South Carolina Aquarium

K-2 South Carolina Habitats Activity

Overview

Focus Question
What plants and animals live in the different habitats of South Carolina?

Activity Synopsis
Students will use maps and pictures to learn that each region in South Carolina has different habitats. The students will create dioramas to represent some of these habitats.

Time Frame
3 days (60 minutes per day)

Objectives
The learner will be able to:

- Explain that South Carolina contains many different environments
- Demonstrate that each of these environments has different features
- Given the needs of common plants and animals, correctly place them in the environment(s) which could serve as their habitat

Student Key Terms

- blackwater swamp
- deep ocean
- freshwater
- habitat
- mountain stream
- Piedmont river
- saltmarsh
- saltwater

Teacher Key Terms

- Coastal Plain
- Coastal Zone
- ecoregions
- intertidal zone
- Mountains
- Ocean
- Piedmont
- Sandhills

Standards

South Carolina College- and Career-Ready Science Standards 2021

Kindergarten: K-LS1-1, K-ESS2-2, **K-3SS3-1**
1st Grade: 1-LS1-1
2nd Grade: 2-LS2-1, 2-LS4-1, 2-ESS2-2

*** Bold standards are the main standards addressed in this activity**

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2014 Academic Standards and Performance Indicators for Science

Kindergarten: K.P.1A.1, K.P.1A.7, **K.P.1A.8**, **K.L.2A.1,** K.L.2A.2, **K.L.2A.5, K.L.2A.6**
1st Grade: 1.S.1A.1, 1.S.1A.4, 1.S.1A.7, **1.S.1A.8,** 1.L.5B.1, **1.L.5B.2**
2nd Grade: 2.S.1A.1, 2.S.1A.4, **2.S.1A.6**, 2.S.1A.7, **2.S.1A.8, 2.L.5B.1, 2.L.5B.2**

*** Bold standards are the main standards addressed in this activity**

South Carolina College- and Career-Ready Science Standards 2021

Kindergarten Performance Expectations
K-LS1-1 Use observations to describe patterns of what plants and animals (including humans) need to survive.
K-ESS2-2 Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.
K-ESS3-1 Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

First Grade Performance Expectations
1-LS1-1 Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

Second Grade Performance Expectations
2-LS2-1 Plan and conduct an investigation to determine what plants need to grow.
2-LS4-1 Make observations of plants and animals to compare patterns of diversity within different habitats.
2-ESS2-2 Develop a model to represent the shapes and kinds of land and bodies of water in an area.

2014 Academic Standards and Performance Indicators for Science

Kindergarten Performance Indicators
K.P.1A.1 Ask and answer questions about the natural world using explorations, observations, or structured investigations.
K.P.1A.7 Construct scientific arguments to support explanations using evidence from observations or data collected.
K.P.1A.8 Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions about the natural world, (2) understand phenomena, (3) develop models, or (4) support explanations. Communicate observations and explanations using oral and written language.
K.L.2A.1 Obtain information to answer questions about different organisms found in the environment (such as plants, animals, or fungi).
K.L.2A.2 Conduct structured investigations to determine what plants need to live and grow (including water and light).
K.L.2A.5 Construct explanations from observations of what animals need to survive and grow (including air, water, nutrients, and shelter).
K.L.2A.6 Obtain and communicate information about the needs of organisms to explain why they live in particular areas.

First Grade Performance Indicators
1.S.1A.1 Ask and answer questions about the natural world using explorations, observations, or structured investigations.
1.S.1A.4 Analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings.
1.S.1A.7 Construct scientific arguments to support claims or explanations using evidence from observations or data collected.
1.S.1A.8 Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions about the natural world, (2) understand phenomena, (3) develop models, or (4) support explanations. Communicate observations and explanations clearly through oral and written language.
1.L.5B.1 Conduct structured investigations to answer questions about what plants need to live and grow (including air, water, sunlight, minerals, and space).

1.L.5B.2 Develop and use models to compare how the different characteristics of plants help them survive in distinct environments (including deserts, forests, and grasslands).

Second Grade Performance Indicators

2.S.1A.1 Ask and answer questions about the natural world using explorations, observations, or structured investigations.
2.S.1A.4 Analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings.
2.S.1A.6 Construct explanations of phenomena using (1) student-generated observations and measurements, (2) results of scientific investigations, or (3) data communicated in graphs, tables, or diagrams.
2.S.1A.7 Construct scientific arguments to support claims or explanations using evidence from observations or data collected.
2.S.1A.8 Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions about the natural world, (2) understand phenomena, (3) develop models, or (4) support explanations.
2.L.5B.1 Obtain and communicate information to describe and compare how animals interact with other animals and plants in the environment.
2.L.5B.2 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).

