

The Massachusetts Ecosystem and the Civil War

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Unit Overview

This unit is designed to be taught in conjunction with a social studies unit examining the civil and military aspects of Fort Warren on Georges Island, an English unit examining the personal lives and perspective of soldiers and family members, and a math unit on engineering and supply calculations required to construct and maintain Fort Warren. This science unit will examine the impact ecosystems and land features have on military events and the construction of military forts including Fort Warren. The unit will use a pair of primary sources to bookend a trip to examine the actual ecosystems and construction on Georges Island. The selected primary source documents highlight both the impact of the ecosystems in which Civil War era forts were constructed as well as the human face of the war.

Students will use their knowledge of land forms and ecosystems to identify challenges that fort builders may have faced and examine the solutions that the architects employed. Students will also speculate about the impact that fort construction may have had on native species population and the reciprocal impact native species had on fort life.

An end of unit project will require student groups to anticipate construction difficulties and propose construction adaptations when presented with challenging ecosystems in which to build and maintain Civil War style forts.

Related Massachusetts Science Standards

Earth Science 6-8; #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.

Earth Science 6-8; #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.

Life Sciences 6-8; #13: Give examples of ways in which organisms interact and have different functions within an ecosystem that enable the ecosystem to survive.

Life Sciences 6-8; #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.

Technology & Engineering 6-8; #2.1: Identify and explain the steps of the engineering design process, i.e., identify the need or problem, research the problem, develop possible solutions, select the best possible solution(s), construct a prototype, test and evaluate, communicate the solution(s), and redesign.

Technology & Engineering 6-8; #2.2: **Demonstrate methods of representing solutions to a design problem, e.g., sketches, orthographic projections, multiview drawings.**

Technology & Engineering 6-8; #2.4: **Identify appropriate materials, tools, and machines needed to construct a prototype of a given engineering design.**

Technology & Engineering 6-8; #3.2: **Identify and explain the appropriate tools, machines, and electronic devices (e.g., drawing tools, computer- aided design, and cameras) used to produce and/or reproduce design solutions (e.g., engineering drawings, prototypes, and reports).**

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

Technology & Engineering 6-8; #6.2: **Given a transportation problem, explain a possible solution using the universal systems model. (Quincy Granite!)**

Lesson Plans

Lesson #1	Preparation for Field Trip to Georges Island: Exploration of Engineering Challenges on Georges Island
Content Objectives	<p>STUDENTS WILL BE ABLE TO:</p> <ul style="list-style-type: none"> - describe the challenges posed to construction by particular ecosystems and explain - propose construction adaptations to overcome natural challenges to Civil War fort construction.
Language Objectives	<p>STUDENTS WILL BE ABLE TO:</p> <ul style="list-style-type: none"> - read a nineteenth-century non-fiction description of Fort Warren. - explain and describe the challenges posed by environmental factors.
Primary Source Document(s)	Excerpt from <i>Harpers Weekly</i> Dec 7, 1861 issue publishing a description of Fort Warren. Reprinted in Jay Schmidt's <i>Fort Warren</i> (2003) on pages 11-12.
Procedure	<p>Do Now: Students will view a ~5 minute slide show with 10 pictures of the Harbor Islands (mainly Georges Island). (View some of these features on the Boston Harbor Islands website: http://www.nps.gov/boha/naturescience/naturalfeaturesandecosystems.htm.) While they are viewing the slide show, students will record the land features, ecosystem types (biomes), and plant and animal species that they see in the pictures. This data will be recorded during the do now on a chart provided to students. The chart will have three columns: (1) biomes, (2) land features, and (3) Plant/Animal species.</p> <ol style="list-style-type: none"> 1. Following the do now, the teacher will poll the class to ascertain their answers. Student answers will be recorded in a larger chart at the front of the room. The teacher will push the students to provide evidence for their biome and land feature claims. 2. Students will examine two maps of the Boston Harbor Islands. One map will show island locations and shores from early colonial days before large parts of the harbor were filled. (http://www.masshist.org/online/siege/doc-viewer.php?item_id=1905.) The second map will show island shorelines as they stood during the Civil War. (http://maps.bpl.org/details_10042/?dl_pp=2&mtid=51.) Student groups examining these maps will have to hypothesize about what geologic forces helped to shape this landscape (glaciers, tides, storms, erosion, and weathering) and what earth processes may still affect the region (tides, erosion, weathering, storms, invasive species). 3. Students will first read silently the passage from <i>Harper's Weekly</i> about Fort Warren. Students should annotate the passage as they read. Students will then read the passage together in groups further annotating the work. 4. The class will come back together to list engineering challenges that the Georges Island ecosystem and the earth processes may cause as

suggested by the *Harper's* article. Each group will choose a different challenge and discuss the impact that this challenge might have on the construction of Fort Warren and how they might problem solve the challenge.

