

We Arrived 10,000 Years Ago...

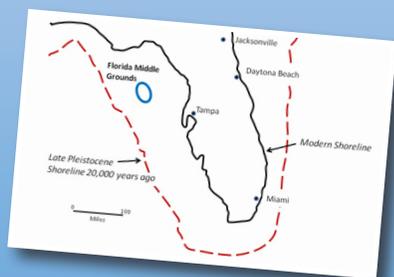
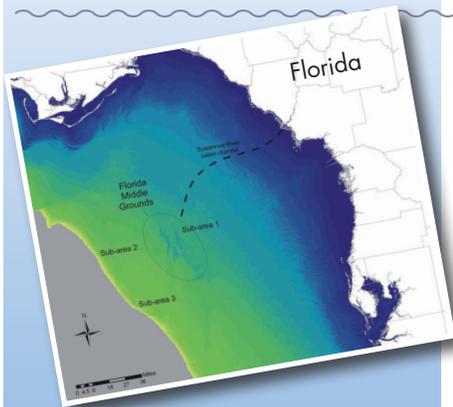


Image captions/credits on Page 2.

lesson plan

Focus

Lifeways of paleoamericans

Grade Level

7-8 (Archaeology/Anthropology)

Focus Question

What inferences can be made about the lifeways of paleoamericans?

Learning Objectives

- Students will be able to explain at least two ways that humans migrating from eastern Asia may have settled North and South America.
- Students will make inferences about lifeways of paleoamericans based on an extant 10,000 year-old human culture in southern California.

Materials

- Copies of *Paleoamerican Lifeways Inquiry Guide*, one copy for each student or student group

Audio-Visual Materials

- None

Teaching Time

One or two 45-minute class periods, plus time for student research

Seating Arrangement

Classroom style, or groups of 2-4 students

Maximum Number of Students

30

Key Words

Paleoamerican
Pleistocene Epoch
Chumash
Arlington Springs
Santa Rosa Island
Daisy Cave
San Miguel Island
Lifeways

Background Information

NOTE: Explanations and procedures in this lesson are written at a level appropriate to professional educators. In presenting and discussing this material with students, educators may need to adapt the language and instructional approach to styles that are best suited to specific student groups.

Recent archaeological and molecular genetic evidence (Goebel, *et al.*, 2008) indicates that the first humans to inhabit North America migrated from Siberia around 15,000 years ago, near the end of the Pleistocene Epoch. These migrants are believed to have crossed a land bridge to the Pacific coast of North America, and continued southward, possibly using boats. Some of their descendants spread across what is today the United States, while others continued southward into South America. An important characteristic of these first Americans is that they used thrusting spears tipped with specialized stone points, and were very successful hunters. At this time, North America was inhabited by many large mammals that are now extinct, including mammoths, bison, short-faced bears, giant sloths, and sabre-toothed cats.

Some of the oldest archaeological sites discovered in North America are in the eastern United States, and there are numerous quarry-campsites in the southeastern states. Quarries are locations where raw rock material was mined and processed to make tools. If a reliable source of water is nearby (or was nearby during late Pleistocene times), residential sites are often found near the quarry. When the first humans arrived in Florida, sea level was much lower and there was more than twice as much dry land as exists today. The climate was considerably drier, and water was scarce. Not surprisingly, early American settlements that have been discovered in the state are almost always associated with a reliable water supply such as rivers and springs. These areas would also have been attractive to animals, increasing the likelihood that human hunters would be able to find food.

Limestone bedrock that underlies the Florida peninsula strongly influences the state's landscape. Limestone dissolves in acidic solutions, and over time has been sculpted by rainwater which is weakly acidic. This sculpting includes the formation of underground caves. When the roof of a cave becomes unstable, it collapses to form a hole in the ground called a sinkhole. Florida has hundreds of sinkholes, some of which became natural reservoirs for fresh water. Not surprisingly, some of the most artifact-rich paleoamerican sites are located near sinkholes.

