Discussion Guide

WILDLIFE MANAGEMENT

Managing Pleistocene Megafauna

In This Activity...

Students will research and debate different stakeholder group perspectives in developing a wildlife management plan for... North America's extinct megafauna. Their conservation plan will consider the needs of humans along with the long-term health of Pleistocene megafauna as valued "citizens" of Planet Earth.

GRADE LEVELS
HIgh School - Grades 9-12

CONTENT AREAS
Natural Resource Science, Natural History, Ecology, Anthropology
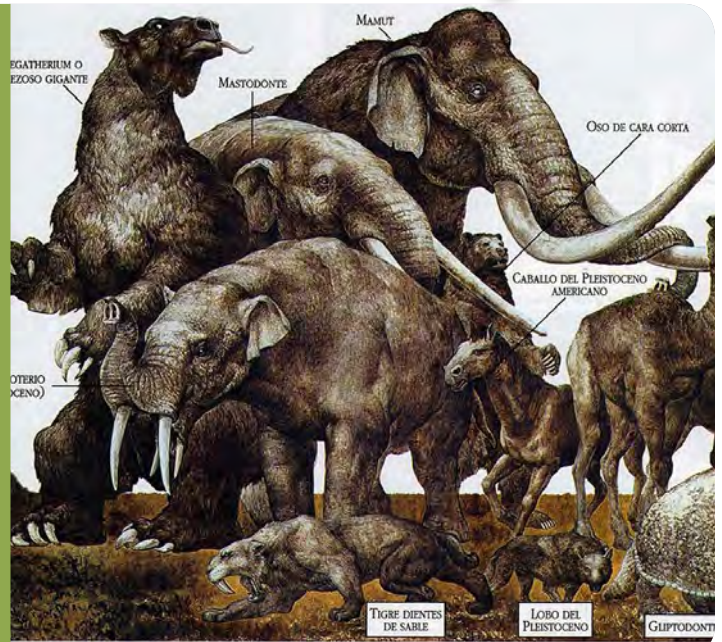
UNIT THEME
Natural Resource Evaluation and Management

TOPICS
Wildlife Management, Ecology, Anthropology

TIME REQUIRED
Three 45-minute Sessions

OVERVIEW

The Pleistocene Epoch is the time period that began about 2.6 million years ago and lasted until about 12,000 years ago. This period was marked by repeated glacial advances and retreats of "continental" ice sheets that covered the northern parts of North America, including the northern tier of states and most of the Upper Midwest. Anthropologists believe the first humans to inhabit the continent migrated across the Bering land bridge between 15,000 and 18,000 years ago. When these first Paleo-hunters arrived, they found a continent teeming with wildlife, including a variety of large-bodied "megafauna".

The list of these megafauna included notables such as; North American horses, Glyptodons, Mastodons, Mammoths, Short-faced bears, Dire Wolves, American Cheetahs, Giant Ground Sloths, Giant Beavers, Camels, Saber-toothed Cats, Giant American Bison, Stag-Moose, and nearly a dozen other sub-species. Professor Paul S. Martin's book, *Twilight of the Mammoths: Ice Age Extinctions and the Rewilding of America*, reveals that within 1500 to 3000 years of humans arriving on continents around the world, a significant number of vulnerable megafauna became extinct. Martin and many other scientists believe that these megafauna extinctions were directly or indirectly the result of over-hunting by expanding populations of Paleo-hunters.

In this lesson, students will assume the roles of different "Paleo-stakeholder tribal groups" that share the landscape with Pleistocene megafauna. Students will research and debate how to manage these wildlife populations that considers ecosystem biodiversity, the health of the various megafauna populations, and their various "tribal" interests and beliefs.

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CONCEPT Wildlife Management

ENDURING UNDERSTANDING:

Students will understand the differences between managing various species of wildlife populations for human and ecosystem welfare.

CONTENT OBJECTIVES:

Students will be able to evaluate ecological and social factors that determine how to manage wildlife populations. They will also be able to research, debate and develop a Pleistocene megafauna management plan for the health of key wildlife species and humans.

LEARNER OBJECTIVES:

Students will use online research to determine what strategies wildlife managers use to develop wildlife management plans. Students will use other online research and group discussions to develop a Pleistocene megafauna management plan that uses the model of modern wildlife management.

PROCESS OBJECTIVES:

Students will work in small and large groups to process new information and use evidence to come to a conclusion.

MATERIALS NEEDED (each group, each student):

1. Access to computers and Internet
2. Video, background information, (all available for free download, including HD video) http://intotheoutdoors.org/topics/birth-of-wildlife-conservation/
3. Student Worksheet with Pre-lesson questions to fill in while watching video
4. Student Megafauna Management Plan Worksheet

PROCEDURES

Session 1

Before watching the *Birth of Wildlife Conservation* video or reading the website background information, ask students about the fundamental principals of wildlife conservation. Also ask students how they have been involved in wildlife conservation programs. Lead a short discussion on what students have learned about themselves and their relationship to wildlife conservation.

Have students download, or print and distribute the Pre-Lesson Student Worksheet (copy contained in this PDF and on the web link). Instruct students to fill in the worksheet while watching the video. Go over the questions with the students before viewing so they know what to look and listen for.

After viewing the video, review and discuss the answers to the questions as a class.

Next, divide the class into these four (4) Megafauna Management Tribes: 1) Mother Earth Clan, 2) Predator Slayers, 3) Mammoth Eaters, 4) Dream Walkers. Inform students they will be working as "tribal" teams in Sessions 2 & 3.