Reflection: Recalling your examination of the pictures of Georges Island, what biome on Georges Island would you want to study further and why? If you were a civil war construction worker, what modern tool would you wish you could use and why?

Lesson #2	Preparation II for Field Trip to Georges Island
Content Objectives	<p>STUDENTS WILL BE ABLE TO:</p> <ul style="list-style-type: none"> - extend their knowledge of fort construction challenges to construction issues around Fort Totten, NC. - apply their knowledge of food chains and niches to identify solutions to mosquito issues soldiers must have faced at Fort Totten, NC.
Language Objectives	<p>STUDENTS WILL BE ABLE TO:</p> <ul style="list-style-type: none"> - explain their solution to the mosquito issues faced by Fort Totten.
Primary Source Document(s)	Letter from E. B. Pierce to Mother [Mary Alden Pierce], 2 December 1863, Fort Totten, NC. (Appears at the end of this lesson)
Procedure	<p>Do Now: Students will respond to one of three prompts posted on the front board:</p> <ul style="list-style-type: none"> - Based on your examination of the map of Boston Harbor, explain why you think Georges Island was a great location for a fort. (Hint: Think ships!) - Pretend that you are in charge of the construction of Fort Totten. Write a telegram to your boss in the War Department in Washington, DC explaining a challenge that you have encountered. - Recall our studies of wetlands. Describe what happens to the dead plants and animal materials that sink to the bottom of the wetland? <ol style="list-style-type: none"> 1. Review do now's. Have two students read/describe their answers for each prompt. Discuss addition of details as needed. 2. Students will read the letter from E. B. Pierce to his mother silently first, annotating as they read. Students will then partner to read aloud and annotate in groups of two. 3. The class will quickly review the letter together probing to confirm comprehension and build connections between knowledge of wetland ecosystems and speculation about the fort's environment. 4. Teacher will divide the class in half. Small groups on one side of the room will address construction issues related to building in a wetland. <ul style="list-style-type: none"> (a) The construction in the wetland issue groups will first discuss/hypothesize/record what issues may complicate construction on a wetland. By this time of year, the students will have traveled to the Granite Avenue salt marsh and would have experienced the shaking of the ground/peat. (b) Students will then propose solutions for how they could

	<p>construct a robust, heavy fort on the wetland. Students will draw a schematic of their proposal.</p> <ul style="list-style-type: none">(c) Students will then compare and contrast the strengths of a wetland-based fort with Fort Warren's rockier setting.(d) Finally, the group will then discuss the impact of construction on organisms within the wetland ecosystem. Teacher will ask students to reflect on whether wetland construction should be legal or illegal. <p>5. Small groups on the other side of the room will address ecosystem and health issues related to the presence of mosquitoes.</p> <ul style="list-style-type: none">(a) The mosquito group will first identify the needs of a mosquito for their lifecycles and what type of environmental niche the mosquito uses.(b) The group will then propose methods for reducing the number of mosquitoes in the vicinity of Fort Totten. Each group will generate a mosquito reduction plan.(c) The group will then share out knowledge that they have regarding current mosquito prevention programs and compare/contrast methods available to the Fort Totten planners with those available today. <p>6. Students groups will share out their findings with the whole class.</p>
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Edward Burgess to his Mother, December 2, 1863

Fort Totten

Dec 2 1863

Dear Mother

I received your letter today I was glad enough you had better believe. In the first place I will answer all your questions, you ask if I am warm nights? yes pretty warm. we have a stove in our tent & so we keep pretty warm. Are your slippers wearing out. no but I am going to sew some canvass on the bottoms so that I can wear it around the tent. what did you do with your old valise? I left it in R. I got 2 big bundles of Papers of while I was in Readville from Uncle E. I suppose I was very glad of them. our fort is made of a kind of peat cut out about the shape of bricks & piled together just outside the wall a deep ditch 26 ft wide is dug & so contrived that it can be filled with water with in an hour. If not inside the wall is a huge structure of logs & dirt about 30 ft wide