Coastal areas inhabited by early Americans are difficult to explore because the coastlines of 15,000 years ago are now under more than 300 feet of water! As the last ice age drew to a close, melting ice sheets caused a rapid rise in sea level just as the first Americans were entering the New World. Drowned settlements may contain well-preserved

Images from Page 1 top to bottom:

The eastern Gulf of Mexico showing the three sub-areas examined in 2008, the Florida Middle Grounds, and the Suwanee River paleo channel.
http://oceanexplorer.noaa.gov/explorations/09newworld/background/plan/media/fmg_surveyareas.html

During the Late Pleistocene Florida's shoreline extended much farther offshore than the present coast. The Florida Middle Grounds were part of the exposed coastal margin.
<http://oceanexplorer.noaa.gov/explorations/09newworld/background/climatechange/media/pleistocene.html>

Map of the Bering land bridge during the late Wisconsin glaciation, when global sea level dropped to about 120 meters or more below its present position.
http://oceanexplorer.noaa.gov/explorations/09newworld/background/occupation/media/beringia_late_wisconsin.html

This image portrays a more accurate reconstruction of Ice Age human behavior with a focus on small familial groups and the processing and use of plants as opposed to athletically fit young men attacking large, dangerous animals.
<http://oceanexplorer.noaa.gov/explorations/09newworld/background/beliefs/media/correctpaleobehavior.html>

All images courtesy NOAA.

artifacts that can provide important new information about how the first Americans lived and when they arrived at various locations in North and South America. The eastern Gulf of Mexico in the vicinity of the Ocala Uplift Zone (Florida) is particularly promising as a potential location for drowned coastal settlements because:

- There are numerous onshore archaeological sites along the same zone that are more than 13,000 years old;
- Clusters of similar sites have been identified along drowned shorelines in the northern Gulf of Mexico;
- Rivers that discharge into this part of the Gulf do not carry large quantities of sediment, so sites should not be deeply buried;
- The coastal shelf is gently sloped which would reduce the impact of waves and storms; and
- Rapid sea level rise would have reduced the impact of waves as coastal settlements were inundated.

The Northeastern Gulf of Mexico 2008 Expedition focused on ancient river channels in the vicinity of the Florida Middle Grounds, which are now several hundred feet below the Gulf's surface. Major accomplishments included:

- Locating and high resolution mapping of a large, essentially intact, and infilled ancient river channel several kilometers long, east of the Florida Middle Grounds;
- Identifying additional stream and river channels, some with clearly visible deposits along the banks;
- Locating and identifying more than 100 sinkhole features filled with material in stratified layers that may contain human artifacts as well as plant and animal material from early American times; and
- Mapping nearly 10 square kilometers of intact, shallow-water, near-shore sand ripples/ridges adjacent to an area that would have been Florida's shoreline when sea level was at its lowest point during the last glacial period.

The latter achievement is particularly important because it shows that the oldest shoreline is extraordinarily well preserved. Most interesting, though, are the infilled sinkholes with multiple layers of distinct strata. These sinkholes are a potential treasure trove of new information about the late Pleistocene landscape and environment, as well as about the humans who lived there.

This lesson guides a student inquiry into the lifeways of some of the first Americans to inhabit coastal areas.

Learning Procedure

1. To prepare for this lesson:
 - (a) Review introductory essays for the Exploring the Submerged New World 2009 Expedition at <http://oceanexplorer.noaa.gov/explorations/09newworld/welcome.html>; and

Refer to the probable Siberian origin of the first Americans. Ask students whether they would expect environmental conditions to have been homogenous throughout this region during the 15,000 years or so before migrations began to North America. Students should infer that it is very unlikely that uniform conditions would have existed over a large geographic area for such a long period of time. Habitats almost certainly included the Arctic steppe with socially gregarious herd animals, wooded valleys with rivers containing fish, and the ice-packed coastal shelf inhabited by sea mammals. Pleistocene artifacts from these areas show evidence of different lifeways that were adapted to particular food resources available in each area (James Q. Jacobs; http://www.jqjacobs.net/anthro/paleoamerican_origins.html).

