NASHUA RIVER WATERSHED ASSOCIATION

Nashua River Watershed Investigations for Grades K - 8

Lesson # 7-2

Title: 7-2 Ice Age Influences: Glaciation in our Watershed

Grade level & Standard: Grade 7
7MS-ESS2-2 Construct an explanation based on evidence for how Earth's surface has changed over scales that range from microscopic to global in size and operate at times ranging from fractions of a second to billions of years.

Objective: Students will create models of features caused by glacial deposition and glacial erosion. They also will look deeply at a map of Glacial Lake Nashua and compare it to a map of the Nashua River Watershed. If possible, they will visit outdoor glacial features around the school or community.

Background:
Outside most schools you can find signs of glaciation:

- Sand and gravel deposits (e.g., gravel pits)
- Large boulders/rocks (erratics).
- Stone walls made from rocks left behind by the last ice age.
- Landforms like eskers, drumlins, moraines, and kettle holes are left behind by glaciers.

Vocabulary:

Glacial Deposition

- **Esker** - a long ridge of gravel and other sediment, typically having a winding course, deposited by meltwater from a retreating glacier or ice sheet
- **Drumlin** - a low oval mound or small hill, typically one of a group, consisting of glacial till molded by past glacial action

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- **Glacial erratic** - stones and rocks that were transported by a glacier, and then left behind after the glacier melted
- **Kettle pond** - a pond formed by a large block of ice left behind by the glacier
- **Glacial till** - unsorted silt, clay, sand, pebbles and boulders that have been deposited by a glacier

Glacial Erosion:

- **Exposed bedrock** - In geology, **bedrock** is the lithified (pressed) rock that lies under the loose softer material (soil) at the surface of the Earth or other terrestrial planet. Exposed bedrock refers to what we see above ground.
- **Plucking** - parts of bedrock are “plucked” off by a glacier
- **Striations** - series of linear marks on a rock surface created by friction between rocks and moving glacier

Discussion points: Can we find evidence that glaciers once covered New England? How can we create a model to demonstrate how glaciers affect the land?

Materials:

- sand
- gravel
- rocks
- clay
- ice cubes with rocks frozen in them
- a large tupperware for freezing a large” glacier”
- bars of soap

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Glacial Erratic from the Wisconsin Ice Age
Photo taken by Kimberly King

Procedure: Create a model of landforms and glacial features left behind by glaciers using sand and gravel, pebbles, and cobbles. As a demonstration before the lab, a large block of ice can be frozen with gravel and rocks at the bottom. This can be set up in a stream table or an aquarium and left to melt over several days. Students can see meltwater features and till outwash.

Set-up for lesson requires 3 stations

1. Glacial deposition station - Students will create erratic boulders, eskers, drumlins, and glacial lakes with sand, gravel and large rocks. This can be done with clay instead of sand, and rocks. After creating the model, students sketch them on their data sheet.
2. Glacial erosion station - Erosion can be demonstrated with small ice cubes embedded with rocks and gravel. These can be scraped over a bar of soap (bedrock) and students will see striations on the soap.
3. Map compare station - Look at the *map of Glacial Lake Nashua*. This is how the lake looked approximately 10,000 years ago. Now look at the present day *map of the Nashua River Watershed*. What can you observe? Is there a connection between the two maps? (use data sheet for answers)

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Station 2 demonstration of glacial striations using ice, gravel, and soap.
Photo taken by Martha Morgan

Extension / resources:

- Create posters of before and after glaciation in the watershed.
- USGS Surficial Geology Map which shows surficial till
- YouTube: https://www.youtube.com/watch?v=TqEraWuWDw0

Data Sheets (attached)

- Ice Age Influences: What have glaciers left behind?
- Maximum extent of Glacial Lake Nashua
- Nashua River Watershed Map

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Name_____

STATION 1

With your sand or clay, make the following features and sketch them.

Esker	
Drumlin	
Erratic boulder	
Glacial lake	

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STATION 2

Gently scrape your ice cube over a piece of soap.

1) What do you observe?

2) Where does this happen in nature?

