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

Program Description

Bring earth science to life for your students as they see first-hand how glaciers have marked the New England landscape of Moose Hill. Stand atop an esker while you imagine a river passing under ice. Climb to the summit to observe exposed bedrock, striations, and evidence of plucking. Visit our conglomerate and learn how geologists used glacial erratics like this to determine the path the glacier took.

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 Watersheds or Rock On. Because of our large trail system and full-day option, we can serve up to 140 students for many programs. We provide a ratio of one Moose Hill teacher-naturalist to 12 to 14 students.

Massachusetts State Curriculum Frameworks

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| 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.

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| 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 #5: Describe how the movement of the earth's crustal plates causes both slow changes in the earth's surface (e.g., formation of mountains and ocean basins) and rapid ones (e.g., volcanic eruptions and earthquakes).

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.

6-8 Earth Science #7: Explain and give examples of how physical evidence, such as fossils and surface features of glaciation, supports theories that the earth has evolved over geologic time

The Earth in the Solar System

6-8 Earth Science #11: Explain how the tilt of the earth and its revolution around the sun result in an uneven heating of the earth, which in turn causes the seasons.

Subject: Science and Technology

Topic: Physical Science

Properties of Matter

6-8 Physical Science #1: Differentiate between weight and mass, recognizing that weight is the amount of gravitational pull on an object.

Elements, Compounds, and Mixtures

6-8 Physical Science #5: Recognize that there are more than 100 elements that combine in a multitude of ways to produce compounds that make up all of the living and nonliving things that we encounter.

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

Subject: English Language Arts

Topic: Language

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.

Lesson Objectives

Students will know and be able to:

- Give two examples of how glaciers have changed the New England landscape
- Name two sources of weathering and erosion.
- Name one type of evidence that glacial plucking occurred at Moose Hill
- Describe the three processes of rock formation
- Define vocabulary words such as bedrock
- Understand a topographic map and use contour lines to determine elevation

Vocabulary

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|--------------------|-----------------|-----------------|
| Glaciers | Conglomerate | Sedimentary |
| Erosion | Volcanic action | Metamorphic |
| Glacial plucking | Plate tectonics | Glacial erratic |
| Bedrock | Weathering | Chaos theory |
| Glacial striations | Igneous | Esker |

Assessments

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

- Mass Audubon educator will observe students exploring, observing, and identifying glacial features in the landscape, examples of weathering and erosion, the three rock types, and how to use a topographic map.
- Students will participate in answering teacher prompted questions.





- Students will demonstrate their understanding of how glaciers have changed the New England landscape, and the processes of weathering and erosion, by participating in a wrap-up activity.



Summarizer

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

- Students will give (and demonstrate) at least two examples of how glaciers have changed the New England landscape, while using vocabulary words to support their answer
- The class will identify two sources of weathering and erosion
- Students will be able to show evidence of glacial plucking at Moose Hill
- As a group, the students will demonstrate the three processes of rock formation through a kinesthetic activity



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.