Refer to the migratory routes discussed in Step 2. Ask students whether they would expect conditions to be similar at all points along these routes. Again, such uniformity is very unlikely. So the picture of paleoamericans exclusively focused on hunting large mammals is probably incomplete. Point out that the Paleoindian Period is usually defined as the interval between about 13,000 to 8,000 years ago. This period included major climate shifts, changes in sea level, and species extinctions; as well as advances in human skills and technology (consider the better-known changes during the interval between 5,000 years ago and the present). The point is that paleoamerican lifeways were probably more diverse than most collections of artifacts might suggest, and these lifeways almost certainly changed substantially in response to changing environments and human technologies.

5. Have students complete Part 3 of the *Inquiry Guide*, then lead a discussion of their inferences. The following points should be included:

- Chumash Indians had permanent settlements on Santa Rosa Island when Europeans first arrived in 1542, and there is evidence that a complex society had been in place as early as 1150. Connections between the Chumash and paleoamericans who inhabited Santa Rosa Island are uncertain, but there is some evidence (Lovgren, 2007) of a genetic relationship.
- The Chumash name for Santa Rosa is Wimat, which refers to redwood logs that drifted from northern California onto the island's beaches. Redwood lumber is well-suited for the construction of traditional Chumash canoes, which were in use well before the first European arrivals. Considering that Santa Rosa was an island during the Ice Ages, paleoamerican inhabitants of the island almost certainly used boats as well.

- Chumash are skillful fishers, and are known to harvest fin fish, shellfish, and sea mammals. Berries, nuts, roots, bulbs, and various plant materials are also used for food and medicinal purposes, but there is no record of formal agriculture. Since these resources were also available to paleoamerican inhabitants, it is reasonable to infer that they were part of the lifeways of people who first lived at Arlington Springs. Archaeological evidence indicates that shellfish were the key dietary resource for paleoamerican inhabitants. Pygmy mammoth fossils have been discovered on Santa Rosa Island, and may have been present when the first humans arrived. If so, mammoths may have been part of the diet of paleoamericans, but were probably not the most significant source of food.
- Daisy Cave is an archaeological site on San Miguel Island, another of the Channel Islands near Santa Rosa. The earliest evidence of woven technology (basketry and cordage) on the Pacific coast was found at Daisy Cave, and has been dated to between 8,500 and 10,000 years ago. If the first inhabitants of the Channel Islands were migrants from northeast Asia, it is very likely that they possessed technologies for working plant and animal materials into clothing and shelters, since these skills would have been essential for survival in the ice age environment of Arctic Siberia.

The BRIDGE Connection

www.vims.edu/bridge/archeology.html

The “Me” Connection

Have students write a brief essay describing their own lifeways, and comparing these with inferred lifeways of paleoamericans who lived at Arlington Springs.

Connections to Other Subjects

English/Language Arts, Geography, Earth Science, Life Science

Evaluation

Students’ research reports and class discussions provide opportunities for assessment.

Extensions

1. Visit <http://oceanexplorer.noaa.gov/explorations/09newworld/welcome.html> for more about the Submerged New World 2009 Expedition.
2. Visit <http://www.pbs.org/wgbh/nova/first/> for information and resources about the discovery and controversy surrounding a well-preserved, 9,000-year-old human skeleton called Kennewick Man.

Other Relevant Lesson Plans from NOAA's Ocean Exploration Program

(The following Lesson Plans are targeted toward grades 7-8)

Shipwreck Mystery (10 pages, 322k) (from AUVfest 2008)
<http://oceanexplorer.noaa.gov/explorations/08auvfest/background/edu/media/shipwreck.pdf>

Focus: Marine Archaeology (Earth Science/Physical Science/Social Science)

In this activity, students will be able to draw inferences about a shipwreck given information on the location and characteristics of artifacts from the wreck; use a grid system to document the location of artifacts recovered from a model shipwreck site; and identify and explain types of evidence and expertise that can help verify the nature and historical content of artifacts recovered from shipwrecks.