Cross Curricular Standards

South Carolina College and Career Standards for Social Studies
K.G.1, K.G.2, K.G.3, 1.H.1, 1.H.3, 1.G.1, 1.G.4

South Carolina College and Career Standards for Math
1.MDA.4

South Carolina College and Career Standards for ELA
Inquiry (I) – K-1.1, K-2.1, K-3.1, K-3.2, K-4.1, K-4.2, K-4.3, 1-1.1, 1-2.1, 1-3.1, 1-3.2, 1-4.1, 1-4.2, 1-4.3, 2-1.1, 2-2.1, 2-3.1, 2-3.2, 2-4.1, 2-4.2, 2-4.3
Reading Literacy (RL) – K-6.1, 1-6.1, 2-6.1
Communications (C) – K-1.1, K-1.2, 1-1.1, 1-1.2, 2-1.1, 2-1.2

Common Core Math Standards
K.MD.1, K.MD.2, K.MD.3, 1.MD.4, 2.MD.10
1.NBT.3, 1.NBT.4, 1.NBT.5, 1.NBT.6

Common Core ELA Standards
Reading Informational Text – K.1, K.2, K.3, K.7, 1.1, 1.2, 1.3, 1.7, 2.1, 2.3, 2.7
Reading Foundational Skills – K.1, 1.1, 2.1
Speaking/Listening – K.1, K.2, K.3, K.5, 1.1, 1.2, 1.3, 1.5, 2.1, 2.2, 2.3, 2.5

Background

Key Points
Key Points will give you the main information you should know to teach the activity.

- There are 6 geographic regions in South Carolina. Regions are delineated areas of land with distinct topographic, climate and wildlife inhabitant characteristics. The 6 geographic regions in South Carolina are the Blue Ridge **Mountains**, **Piedmont**, **Sandhills**, Inner **Coastal Plain**, Outer Coastal Plain and **Coastal Zone**. Because each region has different characteristics, each region supports unique **habitat**s and animals.
- Characteristics of **Mountain stream** habitats (Mountain Region):
    - Cold (there is a difference), fast-moving, **freshwater** shallow streams with a high level of dissolved oxygen in the water. Home to many small fish, aquatic insects and trout.
- Characteristics of **Piedmont river** habitats (Piedmont Region):

    - Moving, freshwater habitats with high amounts of sediment. Rivers can have areas of both shallow, fast-moving water and deep, slow-moving water. Home to many different types of fish.
- Characteristics of **blackwater swamp** habitats (Coastal Plain Region):
    - Slow-moving bodies of warm freshwater that partially submerge cypress tree forests. Blackwater swamps are low in sediment content, but high in nutrient content. Home to cypress and tupelo trees and many reptiles, amphibians, fish and birds.
- Characteristics of **saltmarsh** habitats (Coastal Zone Region):
    - Grassland areas that are submerged twice daily by the ocean tides. Water varies in salt amounts from low to high as the tide changes. Water is high in nutrient content, but salt marsh soils are low in oxygen content. Home to massive amounts of Spartina grass, as well as many plankton, fish, invertebrates and birds.
- Characteristics of **Ocean** rocky reef habitats (Ocean Region):
    - Rocky reef habitats are rocky outcrops submerged under the **saltwater** of the ocean. They are found on the continental shelf and are shallow enough for plant plankton and algae to receive sunlight to produce oxygen and close enough to the coast to be high in nutrients. Temperatures remain warm all year. Home to many fish and invertebrate marine life.
- Habitat needs of American Alligators:
    - Air: Oxygen from the atmosphere
    - Food: Fish, turtles, birds, small mammals
    - Water: Freshwater
    - Shelter: Dig holes in the mud called dens
    - Space: Need areas of standing water for food and staying cool. Need areas of land for basking to become warm
- Habitat needs of bald cypress trees:
    - Air: Carbon dioxide from the atmosphere
    - Food: Makes food from photosynthesis. To do so, needs sunlight, water, carbon dioxide and nutrients from the soil
    - Water: Freshwater
    - Space: Do best in areas that are temporarily or permanently submerged under freshwater during the year
- Habitat needs of Brook Trout:
    - Air: Oxygen from water
    - Food: Aquatic insects and insect larvae
    - Water: Freshwater
    - Shelter: Shallow areas in streams and rivers called riffles that other animals cannot easily access
    - Space: Shallow, fast-moving, cold streams that are high in oxygen content
- Habitat needs of Gag Grouper:
    - Air: Oxygen from water
    - Food: Fish, shrimp, crabs, squid and other invertebrates
    - Water: Saltwater
    - Shelter: Holes and hiding places in rocky outcrops
    - Space: Warm ocean water near rocky outcrops
- Habitat needs of Great Blue Heron:
    - Air: Oxygen from atmosphere
    - Food: Fish, small invertebrates, small amphibians, small reptiles, insects
    - Water: Freshwater
    - Shelter: Trees for building nests
    - Space: Marshlands with shallow fresh or saltwater for wading in while looking for food
- Habitat needs of Largemouth Bass:
    - Air: Oxygen from water
    - Food: Fish, amphibians, small snakes, small birds, insects and invertebrates
    - Water: Freshwater
    - Shelter: Fallen logs or other structures in the water
    - Space: Areas of slow-moving or still water usually near the banks of rivers and lakes
- Habitat needs of Sandbar Shark:
    - Air: Oxygen from water

