

Science Classes

AQUATIC ADVENTURES

Themes: Adaptations; Connections, Cycles, and Systems; McDowell Stewards

Lesson Overview: Learners will predict how different characteristics of freshwater environments impact the types of organisms found in the environment, observe adaptations specific to those aquatic environments, and identify macroinvertebrates. ***Students should come prepared to get wet in this class. Students must wear appropriate closed toed shoes such as old shoes or rain boots.***

Total Time: 1.5 or 3 hours

Hiking Distance: Highly variable; ranges from vehicle transportation to site, small, steep hike to stream bed, or .5 to 1.5 mile hike.

Activity Level: Varies with site selected by instructor. Accommodations for all abilities available, but requires notice.

Learning Goals: By the end of this session, learners will be able to conduct an experiment on a freshwater environments using observation of, abundance of, and or diversity of macroinvertebrates. They will gain skills in the following areas:

1. Making observations of and characterizing unfamiliar organisms.
2. Considering how changing conditions in freshwater environments (naturally or human-induced) can change the composition of aquatic life in that environment.
3. Constructing a reasonable hypothesis about macroinvertebrates and their aquatic habitats, testing it, and discussing the results.

Scientific Practices Highlighted: Planning and Carrying Out Investigations

Crosscutting Concepts Addressed: Structure and Function, Patterns

DOWN TO EARTH

Themes: Energy; Connections, Cycles, and Systems; The Earth Provides; McDowell Stewards

Lesson Overview: Through observation and exploration of habitats at Camp McDowell, learners assess the impact of a reclaimed coal mine on the local ecosystem. Learners observe sedimentary rock types associated with coal formation, as well as the weathering and erosion processes that result in sedimentation. Learners close the class by discussing the need for the responsible use of natural resources.

Total Time: 3 hours

Hiking Distance: ~1.5 miles

Activity Level: Moderate hike; includes a ladder and stream crossings that are not universally accessible.

Learning Goals: By the end of this session, learners will be able to consider the geosphere in the following ways:

1. Identify that sandstone and coal are sedimentary rocks that tell the geologic history of our area, and observe the modern impact of weathering on those rocks.
2. Observe and describe the impact of coal mining on the geosphere and biosphere in the region.
3. Link commonly used materials to finite resources extracted from Earth and discuss the reasons for producing and conserving those resources (ESS3.A; ESS3.C)

Scientific Practices Highlighted: Analyzing and Interpreting Data, Constructing Explanations

Crosscutting Concepts Addressed: Scale, Proportion, and Quantity, Cause and Effect

FOREST CONNECTIONS

Themes: Energy; Adaptations; Connections, Cycles, and Systems; The Earth Provides; McDowell Stewards

Lesson Overview: Students will hike through the forest observing the connections between Earth's spheres. Particular focus on specific adaptations and connections among plants and animals in the biosphere. Students will play games to better understand the reason for typical adaptations expressed by forest organisms.

Total Time: 1.5 or 3 hours

Hiking Distance: ~.75 mile

Activity Level: Can be modified for universal accessibility with notification

Learning Goals: At the end of this session, learners will be able to relate the biosphere at Camp McDowell to other spheres in the following ways:

1. Articulate ways in which organisms in the forest are connected to one another through specific adaptations, integrated food webs, and by exploiting specific niches.
2. Link the non-living habitat (atmosphere, geosphere, hydrosphere) to the biosphere.
3. Understand that removing something - living or not - from the habitat can have major consequences for that area.
4. Insects display a wide variety of adaptations tailored to their environment, are vital to the health of ecosystems, and have changed over time to suit specific roles within that environment.

Scientific Practices Highlighted: Constructing Explanations, Planning and Carrying Out Investigations

Crosscutting Concepts Addressed: Structure and Function, Systems and System Models

HOP, SLITHER & SLIDE

Themes: Adaptations

Lesson Overview: Learners confront and dispel fears of reptiles by meeting snakes, other reptiles and amphibians, and touching/feeding/engaging with them. Instructors handle live animals and discuss conservation and human impacts on reptile and amphibian communities. Incorporation of various kinesthetic learning activities are included to cement the differences between reptiles and amphibians.

Total Time: 1.5 hours

Hiking Distance: N/A

Activity Level: Universally accessible

Learning Goals: Learners will:

- 1) Describe, with evidence, the differences between reptiles and amphibians and relate those traits to habitat requirements.
- 2) Explore specific adaptations of observed reptiles and amphibians and describe the role each plays in Alabama's ecosystem.

