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| School Program Name: | Watersheds and Wetlands |
| Name of Sanctuary: | Moose Hill Wildlife Sanctuary |
| Grade Level: | Grades 6 – 8 |
| Location Options: | At the sanctuary |
| Time: | 2 hours combine with a second program for a full-day field trip |
| For more info: | moosehilledu@massaudubon.org |

Program Description

Following a demonstration of watershed function, students take to the trails and use a contour map to study how the shape of the land directs water flow. Compare wetland versus upland soils and learn to identify some wetland indicator plants. Play a game that demonstrates the importance of wetland protection.

Significant savings are offered when you select a second program to create a full-day of hands-on learning at Moose Hill. This program combines well with Landforms of New England. Because of our large trail system and full-day option, we can serve up to 130 students for many programs. We provide a ratio of one Moose Hill teacher-naturalist to 12 to 14 students.

Massachusetts State Curriculum Frameworks

Subject: Science and Technology

Topic: Life Science

Changes in Ecosystems Over Time

6-8 Life Science #17: Identify ways in which ecosystems have changed throughout geologic time in response to physical conditions, interactions among organisms, and the actions of humans. Describe how changes may be catastrophes such as volcanic eruptions or ice storms.

Subject: Science and Technology

Topic: Earth Science

Mapping the Earth

6-8 Earth Science #1: Recognize, interpret, and be able to create models of the earth's common physical features in various mapping representations, including contour maps.

Heat Transfer in the Earth System

6-8 Earth Science #4: Explain the relationship among the energy provided by the sun, the global patterns of atmospheric movement, and the temperature differences among water, land, and atmosphere.

Earth's History





6-8 Earth Science #6: Describe and give examples of ways in which the earth's surface is built up and torn down by natural processes, including deposition of sediments, rock formation, erosion, and weathering.

Subject: Science and Technology

Topic: Physical Science

Elements, Compounds, and Mixtures

6-8 Physical Science #10: Differentiate between physical changes and chemical changes.

Forms of Energy

6-8 Physical Science #13: Differentiate between potential and kinetic energy. Identify situations where kinetic energy is transformed into potential energy and vice versa.

Heat Energy

6-8 Physical Science #14: Recognize that heat is a form of energy and that temperature change results from adding or taking away heat from a system.

6-8 Physical Science #15: Explain the effect of heat on particle motion through a description of what happens to particles during a change in phase.

Subject: Science and Technology

Topic: Technology/Engineering

Construction Technologies

6-8 Technology #5.1: Describe and explain parts of a structure, e.g., foundation, flooring, decking, wall, roofing systems.

Subject: Comprehensive Health

Topic: Personal & Community Health

Ecological Health

PreK-12 Health #13: Students will gain knowledge of the interdependence between the environment and physical health, and will acquire skills to care for the environment.

Subject: English Language Arts

Topic: Language

Discussion

PreK-12 Language #1: Students will use agreed-upon rules for informal and formal discussions in small and large groups.



Questioning, Listening, and Contributing

PreK-12 Language #2: Students will pose questions, listen to the ideas of others, and contribute their own information or ideas in group discussions or interviews in order to acquire new knowledge.

Vocabulary and Concept Development

PreK-12 Language #4: Students will understand and acquire new vocabulary and use it correctly in reading and writing.

Subject: History and Social Science

Topic: History and Geography

Geography

6 History #1: Use map and globe skills learned in prekindergarten to grade five to interpret different kinds of projections, as well as topographic, landform, political, population, and climate maps.

6 History #2: Use geographic terms correctly, such as delta, glacier, location, settlement, region, natural resource, human resource, mountain, hill, plain, plateau, river, island, isthmus, peninsula, erosion, climate, drought, monsoon, hurricane, ocean and wind currents, tropics, rain forest, tundra, desert, continent, country, nation, and urbanization.

6 History #3: Interpret geographic information from a graph or chart and construct a graph or chart that conveys geographic information (e.g., about rainfall, temperature, or population size).