  - Food: Fish, squid, crustaceans, seabirds
  - Water: Saltwater
  - Shelter: Sandy bottoms
  - Space: Large areas of open-ocean water near the shore
- Habitat needs of Eastern Oyster:
  - Air: Oxygen from water
  - Food: Detritus, bacteria, phytoplankton and other microscopic organic material in water
  - Water: Brackish water
  - Shelter: Shells that grow with the oyster's body
  - Space: Must attach self to a hard surface, such as another oyster shell, in the **intertidal zone** (the area of land between low and high tide)
- Habitat needs of River Otter:
  - Air: Oxygen from atmosphere
  - Food: Fish, amphibians, crayfish, small reptiles, birds and some plants
  - Water: Freshwater
  - Shelter: Abandoned beaver dens or nests built in hollow logs or spaces between rocks or roots
  - Space: Areas of slow-moving freshwater with stable banks
- Habitat needs of Spartina Grass:
  - Air: Carbon dioxide from the atmosphere
  - Food: Makes food from photosynthesis. To do so, need sunlight, water, carbon dioxide and nutrients from the soil
  - Water: Brackish water
  - Space: Do best in areas that are partially covered by the ocean tides twice daily

Detailed Information
Detailed Information gives more in-depth background to increase your own knowledge, in case you want to expand upon the activity or you are asked detailed questions by students.

Despite being the state ranked 40th in physical size, South Carolina is in the top 15 in biodiversity. Each of the regions of South Carolina (Blue Ridge **Mountains**, **Piedmont**, **Sandhills**, Inner **Coastal Plain**, Outer Coastal Plain, and **Coastal Zone**) have unique physical and climate characteristics. Because of these differences, South Carolina supports a wide variety of **habitats** and species. Below is information about the physical characteristics of each region and descriptions of the habitats and animals used in this activity that are found in these regions.

Regions

South Carolina is divided into 6 major geographic regions: Blue Ridge Mountains, Piedmont, Sand Hills, Inner Coastal Plain, Outer Coastal Plain, and Coastal Zone. Each of these regions is characterized by a unique topography, which in turn affects the animals and plants that are able to make a home there.

The smallest of the 6 regions, the Blue Ridge Mountain region, is located in the northwest corner of the state and found in only 3 counties. It is part of the Blue Ridge chain of the Appalachian Mountains. The area is characterized by mountains and valleys, rocky outcrops, waterfalls and fast-moving streams. Mountains can be above 3,000 feet in elevation. The region's climate tends to be cooler and less humid than the rest of the state but with a higher amount of rainfall, ranging from 60-80 inches a year.

The Piedmont region is in the northwest part of the state and extends from the mountains to the Fall Line that crosses through Columbia. It is generally a flat area with gently-sloping hills and wide river valleys. Most of the soil in the Piedmont is composed of clay, and therefore, only a small amount of rainwater soaks into the soil. Much of the rainwater runs off to join many streams and rivers that cover the landscape. The Piedmont is a warm, humid area. Because of its distance from the ocean, it does not receive the temperature-regulating effects the **ocean** provides and thus has wider temperature extremes than the coast. It has an average rainfall of 45-60 inches a year.

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The Sand Hills are a band of hills that run across the midlands of the state roughly where Columbia is located. The Sandhills compose approximately 12% of the state's area. These hills are the remains of ancient sand deposits when the ocean covered this part of the state. Between 250-450 feet above sea level, the Sandhills are higher than the surrounding Piedmont and Inner Coastal Plain. During the summer, it is generally the hottest area of the state with a high humidity. It receives approximately 44 inches of rain, but because of the looseness of the sandy soil, water drains quickly. Soil tends to be dry and animals and plants must adapt to this aridity.

The Inner Coastal Plain region is more dry and fertile than the outer coastal plains. The rolling topography tends to allow better natural draining than other regions. Farming is popular in this region, especially cotton and soybeans.

The Outer Coastal Plain region, commonly referred to as the lowcountry, is flat and the land is broken up with many streams and rivers. This topography tends to create swamp habitats and areas of sandy soil. Both of these conditions are not suitable for farming because of the low nutrient load in the soil. However, the longleaf pine can flourish in this area if periodic fires are allowed. Longleaf pine has a special lifecycle that needs fires to bust small grass phase sapling into a phase of vertical growth.

The Coastal Zone is an area of land at the edge of the Ocean extending from the North Carolina border to the Georgia border that is about 10 miles wide. Of all the regions of South Carolina, the Coast is the most dynamic. The salinity in this region changes throughout the day as tides rise and fall. Barrier islands, beaches and salt marshes will change in size and shape as waves and ocean currents erode and deposit sand. The Coast tends to be cooler than other areas because of sea breezes. The Coast tends to be humid with abundant rainfall.

Habitats

Each of the regions support unique habitats. **Mountain streams** are a rare habitat in South Carolina. Found only in the mountains of the northwest corner of South Carolina, this habitat makes up only 2% of the state's **freshwater** habitats. The water originates from abundant rainfall and groundwater springs. These streams erode away the soil in their beds leaving a rocky bottom. The water of mountain streams tends to be cold, clean and highly oxygenated, because the water falling over rocks collects air. Streams tend to be shallow with areas of rapid-moving water and slower-moving pools. Many plants and animals can be found along the banks of mountain streams.