Sonar Simulation (10 pgs, 308kb) (from the Bonaire 2008: Exploring Coral Reef Sustainability with New Technologies Expedition)
<http://oceanexplorer.noaa.gov/explorations/08bonaire/background/edu/media/sonarsim.pdf>

Focus: Side-Scan Sonar (Earth Science/Physical Science)

In this activity, students will describe side-scan sonar, compare and contrast side-scan sonar with other methods used to search for underwater objects, and make inferences about the topography of an unknown and invisible landscape based on systematic discontinuous measurements of surface relief.

This Old Ship (9 pages, 272 kb) (from the 2006 Phaedra Expedition)
http://oceanexplorer.noaa.gov/explorations/06greece/background/edu/media/old_ship.pdf

Focus: Ancient and Prehistoric Shipwrecks (Earth Science/Social Studies)

In this activity, students will be able to describe at least three types of artifacts that are typically recovered from ancient shipwrecks, explain the types of information that may be obtained from at least three types of artifacts that are typically recovered from ancient shipwrecks, and compare and contrast, in general terms, technological features of Neolithic, Bronze Age, Hellenistic, and Byzantine period ships.

Mapping the Aegean Seafloor (8 pages, 288 kb) (from the 2006 Phaedra Expedition)

http://oceanexplorer.noaa.gov/explorations/06greece/background/edu/media/seafloor_mapping.pdf

Focus: Bathymetric Mapping of Deep-sea Habitats (Earth Science)

In this activity, students will be able to create a two-dimensional topographic map given bathymetric survey data, create a three-dimensional model of landforms from a two-dimensional topographic map, and interpret two- and three-dimensional topographic maps.

Other Resources

The Web links below are provided for informational purposes only. Links outside of Ocean Explorer have been checked at the time of this page's publication, but the linking sites may become outdated or non-operational over time.

<http://oceanexplorer.noaa.gov> – NOAA's Ocean Explorer Web site

<http://oceanexplorer.noaa.gov/explorations/09newworld/welcome.html> – Web site for the Submerged New World 2009 Expedition

<http://celebrating200years.noaa.gov/edufun/book/welcome.html#book> – A free printable book for home and school use introduced in 2004 to celebrate the 200th anniversary of NOAA; nearly 200 pages of lessons focusing on the exploration, understanding, and protection of Earth as a whole system

<http://centerfirstamericans.org/index.php> – Web site for the Center for the Study of the First Americans

<http://www.jqjacobs.net/anthro/paleoamericans.html> – Online article on issues and evidence relating to peopling of the New World

<http://www.pbs.org/wgbh/nova/first/> – Web site to accompany the NOVA presentation, "Mystery of the First Americans" (originally broadcast on February 15, 2000) documenting the discovery and controversy surrounding a well-preserved, 9,000-year-old human skeleton called Kennewick Man; includes "Does Race Exist?," "Meet Kennewick Man," "Claims for the Remains," "The Dating Game" (about carbon-14 analysis), and links to resources

<http://www.nps.gov/history/aad/eam/index.htm> – National Park Service Archaeology and Ethnography Program's Web site, The Earliest Americans

Goebel, T., M. R. Waters, and D. H. O'Rourke. 2008. The Late Pleistocene Dispersal of Modern Humans in the Americas. *Science* 319:1497-1502. <http://centerfirstamericans.org/cfsa-publications/Science2008.pdf>

Largent, F. B. 2004. Diving into Florida Prehistory. Mammoth Trumpet 19(4):18-20; http://csfa.tamu.edu/mammoth/issues/Volume-19/vol19_num4.pdf

Lovgren, S. 2007. First Americans Arrived Recently, Settled Pacific Coast, DNA Study Says. National Geographic News; <http://news.nationalgeographic.com/news/2007/02/070202-human-migration.html>

Steinberg, A. 2005. Shellfish and Ancient Human Ecology: An Archaeological Study from San Miguel Island, California. Thesis presented to Department of Anthropology, University of Oregon; https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/9887/Steinberg_Alexis_ba2005.pdf