7 History #1: Compare information shown on modern and historical maps of the same region.

Subject: Math

Topic: Math

Measurement

PreK-6 Math #M1: Understand measurable attributes of objects and the units, systems, and processes of measurement.

PreK-6 Math #M2: Apply appropriate techniques, tools, and formulas to determine measurements.

Data Analysis, Statistics, and Probability

PreK-6 Math #D1: Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.

PreK-6 Math #D3: Develop and evaluate inferences and predictions that are based on data.



PreK-6 Math #D4: Understand and apply basic concepts of probability.

Lesson Objectives

Students will know and be able to:

- Define a watershed, a wetland, topography, percolation, etc.
- Understand the composition of soil and compare two different soil types
- Demonstrate how land directs water flow
- Use maps to identify water sources, contour lines, etc.
- Identify wetland indicator plants and determine their function
- Understand the natural forces that influence the seasonal hydrology of a watershed
- Discover the importance of watershed protection

Vocabulary

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|--------------------|----------------------|-----------------|
| Watershed | Soil | Percolation |
| Seasonal hydrology | Decomposition | Absorption rate |
| Wetlands | Landforms | Erosion |
| Indicator plants | Topography | Weathering |
| Contour maps | Watershed protection | evaporation |

Assessments

How will the Mass Audubon educator know that the students have met the standards?

- Mass Audubon educator will observe the students exploring, observing, and identifying the functions of a watershed and a wetland through a demonstration, contour lines and other features of a topographic map, soils within a soil core, wetland indicator plants, changes in a watershed throughout the seasons, and the effects of precipitation...
- Students will participate in answering teacher prompted questions throughout the lesson and during the wrap up.
- Students will demonstrate their understanding of the above Lesson Objectives by participating in hands-on activities throughout the lesson, as well as during a wrap-up activity.



Summarizer

How will the Mass Audubon educator close the lesson to see if students met your objective?

- Wrap up game and/or discussion and connecting to each student's personal experience (striving for a "self to world connection")....
- Students will be able to define such vocabulary words as watershed, locate water sources on a topographic map and outline the watershed that they are a part of, demonstrate how contour lines indicate a change in elevation, and how land directs the flow of water
- Using two soil cores, students will be able to explain the composition of soil and compare the different soil types
- When shown a wetland indicator plant, students will be able to identify it and determine its function within the wetland ecosystem
- Students will be able to explain the importance of watershed protection and give examples of how this occurs
- As a group, students will demonstrate how natural forces influence the seasonal hydrology of a watershed



Mass Audubon School Programs

At Mass Audubon we strive to create learning experiences that are enriching, innovative, meaningful, and engaging. All our school programs are aligned with Massachusetts Curriculum Frameworks. Our network of wildlife sanctuaries and nature centers located in urban, suburban, and rural communities around the state enable us to have strong relationships with local schools.

Our Education Foundations

- Place-based education is an educational philosophy that connects learning to what is local for an individual. We help build conservation communities, working with students and teachers in cities and towns to develop place-based environmental education that is linked directly to their home community.
 - Inquiry-based learning is focused on teamwork, being learner-centered, questioning ourselves and the world around us, providing a more focused, time-intensive exploration, promoting lifelong learning, communication, and learning as fun.
 - We are fully committed to creating a positive and supportive environment for all learners.
 - We strive to be culturally sensitive, recognizing and embracing cultural differences.
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Differentiated Instruction

- We strive to create a positive learning environment that is inclusive, supportive to all learners, and sensitive to cultural diversity.
 - Outdoor classroom experiences are structured to meet the needs of the particular learners.
 - Students work in small groups using hands-on materials.
 - A variety of educational media are used, including colorful illustrations.
 - With advance notice, efforts will be made to accommodate all learning styles and physical needs.
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Notes

- Nature exploration is dependent upon the weather and other conditions. A class might observe different wildlife than they expected to see. An outdoor lesson can sometimes provide unexpected, but enriching teachable moments on a natural history topic that was not planned.
- Mass Audubon nature centers each have a unique landscape and will customize programs to work best at their particular site.
- Our lessons can be adapted to incorporate a classroom teacher's needs when given enough notice.