Piedmont rivers flow rapidly with a large volume of water. Though they flow through an area much flatter than the Mountains, these rivers have the force to erode away the clay of the soil and create valleys. The eroded red clay particles give Piedmont rivers their murky, red coloration. These rivers are cool, well-oxygenated and composed of riffles, rapids and pools. In certain parts of the river where the water flows slower, sediment can be deposited to form sand flats and even islands. A diverse group of plants and animals are associated with the Piedmont river habitat.

Blackwater swamps occur in the Coastal Plain., These areas have slow-moving water and follow a winding, meandering path. When rainfall amounts are high, the water in these rivers floods over the banks into the woods which create the swamp habitat. This habitat can last a few days or a few months. The still, warm water of blackwater swamps is filled with organic material and provides habitat for a number of plants and animals.

Saltmarshes are found throughout the Coastal Zone. These marshes exist within a few miles of the coastline. The twice daily flooding by salt water makes this a difficult habitat for plants. Few plants can grow in this environment, but those that can flourish. Along with rainforests and the kelp forest, the saltmarsh is one of the most productive habitats on earth in terms of producing plant matter. The nutrients from these plants create a major food source for many animals living in the saltmarsh.

The inshore ocean is a body of water that has high salinity and generally stable conditions. Though hurricanes and other major storms can stir up the shallow waters above the continental shelf, ocean waters are generally not affected by the weather. Water temperatures vary only slightly through the year. This shallow water also receives an influx of nutrients from the input of freshwater rivers. The stability of this environment and its high nutrient concentration make the inshore ocean one of the most productive habitats on earth.

Species

American Alligator (*Alligator mississippiensis*)

American alligators, the largest reptile in the United States, are found throughout the Coastal Plain of South Carolina. These crocodilians grow from 8-12 feet in length, though individuals up to 18 have been found. Despite their size and reputation, they are generally not a threat to people. In 25 years, there have been only 6 documented alligator attacks on people in South Carolina, and none were fatal. An alligator's diet consists mainly of fish, birds and small mammals. Normally, if a person is attacked, it is because the alligator was protecting itself or its young and not because it was seeking a meal. Like any wild animal, keep a respectful distance from an alligator, and do not engage in any activity the animal finds threatening including approaching it.

Alligators need freshwater to survive and are found in freshwater swamps, marshes, impoundments, lakes, ponds and the backwaters of large rivers. Alligators are cold-blooded, aquatic animals that depend on the sun for warmth and freshwater aquatic habitats for food. For this reason, they are found only in the Southeastern United States, where the climate is warm and water is plentiful. Alligators need at least pond-sized bodies of water and areas of land easily accessible for basking in the sun.

Adult alligators feed on fish, turtles, birds, snakes and small mammals. Many alligators also feed on carrion. Alligators are opportunistic carnivores and will not turn down an easy meal.

Alligators are large animals with hard scales for protection, and therefore, they do not have any natural predators as adults. For this reason, shelter is not as much of a requirement for alligators as it is for other animals. They do need to protect themselves from the elements, and they will dig holes in the ground, called dens, to stay warm or to find moisture.

Often, alligators are found in the day basking on the shoreline. Unable to maintain a constant body temperature, alligators depend on external sources to raise or lower their body temperature. Absorbing sunlight warms the alligator and prepares it for evening hunting. If it becomes too warm, it will move to the water to cool off. In the winter, when temperatures drop, alligators go into a semi-dormant state, and generally do not become active until March.

Female alligators are protective mothers. In June, the female builds a mound made of dirt and vegetation about 7 feet in diameter and 1-2 feet in height. In the middle of this mound, she digs a hole and lays 15-80 eggs. This nest acts as an incubator that keeps the temperature in the upper eighties. During this time, the mother protects the nest. When the eggs begin hatching in September, the mother helps the young by digging them out of the nest and gently carrying the young in her jaws to the water. The jaws are capable of exerting 3,500 pounds of pressure per square inch, but they also can be used for delicate actions. For one year, the mother will stay with the young to protect them from predators. During this time, the young alligators feed on insects, crayfish and amphibians.

Bald Cypress Tree (*Taxodium distichum*)

Bald cypress trees attain greater bulk and live longer than any other native South Carolina tree. Like other plants, cypress trees need air, water, nutrients and sunlight. The special adaptations of bald cypress trees allow them to grow in spaces that most trees cannot. Cypress trees primarily occur in blackwater river floodplains and backwaters. Cypress trees are the most dominant woody plant of this environment. Cypress trees develop swollen bases with a conical, buttressed shape. This expanded trunk creates more surface area for the tree. The extra surface area allows oxygen to be brought into the tree when the roots are submerged by water. The height of the base usually exceeds the highwater flood level by about one third, an important adaptation for a tree living in an area that is annually flooded.

In most growing conditions, bald cypress trees develop vertical root projections called knees, which may reach 6 feet or more in height. The purpose of the knees is still being researched. It has been speculated that the knees may act as a snorkel to supply oxygen to the submerged roots, as an anchor to provide added stability to a large tree with a shallow root system, or as an area to store food in the form of starch. At this time, research has not produced conclusive evidence and the purpose of the knees remains a mystery.