National Science Education Standards

Content Standard A: Science As Inquiry

- Abilities necessary to do scientific inquiry
- Understandings about scientific inquiry

Content Standard C: Life Science

- Interdependence of organisms

Content Standard D: Earth and Space Science

- Origin and evolution of the Earth system

Content Standard E: Science and Technology

- Understandings about science and technology

Content Standard F: Science in Personal and Social Perspectives

- Natural resources
- Environmental quality
- Natural and human-induced hazards

Content Standard G: History and Nature of Science

- Science as a human endeavor
- Nature of scientific knowledge

Ocean Literacy Essential Principles and Fundamental Concepts

Essential Principle 1.

The Earth has one big ocean with many features.

Fundamental Concept d. Sea level is the average height of the ocean relative to the land, taking into account the differences caused by tides. Sea level changes as plate tectonics cause the volume of ocean basins and the height of the land to change. It changes as ice caps on land melt or grow. It also changes as sea water expands and contracts when ocean water warms and cools.

Essential Principle 2.

The ocean and life in the ocean shape the features of the Earth.

Fundamental Concept b. Sea level changes over time have expanded and contracted continental shelves, created and destroyed inland seas, and shaped the surface of land.

Essential Principle 6.

The ocean and humans are inextricably interconnected.

Fundamental Concept c. The ocean is a source of inspiration, recreation, rejuvenation and discovery. It is also an important element in the heritage of many cultures.

Fundamental Concept f. Coastal regions are susceptible to natural hazards (such as tsunamis, hurricanes, cyclones, sea level change, and storm surges).

Essential Principle 7.

The ocean is largely unexplored.

Fundamental Concept a. The ocean is the last and largest unexplored place on Earth—less than 5% of it has been explored. This is the great frontier for the next generation's explorers and researchers, where they will find great opportunities for inquiry and investigation.

Fundamental Concept d. New technologies, sensors and tools are expanding our ability to explore the ocean. Ocean scientists are relying more and more on satellites, drifters, buoys, subsea observatories and unmanned submersibles.

Fundamental Concept f. Ocean exploration is truly interdisciplinary. It requires close collaboration among biologists, chemists, climatologists, computer programmers, engineers, geologists, meteorologists, and physicists, and new ways of thinking.

Send Us Your Feedback

We value your feedback on this lesson.

Please send your comments to:

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We Arrived 10,000 Years Ago...

Paleoamerican Lifeways Inquiry Guide

Part 1.

Background Reading

[Based on Who were the First Americans?, a Web page from the Center for the Study of the First Americans (<http://centerfirstamericans.org/who.php>), text adapted from Goebel et al., (2008)]

Molecular genetics studies indicate that all Native Americans came from Asia. Ancient DNA from early American skeletal remains and human coprolites (fossilized fecal material) also point to an Asian origin. The earliest evidence of humans in central Asia is dated to about 40,000 years ago. So it is unlikely that people entered North America before that time. Archaeological evidence of 32,000 year-old human settlements in Siberia shows that people were able to live in the extreme environment of the ice-age Siberian Arctic, and made tools from stone and bones of various animals that included rhinoceros and mammoths.

Periods of cold temperatures during the last ice-age alternated with warmer intervals. During these warmer periods, the huge ice sheets that covered much of Canada melted enough to create ice-free corridors along the Pacific coast and in the plains east of the Canadian Rockies. These corridors were the pathways on which the first humans migrated from Siberia to North and South America. The corridors were open 32,000 years ago, but had closed by 24,000 years ago. The Pacific coastal corridor was open again by at least 15,000 years ago, but the interior corridor may not have opened until after 13,500 years ago.

