproduce.</p> <p><b>6.L.4B.5:</b> Analyze and interpret data to compare how endothermic and ectothermic animals respond to changes in environmental temperature.</p> <p><b>6.L.5B.4:</b> Plan and conduct controlled scientific investigations to determine how changes in environmental factors (such as air, water, light, minerals, or space) affect the growth and development of a flowering plant.</p> <p><b>6.L.5B.5:</b> Analyze and interpret data to describe how plants respond to external stimuli (including temperature, light, touch, water, and gravity).</p> <p><b>7.EC.5A.3:</b> Analyze and interpret data to predict changes in the number of organisms within a population when certain changes occur to the physical environment (such as changes due to natural hazards or limiting factors).</p> <p><b>7.EC.5B.3:</b> Analyze and interpret data to predict how changes in the number of organisms of one species affects the balance of an ecosystem.</p> <p><b>7.EC.5B.4:</b> Define problems caused by the introduction of a new species in an environment and design devices or solutions to minimize the impact(s) to the balance of an ecosystem.</p>
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<b>Standard 3.L.5:</b> The student will demonstrate an understanding of how the characteristics and changes in environments and habitats affect the diversity of organisms.	
<b>3.L.5B. Conceptual Understanding:</b> When the environment or habitat changes, some plants and animals survive and reproduce, some move to new locations, and some die. Fossils can be used to infer characteristics of environments from long ago.	
<b>Performance Indicator</b>	<b>3.L.5B.2:</b> <u>Develop and use models</u> to explain how changes in a habitat cause plants and animals to respond in different ways (such as hibernating, migrating, responding to light, death, or extinction).
<b>Science and Engineering Practice</b>	<b>3.S.1A.2:</b> <u>Develop, use, and refine models</u> to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.
<b>Crosscutting Concepts</b>	The following Crosscutting Concepts may be applied to the content of this indicator. For more information see page 6.  Cause and Effect Systems and System Models Stability and Change

### Essential Learning Experiences:

It is essential that students use information from various sources, including observations, informational texts, videos, pictures, expert speakers, field studies, etc. to develop models that can be used to construct explanations for how plants and animals respond to changes in habitats in different ways, including the following:

- Animals may respond to changes in habitats by migrating to new areas if their basic needs cannot be met in their existing habitat.
- Other animals (such as bears) may hibernate if they are unable to find sufficient food sources or if the temperature becomes too cold.
- More light is available for the forest floor when some trees are cut, allowing other plants to grow taller.
- Seeds may not germinate if there is insufficient rainfall or if the temperature is too cold.
- Both plants and animals may be unable to respond to changes in their habitat and may individually die or become extinct. Extinction is the death of an entire group of organisms. Extinction occurs if over many generations, animals or plants cannot adapt to changes in the environment.

### Extended Learning Experiences:

The following knowledge and learning experiences are not essential to the success of this learning goal but can be used by teachers to extend the depth and rigor of student engagements.

- Students may develop models to illustrate other ways organisms respond to changes in their habitats beyond those listed above.
- Students may develop models to illustrate how organisms respond to different natural events, such as those described in the essential learning experiences for **3.L.5B.1**.
- Students may obtain information about specific organisms that have gone extinct.

### Assessment Guidelines:

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[https://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete\\_2014SEPsGuide\\_SupportDoc2\\_0.pdf](https://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf)

<b>Learning Connections</b>	<p><b>Previous Learning Connections (K-2):</b></p> <p><b>1.L.5B.3:</b> Analyze and interpret data from observations to describe how changes in the environment cause plants to respond in different ways (such as turning leaves toward the Sun, leaves changing color, leaves wilting, or trees shedding leaves).</p> <p><b>2.L.5B.3:</b> Analyze and interpret data from observations to describe how animals respond to changes in their environment (such as changes in food availability, water, or air).</p> <p><b>2.L.5B.4:</b> Construct scientific arguments to explain how animals can change their environments (such as the shape of the land or the flow of water).</p> <p><b>Future Learning Connections (4-8):</b></p> <p><b>5.L.4B.4:</b> Construct scientific arguments to explain how limiting factors (including food, water, space, and shelter) or a newly introduced organism can affect an ecosystem.</p> <p><b>6.L.4B.3:</b> Construct explanations of how animal responses (including hibernation, migration, grouping, and courtship) to environmental stimuli allow them to survive and reproduce.</p> <p><b>6.L.4B.5:</b> Analyze and interpret data to compare how endothermic and ectothermic animals respond to changes in environmental temperature.</p> <p><b>6.L.5B.4:</b> Plan and conduct controlled scientific investigations to determine how changes in environmental factors (such as air, water, light, minerals, or space) affect the growth and development of a flowering plant.</p> <p><b>6.L.5B.5:</b> Analyze and interpret data to describe how plants respond to external stimuli (including temperature, light, touch, water, and gravity).</p> <p><b>7.EC.5A.3:</b> Analyze and interpret data to predict changes in the number of organisms within a population when certain changes occur to the physical environment (such as changes due to natural hazards or limiting factors).</p> <p><b>7.EC.5B.3:</b> Analyze and interpret data to predict how changes in the number of organisms of one species affects the balance of an ecosystem.</p> <p><b>7.EC.5B.4:</b> Define problems caused by the introduction of a new species in an environment and design devices or solutions to minimize the impact(s) to the balance of an ecosystem.</p>
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**8.E.6A.3:** Construct explanations from evidence for how catastrophic events (including volcanic activities, earthquakes, climatic changes, and the impact of an asteroid/comet) may have affected the conditions on Earth and the diversity of its life forms.