Scientific Practices Highlighted: Developing and Using Models

Crosscutting Concepts: Structure and Function

MEET A TREE

Themes: Energy; Adaptations; Connections, Cycles, and Systems; The Earth Provides

Lesson Overview: Learners explore the relationship of Earth's four spheres to one of the forest's principal plants: the tree. Students discuss how energy cycles in trees, the structure and functions of trees in the forest ecosystem, and identify common Alabama tree species.

Total Time: 3 hours

Hiking Distance: ~.75 miles

Activity Level: Low to moderate; can be modified for all abilities

Learning Goals: By the end of this session, learners will be able to describe the value of Alabama trees to the forest ecosystem in the following ways:

1. Tree species have unique physical characteristics that can be used to identify them, and all trees have specific parts that function together to transfer energy and nutrients, allowing the tree to grow.
2. Trees are an important component of forest ecosystems that impact and are impacted by the atmosphere, biosphere, geosphere, and hydrosphere.
3. Energy can be traced throughout the life cycle of a tree.

Scientific Practices Highlighted: Asking Questions, Developing and Using Models

Crosscutting Concepts Addressed: Energy and Matter, Structure and Function

ROCK QUERY

Themes: Energy; Connections, Cycles, and Systems; The Earth Provides

Lesson Overview: Learners will hike into a sandstone canyon to better understand how rocks form and engage with rock samples to discern the relationship between sedimentary, igneous, and metamorphic rocks. Learners will observe and consider the impact of the geosphere on local ecosystems, and, in turn, the role the hydrosphere, atmosphere, and biosphere play in shaping the geosphere.

Total Time: 3 hours

Hiking Distance: ~ 1.5 miles

Activity Level: Moderate to strenuous hike; includes a ladder and stream crossings that are not universally accessible.

Learning Goals: At the end of this lesson, learners will be able to think critically about the geosphere in the following ways:

1. Rocks have unique properties based upon their origin. They can cycle between igneous, sedimentary, and metamorphic as a result of processes like weathering, transport, and mountain building.
2. The geosphere is one of Earth's major systems that shapes and is shaped by all of Earth's other systems (biosphere, hydrosphere, atmosphere), revealing changes over time.
3. Different rock types are found throughout Alabama and allow us to predict places to mine for resources.

Scientific Practices Highlighted: Developing and Using Models, Obtaining, Evaluating, and Communicating Information

Crosscutting Concepts Addressed: Stability and Change, Scale, Proportion, and Quantity

STREAM STUDIES

Themes: Adaptations; Connections, Cycles, and Systems; McDowell Stewards

Lesson Overview: Learners will assess the water quality of a stream using chemical testing and bioassessments, and discuss the human and natural impacts to stream quality. Learners will relate the stream to local and regional watersheds, and discuss how changes to individual streams can impact water quality in the watershed. ***Students should come prepared to get wet in this class. Students must wear appropriate closed toed shoes such as old shoes or rain boots.***

Total Time: 3 hours

Hiking Distance: .5 - 1 mile

Activity Level: Moderate with a short, steep hike up a stream; not easily modified for all abilities

Learning Goals: By the end of this session, learners will be able to discuss the relationship among biodiversity, water chemistry, and watershed health in the following ways:

1. Stream health is a combination of natural (biologic, geologic, atmospheric, and hydrologic) and human induced (pollution, diversion) factors.
2. Stream health can be monitored using biotic and abiotic assessments.
3. Stream health is an important component of watershed health, and watershed health can be strongly impacted by regional land use choices.

Scientific Practices Highlighted: Asking Questions, Planning and Carrying Out Investigations

Crosscutting Concepts Addressed: Cause and Effect, Systems and System Models

VALUE OF A TREE

Themes: Adaptations; The Earth Provides; McDowell Stewards

Lesson Overview: Learners will explore the economic, ecologic, and recreational value of forest communities while hiking through a variety of types of forests at Camp McDowell. Learners will discuss and observe the impact of using forests as resources, and explore aspects of forestry management.

Total Time: 3 hours

Hiking Distance: 1 mile

Activity Level: Can be modified to meet some accessibility needs with notification

Learning Goals: At the end of this session, learners will be able to discuss the role of forests as resources, and how forest ecosystems are impacted by use in the following ways:

1. Forests are a renewable resource that are harvested for production of lumber and paper products, but different methods of harvesting impact forest health in different ways.
2. Forest ecosystems are always changing as a result of natural and human impacts, but healthy forests are characterized by high biodiversity and dominance of regionally important tree species. Some species have specific reproductive strategies that are interrupted by human interactions.
3. Forests are economically valuable beyond traditional harvesting, and sustainable forestry management considers economic, environmental, and recreational activities associated with forest resources.

Scientific Practices Highlighted: Obtaining, Evaluating, and Communicating Information, Constructing Explanations

Crosscutting Concepts Addressed: Energy and Matter, Structure and Function