Cypress trees are gymnosperms or cone-bearing plants. The seed-bearing cones grow to about 1 inch in diameter. Both cones and

seeds can float in water, which serves as their main dispersal mechanism. Seedlings cannot germinate when submerged, and those inundated for a short time die. Therefore, cypress tree regeneration occurs only on the higher edges and ridges of swamps. Mature trees now growing in standing water began growing long ago, when the river's position differed enough to create seasonally dry conditions.

Brook Trout (*Salvelinus fontinalis*)

This colorful fish is not a true trout, but a char. Brook trout are native to Eastern North America where they range from Maine to northern Georgia and Alabama, and West to Minnesota. They also are found in Canada from Labrador to Saskatchewan.

The presence of brook trout indicates high-quality streams. Brook trout require low water temperatures (less than 70 degrees) and moving water with lots of oxygen. Confined to a narrow range of oxygen concentration, these fish are sensitive to water quality changes. The addition of too much sediment from runoff or toxic materials in the stream will eliminate the brook trout.

Adult brook trout migrate downstream to feed in larger streams, but migrate back upstream to spawn. For successful reproduction, these fish require a gravel bottom in shallow water where the eggs are laid. The eggs remain dormant for 90-210 days depending on the severity of the winter. When the water begins to warm, young brook trout hatch and move to shallow, rapid-flowing water called riffles. These areas, 1-6 inches deep, provide shelter from larger predators that cannot swim into shallow water. Feeding primarily on caddis fly larvae (Pycnopsyche sp.), first year fish seldom exceed 3 inches in length. Adult brook trout vary in size depending on the size of the stream. In small streams, they can be 6 inches long and weigh only 2-3 ounces. In larger streams and rivers, mature brook trout can reach 18 inches and weigh several pounds. In the mid 1800's, before fishing pressure became great and other species were introduced, brook trout weighing 8 pounds were not uncommon.

Compared to other trout species, brook trout have a short life span of 4-5 years. Adults prefer the slower stretches of streams undercut banks where they can easily ambush their favorite food, the mayfly. Besides the mayfly, brook trout feed on other aquatic insects and arthropods.

Brook trout populations have receded because of overfishing, loss of habitat and introduction of non-native trout species. The European brown trout and the Western American rainbow trout have been introduced into mountain streams of South Carolina. Because they occupy a similar niche to the brook trout, they compete with the brook trout for food and space. There is not enough food and space to sustain large populations of 3 species, and so brook trout numbers have declined.

Gag Grouper (*Mycteroperca microlepis*)

One of a dozen grouper species inhabiting tropical and subtropical American ocean waters, the gag grouper ranges from North Carolina to the Yucatan. Like other fish, gag grouper breathe oxygen from the water using their gills. Gag grouper live more than 30 miles offshore in warm waters. The gag averages 2-4 pounds although it can reach 50 pounds. Favored habitats include rocky live bottoms, areas where rocky outcrops extend out of the sand and are covered with invertebrate growth, generally in water from 122-300 feet deep. Gag grouper tend to be territorial, finding a space in a reef habitat that they claim as their own. The rocky reefs provide food and shelter to the gag. Gag grouper feed mainly on small fish, particularly grunts, squid and reef-dwelling crustaceans such as crabs and shrimp.

Female gag groupers mature sexually at 5-6 years and spawn in water over 200 feet deep. The eggs and planktonic larvae that hatch and are carried inshore to the estuaries by eddies spinning off the Gulf Stream. Juvenile groupers move into salt marshes to feed on grass shrimp and mature. Within a few months they reach lengths of up to 12 inches and begin to swim to the live bottom reefs. This fish has a long life expectancy and tends to remain in its preferred habitat.

During the spring, many gags migrate to Southern Florida to spawn in a narrow area of ocean water. They congregate together in large groups and release their eggs and sperm into the water where fertilization occurs externally. Adult gags then migrate back to their original territory, and the eggs eventually hatch and the current carries the gag larvae into estuaries.

Great Blue Heron (*Ardea herodias*)

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Great Blue Herons are wading birds, like egrets and storks, and are a common sight in the salt marshes of South Carolina. Herons can be found throughout the year in the warm, coastal areas of the Southeast. During the summer, herons can migrate and may be found in shallow water habitats throughout the continental United States. They wade through shallow-water looking for aquatic animals to eat. They feed predominately upon small fish, but will also eat crabs, shrimp, amphibians, snakes, insects and other small animals spotted in the water.

Their body shapes are ideal for fishing in shallow water. They stand in the water motionless on their long, spindly legs. When prey is spotted, they swiftly bring down their sharp beaks with their long, flexible necks and snatch up their prey. Despite spending much of their time on the ground wading in shallow water, egrets have large, strong wings. If humans or other potentially dangerous animals approach, herons will spread their wings and fly off to safer ground.

Herons nest in trees, sometimes building nests forty feet in the air. Nests are built out of reeds and sticks and will contain up to five or six eggs. Herons nest in colonies known as heronies, and it is not unusual to see twenty or thirty herons roosting together in one tree.