**8.E.6B.2:** Obtain and communicate information to support claims that natural and human-made factors can contribute to the extinction of species.



## Life Science: Environments and Habitats

<b>Standard 3.L.5:</b> The student will demonstrate an understanding of how the characteristics and changes in environments and habitats affect the diversity of organisms.	
<b>3.L.5B. Conceptual Understanding:</b> When the environment or habitat changes, some plants and animals survive and reproduce, some move to new locations, and some die. Fossils can be used to infer characteristics of environments from long ago.	
<b>Performance Indicator</b>	<b>3.L.5B.3:</b> <u>Construct scientific arguments</u> using evidence from fossils of plants and animals that lived long ago to infer the characteristics of early environments.
<b>Science and Engineering Practice</b>	<b>3.S.1A.7:</b> <u>Construct scientific arguments</u> to support claims, explanations, or designs using evidence from observations, data, or informational texts.
<b>Crosscutting Concepts</b>	The following Crosscutting Concepts may be applied to the content of this indicator. For more information see page 6.  Patterns Cause and Effect Stability and Change

### Essential Learning Experiences:

It is essential that students use evidence from fossils to construct scientific arguments for how different fossils support claims for how past environments from earlier time periods of Earth's history might have been different. For example:

- A fossil is the remains of a living organism that lived long ago and has been preserved in rock or has hardened minerals. Fossils can give information about what the environment was like in the location where the fossil was found.
  - Fossils of a water organism found in an area that is now mountains means that area was possibly once under water.
  - Fossils of crab burrows found on grasslands suggest that area was possibly once near an ocean.
  - Fossils of trees or tree parts found in a desert mean that area was possibly once a forest.
  - Fossils of plants found in very cold areas of Earth means that area at one time possibly had a warmer climate.
- Every time a new fossil is found, more information about life on Earth and the environment of Earth is discovered. For example,
  - Fossilized shark teeth suggest that sharks in the past lived in an environment similar to current environments, because their teeth are similar.
  - Skulls and lower jaws of crocodilians found in the sandy clay of the coastal plain suggest that these ancestors of modern day alligators and crocodiles lived in the shallow, warm waters of an estuary/salt marsh.

- The wide horns of the ancient buffalo that once roamed the land indicate that there were more grasslands in South Carolina.
- The long, sharp teeth on the skull of the saber-toothed cat fossil, found in rocky sand with other animal fossil, hints that the saber-toothed cat lived in a heavily populated forest.

### **Extended Learning Experiences:**

The following knowledge and learning experiences are not essential to the success of this learning goal but can be used by teachers to extend the depth and rigor of student engagements.

- Students may obtain information about the methods of fossilization and what those methods indicate about past environments.
- Students may obtain information about why organisms change over time as a result of adaptations to changing environments.

### **Assessment Guidelines:**

Students should engage in multiple science and engineering practices when interacting with the content outlined in this performance indicator. For further information please see SEP Support Guide at:

[https://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete\\_2014SEPsGuide\\_SupportDoc2\\_0.pdf](https://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf)

<b>Learning Connections</b>	<p><b>Future Learning Connections (4-8):</b></p> <p><b>8.E.6A.2:</b> Analyze and interpret data from index fossil records and the ordering of rock layers to infer the relative age of rocks and fossils.</p> <p><b>8.E.6A.3:</b> Construct explanations from evidence for how catastrophic events (including volcanic activities, earthquakes, climatic changes, and the impact of an asteroid/comet) may have affected the conditions on Earth and the diversity of its life forms.</p> <p><b>8.E.6A.4:</b> Construct and analyze scientific arguments to support claims that different types of fossils provide evidence of (1) the diversity of life that has been present on Earth, (2) relationships between past and existing life forms, and (3) environmental changes that have occurred during Earth's history.</p>
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