PROCEDURES *(continued)*

Session 2 - Team Research & Plan Development

Have students download and print, or hand out to each student the **Megafauna Management Plan Worksheet** (copy contained in this PDF and on the web link). Each of the four Megafauna Management Tribes have assigned goals and objectives in developing their management plans. In their separate assigned Megafauna Management Tribes, have students perform online research from the links provided, and other sources, then discuss and develop their tribal megafauna management goals. The worksheet provides instructions and research options for students to gather information. Inform each group that two members of each tribe will also prepare a presentation to present their megafauna management recommendations to the class during Session 3. Their presentation should be supported by the modern model of wildlife conservation, and some form of media (either video, poster, graphs, charts, images).

Session 3 - Team Presentations & Class Debate

Have each tribe present their **Megafauna Management Plan** and supporting reasons. After all four tribes present their plans, lead a group discussion on how the tribes can work through their differences in the best interest of the various megafauna populations (both present and future) with consideration to humans and other ecological members. Their final plan should attempt to strike a "hypothetical" scientific and logical balance between the various tribal stakeholder interests.

Conclude the discussion with a sampling of students who are still dissatisfied with the overall plan and explore what options might be available to fulfill their tribal goals.

ASSESSMENT

Students will be informally assessed based on their participation in the tribes and during class presentations and discussions. Teachers could collect the discussion notes students took during the video to check for completion.

Students can be formally assessed using their Pre-Lesson Student Worksheets. Students can be assessed on meeting the formal learning objectives on how thoroughly students completed their **Megafauna Management Plan** worksheets.

EXTENSION ACTIVITY

Student Teams with unresolved issues in their Megafauna Management Plan could explore megafauna extinction sources and prepare a presentation on other possible factors that resulted in the extinction of North America's megafauna. Students can later present their findings in class and compare their issues with what they discovered about modern scientific wildlife management.

SPECIAL CONSIDERATIONS:

1. The instructor should stress that this is a "hypothetical historical" activity that cannot be confirmed by scientific data.

2. During the video, the instructor may want to pause the video to allow students time to fill in their Pre-Lesson Student Worksheet.

3. Sessions 2 & 3 of this activity are richest when completed in groups with answers shared with and discussed as a whole class. **Megafauna Management Plan** worksheet is not a typical worksheet as it encourages students to research and construct knowledge as they answer questions.

RESOURCES for Teachers & Student Research

- http://www.sciencemag.org/news/2014/01/what-killed-great-beasts-north-america

- https://www.nature.com/articles/ncomms14142

- http://www.bbc.com/earth/story/20161102-what-really-happened-to-mammoths-and-other-ice-age-giants

- https://www.livescience.com/51793-extinct-ice-age-megafauna.html

- https://www.smithsonianmag.com/science-nature/what-happened-worlds-most-enormous-animals-180964255/

- http://www.bearsmart.com/managing-communities/human-bear-conflictmanagement-plans/

The following **National Common Core Standards** can be met teaching NATURAL RESOURCE MANAGEMENT:

NATIONAL COMMON CORE STANDARDS

CCSS.ELA-LITERACY.RST.9-10.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

CCSS.ELA-LITERACY.RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

CCSS.ELA-LITERACY.RST.11-12.2 Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

CCSS.ELA-LITERACY.RST.9-10.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.

CCSS.ELA-LITERACY.RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics.

CCSS.ELA-LITERACY.RST.11-12.6 Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.

CCSS.ELA-LITERACY.RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

National Common Core Standards Continued:

CCSS.ELA-LITERACY.RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

CCSS.ELA-LITERACY.RST.11-12.8 Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

CCSS.ELA-LITERACY.RST.9-10.9 Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

CCSS.ELA-LITERACY.RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

CCSS.ELA-LITERACY.RST.9-10.10 By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently.

CCSS.ELA-LITERACY.RST.11-12.10 By the end of grade 12, read and comprehend science/technical texts in the grades 11-CCR text complexity band independently and proficiently.

CCSS.ELA-LITERACY.SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

CCSS.ELA-LITERACY.SL.11-12.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11-12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

CCSS.ELA-LITERACY.SL.9-10.2 Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.

CCSS.ELA-LITERACY.SL.11-12.2 Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

CCSS.ELA-LITERACY.SL.9-10.3 Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.

National Common Core Standards Continued:

CCSS.ELA-LITERACY.SL.11-12.3 Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.

CCSS.ELA-LITERACY.SL.9-10.4 Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

CCSS.ELA-LITERACY.SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.

CCSS.ELA-LITERACY.SL.9-10.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

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CCSS.ELA-LITERACY.SL.9-10.6 Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

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Next Generation Science Standards Next Page...

Next Generation Science Standards

HS-LS2-1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

HS-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales

HS-LS2-6. Evaluate claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.

HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

HS-LS2-8. Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce.

HS-LS4-6. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.

HS-ESS3-3. Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.

Wildlife Management Pre-Lesson Student Worksheet

Student Name: **Class:**   **Date:**

Before watching the video or exploring the website, review these questions and look for answers during the video.

1. What were some of the causes of extinction or near extinction of some North American species?

2. What factors caused many big game species to rebound during the past 100 years?

3. What social and governmental influences helped shape American's wildlife conservation model?

4. What scientific concepts do wildlife professionals use in managing wildlife populations?

5. What tools do wildlife professionals use in managing species such as bears and deer?

6. What challenges do wildlife managers face in managing wildlife primarily for human considerations?