Largemouth Bass (*Micropterus salmoides*)

Largemouth bass average 2-3 pounds but regularly reach more than 10 pounds making them the largest sunfish in North America. A voracious predator, the largemouth hides in shadows and ambushes unsuspecting prey. With a quick open-mouthed lunge, this robust fish swallows smaller fishes, amphibians, small snakes, ducklings and anything else it can catch. Dull, greenish-gray on the back, with vertical dark, broken bars on the sides, and white below, largemouth bass thrive in slow streams, ponds, lakes and reservoirs with high water quality. Because of their propensity for slow moving water, they have easily made the transition from Piedmont rivers to dammed reservoirs.

Adult bass feed mostly on small fish, especially juvenile sunfish, and sometimes attempt to consume fish too large to swallow. Largemouth bass generally avoid bright light by hiding in the shadows of submerged logs or under vegetation such as lily pads. They become closely associated with structures such as stumps, brush piles and other debris. They use them for shelter and seldom stray. They forage most actively at dawn and dusk.

Unlike striped bass and white bass, largemouth bass stick to shallow edges and avoid deeper, open water. The extensive edges of Piedmont reservoirs provide ample habitat for largemouth bass, which sometimes reach high populations. They also can be found in the pools of Piedmont rivers. Although they prefer clear, high-quality water, they can adapt to a wide variety of temperatures, depths, clarities and even changing salinities in the upper reaches of coastal rivers.

Sandbar Shark (*Carcharhinus plumbeus*)

Also known as the brown shark, the sandbar shark can be found from New Jersey to Brazil along the Western Atlantic Ocean. Sandbar sharks are one of the largest coastal sharks in the world reaching lengths of well over 8 feet in length. Body color can range from bluish to brownish to grayish above with a pale white underside. The dorsal fins are a key feature in identifying the species. The first dorsal fin is triangular, high on the back, and can weigh 18% of the total weight of the shark. The second dorsal fin is much smaller and roughly the same size as the anal fin.

Sandbar shark are most active from dusk until dawn. They prefer muddy or sandy bottoms in bays, harbors and estuaries. Their upper teeth have uneven cusps with sharp edges used to catch their prey. Their diet consists of small fish, rays, birds and invertebrates. Predators include great white sharks, tiger sharks but mostly humans.

Eastern Oyster (*Crassostrea virginica*)

Oysters are bivalve mollusks. Bivalves are soft bodied animals and normally have two shells which are symmetrical along the hinge. Oysters prefer low to medium salinity water. In South Carolina, they thrive in the **intertidal zone** of estuaries and salt marshes. Interestingly, in other states, oysters are not in the intertidal zone, but are always covered by ocean water, sometimes as deep as 40 feet. Scientists are not sure why this difference occurs in South Carolina, but the oysters that live in deeper water seldom survive.

Oysters are sessile animals, meaning they attach themselves to a hard surface and remain there. Usually the hard surface is another oyster shell. In their larval stages, oysters are free swimming and have chemical sensors that can detect the presence of other oyster shells. When the larva finds an oyster shell, it attaches to the shell and begins to form new shell material. Clumps of oysters that attach to each other are known as oyster beds.

Oysters are filter feeders that get their food by pumping water through their bodies and straining out organic matter. When covered by the tides, a single oyster can strain about 7 gallons of water a day. They feed on microorganisms and detritus, broken down pieces of organic matter. Filter feeding makes oysters vulnerable to contaminants in the water. Bacteria or toxins can collect in the oyster's body as it feeds. Excess sediment can smother the oyster because, like many marine animals, they have gills that pull oxygen out of the water.

River Otter (*Lutra canadensis*)

The largest mammal predator in the mountain stream, the river otter, occurs throughout North America except for the extreme northern portion of Alaska, the Southwest desert and the arid Plains states. Locally common in South Carolina, it ranges across the state in virtually all freshwater and estuarine habitats. A member of the weasel family, the otter has short legs, webbed toes, a broad tail and an elongated body. An adult otter will grow from 3.5-4 feet in length and weigh from 10-25 pounds. Otters travel within a home range of 15 square miles in family units of 4-5 individuals.

Otters have webbed toes, a water repellant coat, and the ability to close their ears and nostrils while diving. Otters also have long whiskers that help detect prey underwater. These adaptations allow otters to exist on a diet of fish. Otters are known to eat amphibians, turtles, snakes, crayfish and an occasional bird.

Beavers play an important role in the lives of otters. If beavers frequent a particular area, otters will probably be found there. Ponds created by beaver dams are prime habitat for otters, and they often use abandoned beaver dens as shelters. If a beaver den is not available, they may be found in hollow trees or between rocks or roots, building nests out of sticks, leaves and grass.

Otters are active and curious. They spend much of their time playing with each other and exploring their environment. While other animals may play to practice hunting and survival skills, otters often play for enjoyment, a rare trait in animals and a sign of higher intelligence.

Mating takes place in the fall after males battle for a mate. After a gestation period of up to 270 days, female otters give birth to 1-3 young, called kits, in a den with an underwater entrance constructed beneath the bank of a stream, river or lake. The female otter defends her kits and they remain with her as a family unit for over a year.