STATION 3

Look at the *map of Glacial Lake Nashua*. This lake was formed by glacial melt about 10,000 years ago. Compare to the present day *map of the Nashua River Watershed*. Find Leominster and Pepperell on both maps.

1) What can you observe?

2) Is there a connection between the two maps?

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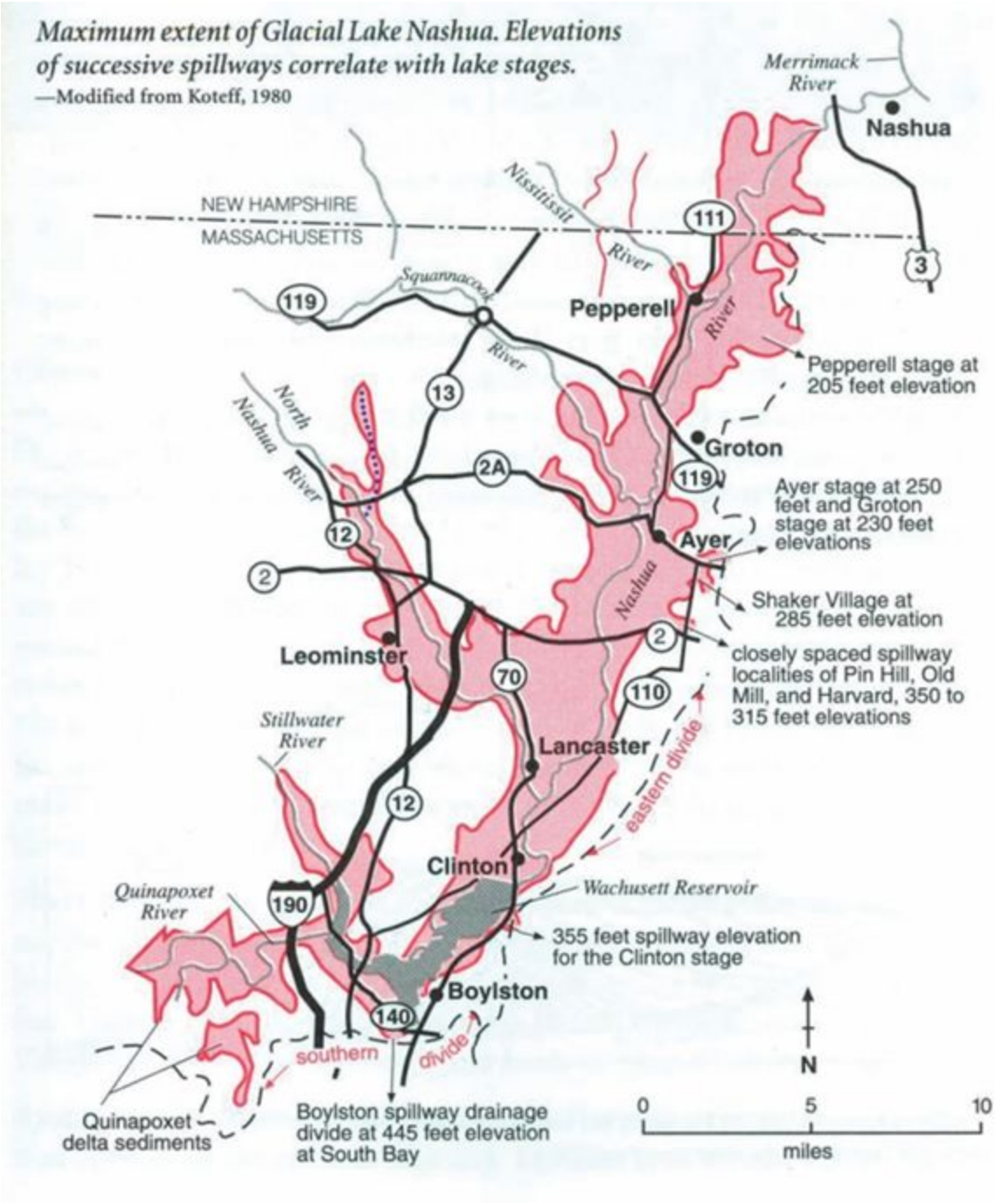