In 1927, archaeologists working near Folsom, New Mexico discovered a stone spearpoint embedded in the rib cage of an extinct bison. Several years later, distinctive long spearpoints were discovered at an archaeological site near Clovis, New Mexico, along with bones of prey dated to about 11,200 years ago. These discoveries provided the basis for a theory that the first humans to enter North America were a small group of hunters that migrated across a land bridge between Asia and North America about 13,500 years ago, and then passed through an inland ice-free corridor in western Canada. According to the theory, thrusting spears tipped with specialized stone points made it possible to successfully hunt the large mammals that inhabited North America and to rapidly expand throughout North and South America over the next 1,000 years during which they exterminated 33 genera in North America and more than 50 genera in South America. The key element of this theory is that these "Clovis people" were the first human inhabitants of North and South America; hence this theory has come to be known as the Clovis First model.

Radiocarbon dates from Clovis sites across North America indicate ages ranging from 13,200 to 12,900 years ago. Studies of other sites show evidence of earlier

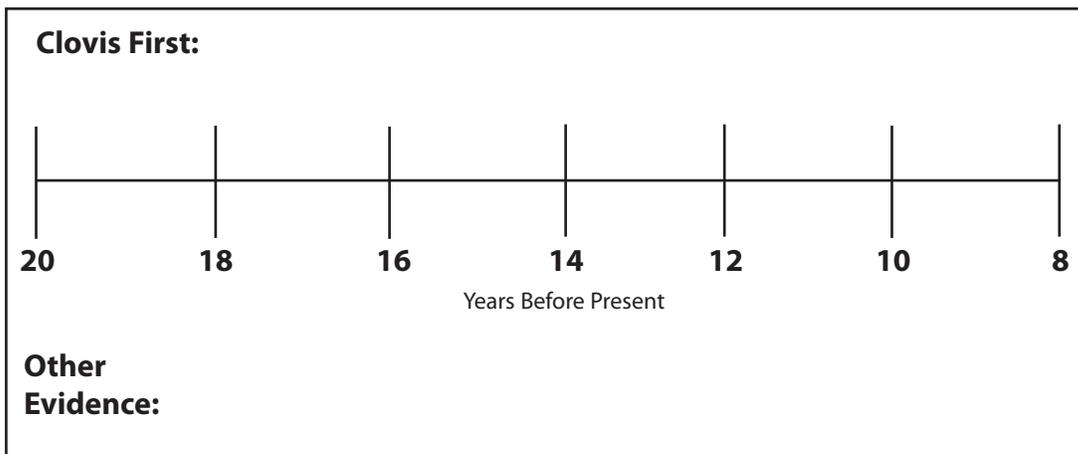
We Arrived 10,000 Years Ago... Paleoamerican Lifeways Inquiry Guide – 2

occupation by humans. These include Monte Verde in Chile (occupied 14,600 years ago), the Schaefer and Hebior sites in Wisconsin where humans hunted mammoths and mastodons between 14,200 and 14,800 years ago, Meadowcroft Rockshelter, Pennsylvania with artifacts in sediments that may be as old as 18,000 to 22,000 years, the Page-Ladson sinkhole in Florida with evidence of mastodon hunting about 14,400 years ago, and Paisley Cave, Oregon, which contained human coprolites dated to about 14,100 years ago.

These observations indicate that humans probably colonized the Americas around 15,000 years ago, as soon as the Pacific coastal corridor re-opened. Once they reached the Pacific Northwest, humans could have continued their spread southward along the coast to Chile, as well as eastward along the southern margin of the continental ice sheets, possibly following traces of mammoth and mastodon to Wisconsin. The discovery of paleoamerican artifacts on the Channel Islands, California, suggest that some of the first Americans used boats.

Summarize

Draw a timeline that summarizes geologic and archaeological information in the Background Reading, as well as information about the Clovis First theory. Put the Clovis First information above the line, and other information below the line like this:



Part 2. Background Reading

A sinkhole is a hole in the ground that is formed when the roof of an underground cave collapses. Sloth Hole is a submerged sinkhole in the middle of the Aucilla River in central Florida at the junction of the peninsula and panhandle portions of the state. At one time, Sloth Hole was a spring-fed pond surrounded by dry land, and was a watering hole for animals that included camels, mastodons, mammoths, and sloths, as well as paleoamericans. Sloth Hole has turned