Otters have few natural enemies other than man, who trap them for their rich, thick pelt, and who also have lowered populations through habitat destruction and roadkill. Look for otters in larger streams or rivers where food is abundant and the water is unpolluted and quiet. The best time to look is early morning or evening.

Spartina Grass (*Spartina alterniflora*)

Spartina grass, is a large, coarse grass that can reach heights of 10 feet. Spartina grass lives in saltmarshes, where salinity changes greatly as the tide changes twice daily. Most plants cannot grow in a saline environment because their cells have a low salt content. When these plants are immersed into saltwater, the difference in salt content between the cells of the plant and the surrounding water pushes water out of the cells and desiccates the plant. Spartina, however, concentrates salt within its cells to a higher level than seawater, so that freshwater actually moves into the cells, not out. In addition, special cells in the leaves of Spartina have the ability to secrete excess salt, often visible as salt crystals on the plant's exterior.

Spartina, like other plants, has to get oxygen into its roots and its leaves. The wet marsh soil contains a minimum of oxygen, and the abundant bacteria found in the soil consume the little oxygen available. Spartina grass has evolved a system of hollow tubes that run from leaf openings, called stomata, down to the roots. These tubes move carbon dioxide from the air through diffusion to the roots and allow oxygen produced by photosynthesis to escape. Spartina grass needs direct sunlight to make food it needs to survive. It does

not have other plants competing for the space and blocking out the sunlight because it is one of the few plants growing in the marsh.

While Spartina can grow in other habitats, it cannot compete with other plants and so is rarely found outside the saltmarsh. However, in the saltmarsh its special adaptations have allowed it to flourish.

Procedures

Materials

- Chart paper
- Markers
- South Carolina Regions Map
- 3-D topographic map of South Carolina (if available)
- 5 shoeboxes/Poster paper
- Construction paper
- Glue
- Scissors
- Tape

Pictures of South Carolina habitats:

- Mountain stream
- Piedmont river
- Blackwater swamp
- Saltmarsh
- Inshore Ocean

Pictures of South Carolina species:

- Largemouth bass
- Gag grouper
- Sandbar shark
- Oyster
- Spartina grass
- Brook trout
- River otter
- Alligator
- Great blue heron
- Bald cypress tree

Procedure

Part I

1. Have students examine the map of South Carolina showing the different regions and the 3-D topographic map of South Carolina if you have one.
2. Describe how the regions are different from each other in the way the land and water look. Write some descriptive words for each region on a chart.
3. Describe each region to the kids using the background information (Mountains, Piedmont, Coastal Plain, Coast and Ocean). Make sure students understand what kind of water can be found in that region and what the land looks like. Have them make a list for each region.
4. Explain to students that because the land is different the habitats that are found in each region are different.

Part II

1. Show the students the habitat pictures (Mountain stream, Piedmont river, blackwater swamp, saltmarsh and ocean). Tape the pictures on the wall in order from Mountains to Sea.
2. Tell students that each of them is going to be a plant or animal found in South Carolina living in one of these 5 habitats.
3. Hand out pictures of each species, one per student (will have doubles).
4. Have the students guess which habitat they would live in and then stand next to the picture.
5. Go around the room and have each student explain why they chose the habitat they did. Help them figure it out if they get stuck. For species that can live in more than one habitat, such as the river otter, the teacher may want to have an otter student standing in each of its natural habitats.
6. Collect the students' animal/plant cards, shuffle them and then hand them out again.
7. Students will look at the card and then have one minute to go to their habitat. Students can act out their animal or plant as they go. After a minute, the teacher will go to each habitat and ask the students which species belong and which do not belong. If a species is in the wrong habitat, ask the students if it will be able to get the things it needs from the habitat and discuss why not. Have other students guide the species to its correct habitat. Repeat this game as long as deemed necessary.

Part III

1. Break up the students into 5 small groups.
2. Assign each group one of the habitats discussed: (Mountain stream, Piedmont river, blackwater swamp, saltmarsh and ocean)
3. Using the chart the class created about each region in Part 1 and the knowledge they gained about the habitats from Part 2, have the groups create shoebox dioramas or a wall poster that represent habitats found in their assigned region.
4. Have them create things out of construction paper that represent both living and non-living things found in that habitat. When dioramas are completed, have student groups explain their dioramas to the rest of the class.

Follow-up questions

- Are these animals found in other parts of the world besides South Carolina?
- Are there places where these animals are not found?

Assessment

Assessment #1: Match the habitat

Give students the below coloring pictures of the different SC habitats and the animals/plants to color. Then have them cut the animals out and glue them in their correct habitat.

Assessment #1 Materials

- Habitat coloring pictures
- Animal/Plant coloring pictures
- Crayons
- Scissors
- Glue

Assessment #1 Answers

There are 10 organisms to sort into habitats. Some animals can survive in more than one habitat. So either place will count as a correct answer.

- Mountain stream: Brook Trout, River Otter
- Piedmont river: Largemouth Bass, River Otter
- Blackwater swamp: Largemouth Bass, River Otter, American Alligator, Great Blue Heron, Bald Cypress tree
- Saltmarsh: Spartina Grass, Gag Grouper (juvenile), Great Blue Heron, River Otter, Eastern Oyster
- Ocean: Gag Grouper, Sandbar Shark

Scoring rubric out of 100 points

Correctly matched organism and habitat (10 points per plant/animal): 100 points total

Cross Curricular Extensions

STEAM Extension
Have students design and create a South Carolina habitat out of recycled materials.