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& 160 ft high it is built to stop balls from our tents which are built at its foot enclosed you will find a plan of this fort. I have been well ever since we came here but some of the boys have had the fever & ague which seems to be the prevailing disease here & have been waiting a good while for a letter I think it will better to write once a week not wait for return letter for it takes about a fortnight for a letter to go and come I got three stamps but I am going to write to Willie & Clara & that will take & I thought I would save the other to reply to one of them if I should get an answer they both ~~go~~ wrote good letters W said he had got a pen-holder for me but I was too late to get it for I got the letter the day I left R. I shall write to them today & the letters will probably go by the same boat as this. we don't see many rebels all we see are prisoners or deserters some poor 20 deserters come in every night they are rough looking

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chaps I tell you they are dressed in clothes like my cashmeret pants. Give my love to the Moreys & tell Charlie I should like to see him. Give my love to Elija & Blaney & to Augusta I tell Eddie Allen that I should like to have him come out here a while if he could. we had a first rate-time here on Thanksgiving, in the morning the whole Garrison was drawn up in a hollow square & the Proclamation of the Pres. was read by the Chaplain of the 5th R.P. Arty & was followed by a short prayer after which we were dismissed & passes were given to all who wished to Newberne where there was a greased pole, sack race, greased pig & other amusements. the rhode island companies had rice puddings & other dainties. but we poor recruits rejoiced in Hard tack & salt beef which looks like cast iron. I dont think you had better send me a box yet as I am comfortable write soon

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send me some Lowell papers & one late Boston Journal

Your Truly

EB Peirce

PS tell me whether you can get state aid or not I will send you some cotton when I can get some more. the leaves are all gone now excuse bad writing E.B.P.

Give my love to father & tell him to be sure to write

Lesson #3	Visiting Georges Island and Fort Totten
Content Objectives	<p>STUDENTS WILL BE ABLE TO:</p> <ul style="list-style-type: none"> - describe specific land forms and ecosystems present on Georges Island. - examine building structures for their component pieces and generate hypotheses about how the Fort was constructed.
Language Objectives	<p>STUDENTS WILL BE ABLE TO:</p> <ul style="list-style-type: none"> - describe in detail using strong adjectives their observations using their senses of sight, smell, touch, and hearing.
Primary Source Document(s)	Examination of Georges Island ecosystems and the interface of the land and the fort's construction.
Procedure	<p>* Students will have approximately 1 hour to conduct their science research as they will need to conduct investigations for their social studies, math, and ELA courses as well. Do Now:</p> <p>Chaperoned groups will visit 3 or 4 of the following spots to engage in activities related to various parts of Georges Island and Fort Warren:</p> <ul style="list-style-type: none"> - Visitors Center: Descriptions and models of food eaten at Fort Warren by rank. Students will examine the displays, read the placards and discuss/record answers related to how the Boston Harbor ecosystem contributed to the meals eaten by the prisoners and soldiers. Reflection: Could the Boston Harbor ecosystem support thousands of soldiers on Fort Warren today? Why or Why not? - Visitors Center: Placard area describing the use of Quincy and Rockport granite in the construction of Fort Warren. Students will answer questions related to the Technology and Engineering state standard referencing transportation issues. Students will speculate about how the granite blocks were moved (simple machines!) 150+ years ago and compare/contrast to how the blocks would be moved today. - Beach/Piers: Students will discuss/hypothesize/record what flora/fauna would have been native to this part of the island and how construction of the fort and piers may have affected this ecosystem. Students will then propose methods by which the piers may have been constructed. Students will be prompted to attempt to build a pier using sticks. What challenges do you encounter? - Main Gate: Students will speculate about how the gate's construction may have helped bolster the fort's defenses and propose methods for how the moat and draw bridge were built. - Ramparts. Students will ascend to the top level of Fort Warren. They will discuss and speculate about how the earthworks on

	<p>the top of the fort helped to protect soldiers. Students will compare the impact that grasses, bushes, and trees on the ramparts has with the impact that plants have on ecosystems (reduce erosion).</p> <p>Reflection: What piece of the Fort Warren construction would you have wanted to participate in? Why? And, how could you have improved upon Fort Warren's design?</p>
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Assessment	<p>In a fourth day of classes in this unit, student groups will be given a map (and pictures where possible) of other Civil War era forts. The students will spend the first part of class identifying challenges to the construction of the fort stemming from the ecosystems, biomes, and plant/animal species. In the second part of class students will propose a solution to one of the fort construction challenges. Students will present their findings and solutions on poster-boards.</p>
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