Maximum Extent of Glacial Lake Nashua

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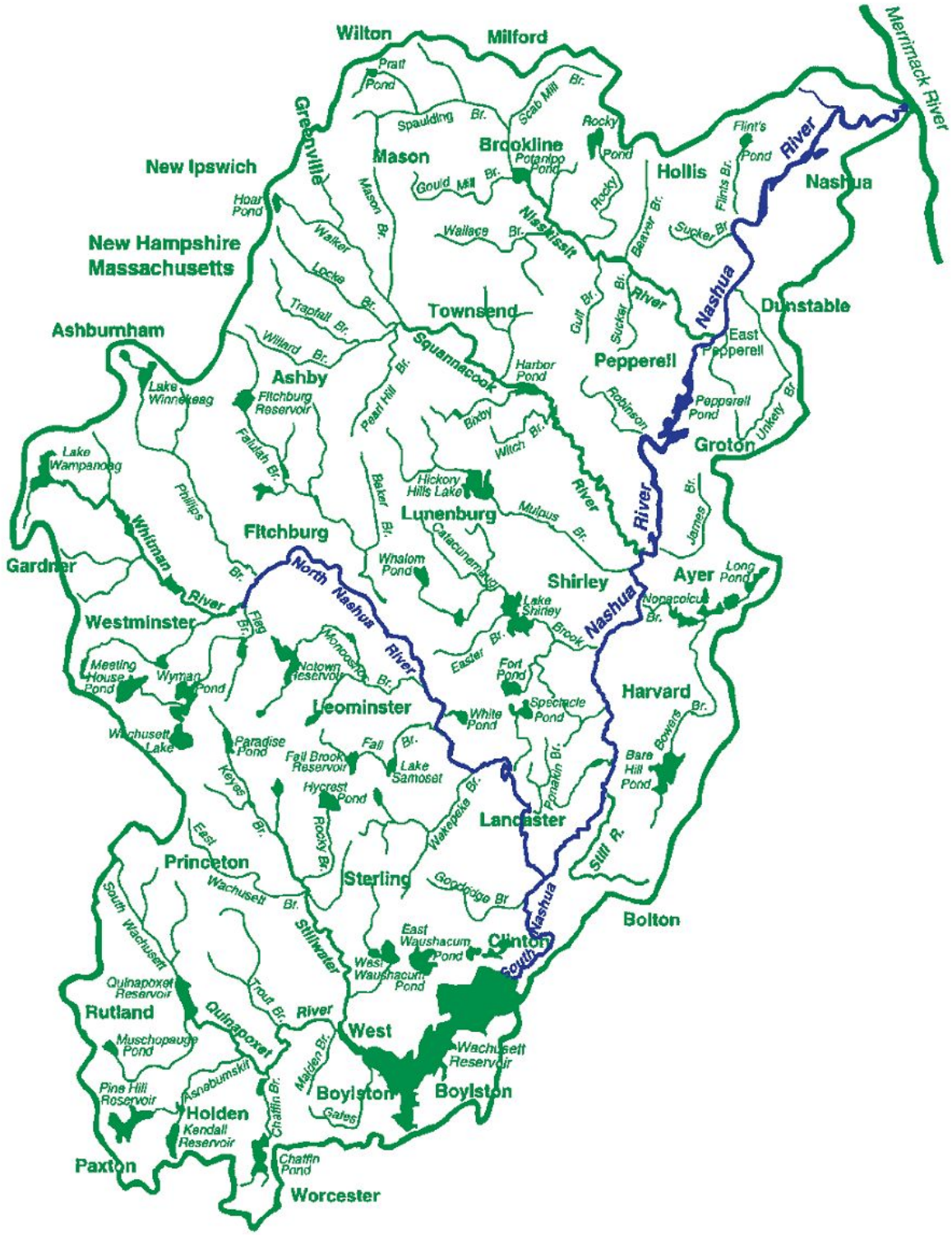

Nashua River Watershed Map

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