English Extension
Have each student choose an animal found in South Carolina. Each student will write a couple sentences about the animal and its habitat and draw a picture. All the students' pages will be bound together to make a classroom book on animals and habitats of South Carolina.

Social Studies Extension
Have students look at a physical map of South Carolina to determine what region they live in. What habitats are near them? What animals can be found in these habitats? How have people changed or used these habitats?

Resources

Teacher Reference Books
Blagden, Tom Jr. and Thomas Wyche. South Carolina's Mountain Wilderness: The Blue Ridge Escarpment, Westcliffe Publishers, Inc, Colorado, 1994.
Explore the mountain habitats of South Carolina through the use of photographs.

Blagden, Tom Jr. South Carolina's Wetland Wilderness: The Ace Basin, Westcliffe Publishers, Inc., Colorado, 1992.
The ACE Basin habitats are explored through the use of photographs and text.

Gazlay, Suzy. Field Detectives: Investigating Playground Habitats, AIMS Education Foundation, 1998.
This wonderful resource provides various activities for classroom use. The activities are designed for third through sixth grades, but can be adapted for younger students. Visit the AIMS website for ordering information: http://www.AIMSedu.org/

Godfrey, Michael A. Field Guide to the Piedmont, The University of North Carolina Press, Chapel Hill, 1997.
This is a field guide to the Piedmont region of the United States that provides identification keys to regional flora and fauna. It also includes directions to regional attractions.

Hacker, Randi and Jackie Kaufman. Habitats: Where the Wild Things Live, John Muir Publications, New Mexico,1992.
This book describes ten habitats found on earth and the life supported by them. Also includes a section on what to do to preserve the habitats.

Kovacik, Charles F. and John J. Winberry. South Carolina: the Making of a Landscape, University of South Carolina Press, Columbia, 1989.
This wonderful reference book provides information on the abiotic factors that determine the habitats of South Carolina.

Meyer, Peter. Nature Guide to the Carolina Coast: Common Birds, Crabs, Shells, Fish and Other Entities of the Coastal Environment, Avian-Cetacean Press, Wilmington, 1994.
This reference is useful for identifying the fauna of the coastal habitat of South Carolina.

Teacher Reference Websites

Bridge: Ocean Sciences Education Teacher Resource Center
www.vims.edu/bridge/index.html
Information on the organization, marine habitats, research being conducted on marine animals and habitats, and activities for classroom use. Contains links to related websites.

Nature to Life
www.enature.com/
Information and other website links about animals and habitats around the United States.

Student Reference Books

The following books may be too difficult for younger children to read but should be understood when read aloud.

Arnosky, Jim. Crinkleroot's Guide to Knowing Animal Habitats, Simon & Schuster Books, New York, 1997.
This book introduces students to different habitats and animals found in wetlands, woodlands, cornfields, and grasslands.

Discovery Books: Under the Ground, Scholastic Inc, New York, 1995.
In this unique book, children can see animals that live underground as they go about their normal lives under our feet.

Eyewitness Books: Jungle, Alfred A. Knopf, Inc, New York, 1994.
This wonderful book uses photographs, illustrations and text to teach the reader about the plants and animals that call the rain forest home.

Eyewitness Books: Pond & River, Alfred A. Knopf, Inc, New York, 1988.
This book uses photographs, illustrations and text to teach the reader about the plants and animals that live in freshwater.

Look Closer: Swamp Life, Dorling Kindersley, New York, 1993.
Using photographs, illustrations and text this book teaches the reader about the plants and animals that live in swamps.

Matthews, Downs. Wetlands, Simon & Schuster Books, New York, 1994.
This book describes the different types of wetlands and the plants and animals found there.

Smithey, William K. American Coastlines: The Beauty of America's Natural Habitat, Gallery Books, New York City, 1990.
An introduction to habitats found along the Pacific and Atlantic oceans, this book uses text and photographs to introduce students to the coastlines of America.

Wildsmith, Brian. Animal Homes, Oxford University Press, Hong Kong, 1991.
This is a picture book that introduces students to animals found throughout the world and discusses the habitat of each.

Student Fiction Books

Fleming, Denise. In the Small, Small Pond, Henry Holt and Company, New York, 1993
This Caldecott Honor book takes a look at the pond habitat through the eyes of a frog.

Hoose, Phillip and Hannah. Hey, Little Ant, Tricycle Press, Hong Kong, 1998.
Have you ever squished an ant? As a reader of this book, you follow the trials and tribulations of an ant as it pleads for its life, while a kid contemplates the question "to squish or not to squish".

McDonald, Megan. Is This a House For a Hermit Crab?, Orchard Books, New York. 1990.
In this book, the reader follows the adventures of a hermit crab as it searches for a new home.

Curricula

Project WILD

Project WILD is an interdisciplinary curriculum for K-12 teachers on a broad range of environmental and conservation topics. For more information click on: http://www.projectwild.org/