

Mystery of the Missing Megafauna



STANDARD COURSE OF STUDY CORRELATIONS:

Science, Grade 6, Goal 7: The learner will conduct investigations and use technologies and information systems to build an understanding of population dynamics.

7.02 Investigate factors that determine the growth and survival of organisms including:

- Light.
- Temperature range.
- Mineral availability.
- Soil/rock type.
- Water.
- Energy.

7.03 Explain how changes in habitat may affect organisms.

7.05 Examine evidence that overpopulation by any species impacts the environment.

7.06 Investigate processes which, operating over long periods of time, have resulted in the diversity of plant and animal life present today:

- Natural selection.
- Adaptation.

Science, Grade 8, Goal 5: The learner will conduct investigations and utilize appropriate technologies and information systems to build an understanding of evidence of evolution in organisms and landforms.

5.01 Interpret ways in which rocks, fossils, and ice cores record Earth's geologic history and the evolution of life including:

- Geologic Time Scale.
- Index Fossils.
- Law of Superposition.
- Unconformity.
- Evidence for climate change.
- Extinction of species.
- Catastrophic events.

5.02 Correlate evolutionary theories and processes:

- Biological.
- Geological.
- Technological.

5.03 Examine evidence that the geologic evolution has had significant global impact including:

- Distribution of living things.
- Major geological events.
- Mechanical and chemical weathering.

AP Earth/Environmental Science, Goal 2: The learner will build an understanding of the interdependence of Earth's systems.

2.05 Investigate the biosphere.

- Organisms: adaptations to their environment.
- Populations and communities: exponential growth and carrying capacity.
- Ecosystems and change: biomass, energy transfer, succession.
- Evolution of life: natural selection, extinction.
- Biomes: global distribution

MATERIALS

- ❄ Graphic organizer (1 per student)
- ❄ *National Geographic* articles referenced below
- ❄ Pictures of several giant prehistoric animals to show students

PREPARATION

If computers and Internet access are available in the classroom, you can have students view and read the articles "Humans to Blame for Ice Age Extinctions" (http://news.nationalgeographic.com/news/2005/08/0810_050810_iceage.html) and "Mammoth Extinction Caused by Trees, Study Suggests" (<http://news.nationalgeographic.com/news/2006/05/ice-age.html>). Otherwise, retrieve and print copies of the articles to distribute to the class.

Biology, Goal 5: The learner will develop an understanding of the ecological relationships among organisms.

5.03 Assess human population and its impact on local ecosystems and global environments:

- Historic and potential changes in population.
- Factors associated with those changes.
- Climate change.
- Resource use.
- Sustainable practices/stewardship.

INTRODUCTION TO LESSON: Students will learn about the diversity of large prehistoric animals and draw conclusions about what caused megafauna to die out. They will read recent articles containing scientific hypotheses and analyze the scientific arguments using a graphic organizer or Venn diagram.

BACKGROUND FOR TEACHER: Mammoths, mastodons, giant sloths and other megafauna were once found throughout North America, including North Carolina. There is much scientific debate about what caused these beasts to die off. One theory is that warming climate after the end of the last Ice Age altered habitat and food sources; a second is that animals were hunted to extinction after humans arrived in North America; a third is that the animals were decimated by disease. An additional, more controversial, theory is that a catastrophic meteor caused climatic changes leading to the extinction of mammoths. A brief article on that theory, referenced in *Additional Resources*, would make a helpful supplemental handout.

engage > Start a discussion about prehistoric megafauna: What are some of the largest terrestrial wild animals that live in North Carolina? (*Possible answers: bear, deer, elk.*) What are some of the largest animals in the world? (*Possible answers: elephants, tigers.*) Do you think any of those large animals—or animals like them—ever lived in North Carolina? The answer is yes! Ask students what they think the word *megafauna* means. Show several photos of mastodons, woolly mammoths, saber-tooth cats or other extinct megafauna. Tell students they will be learning about the giant animals that roamed North Carolina thousands of years ago and deciding what they think happened to them. **Show Chapter 3 of the video.**

explore > Ask students to make a list of possible reasons why the megafauna described in the video disappeared from North Carolina. Then hand out the articles. After they have read the articles, ask students to decide which hypothesis they think has the best supporting evidence. Have them fill out the graphic organizer, and then have them write a paragraph containing their own conclusions, with justifications from the video and the articles.

Alternative assignment: Have students do a Venn diagram using the information from the video and articles.

explain > Have students share their conclusions with the class and debate their theories.

elaborate > Have students investigate other hypotheses, such as the disease or meteorite theories.

evaluate > Review the students' graphic organizers and paragraphs.



BEYOND THE CLASSROOM

Arrange a field trip to a nearby museum that displays prehistoric artifacts and/or fossils (check <http://www.ncmuseums.org>).

Additional Resources:

"New Evidence for Catastrophic Comet Theory" • <http://www.canada.com/montrealgazette/news/story.html?id=41d7da0f-bc99-4a9b-931c-6352dc59ebef>

"Insect Attack May Have Finished Off Dinosaurs" • www.sciencedaily.com/releases/2008/01/080103090702.htm

American Museum of Natural History • <http://www.amnh.org/sciencebulletins/biobulletin/biobulletin/story981.html> • Background on mammoths and information on another hypothesis about megafauna extinction ("hyperdisease").

Natural Resources Defense Council • <http://www.nrdc.org/OnEarth/06win/mammoth1.asp> • Extensive article with in-depth information about one scientist's work investigating the impact of human activity on mammoth populations.

San Diego Natural History Museum • http://www.sdnhm.org/exhibits/mystery/fg_mastodon.html • Good background on mammoths and mastodons (includes photos showing how their teeth differed).

Nature's Ways is a collection of 200 essays from *Wildlife in North Carolina* magazine. The essay "Our Ice Age Relics" (Vol. 1) discusses "disjunct" species that show evidence of the effects of the Ice Age on North Carolina's species diversity. While this lesson plan examines reasons why organisms died out, this essay looks at organisms that, due to special circumstances, were "marooned" in North Carolina and did not die out when the Ice Age ended. *Nature's Ways* is available from the N.C. Wildlife Resources Commission, <http://www.ncwildstore.com/store-naturesways.html>.

Venn Diagram Templates • http://www.technology.com/web_tools/graphic_org/venn_diagrams/ <http://www.readwritethink.org/materials/venn/>



Graphic Organizer

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Title of Article	
Scientist(s) featured	
Summary of main theory	
Evidence for theory	
Evidence against theory	