

Introduction

Widely regarded as the first human inhabitants of North America, PaleoIndians, often called the Clovis people, were migratory tribal groups notable for their crossing of the Bering Strait ice bridge and their fluted arrow points.



Typical Fluted Point (Pennsylvania)

PaleoIndians relied on a diet of large game, particularly reindeer, often occupying a site long enough only to hunt. From 13-10 ka, tribes spread rapidly across modern North America, constantly refining flintknapping styles and depositing arrowheads at occupation sites. Based on distinctions in arrow design, PaleoIndians are generally divided into three groups: Early (13-11 ka), Middle (11-10.5 ka) and Late (10.5-10 ka). Despite consistent study, the motivations for PaleoIndian movements and possible environmental factors controlling these movements are widely speculated.

Paralleling the 13 ka PaleoIndian occupation of North America, ice sheet and glacier recession began to noticeably scar the Earth. Through periods of varied recession and melting, the region extending from southern Canada and the Great Lakes to the Hudson Bay were opened, slowly allowing advanced vegetation and tree coverage to fill the area. There is a strong correlation between large game habitat and forest or grassland biomes, suggesting that Paleoindian groups slowly migrated in response to the movement of game animals and their habitats.

Data

Sites. Found in the Paleoindian Database, potential sites are restricted to North America, modern day Canada and the United States, and must possess at least one recorded fluted point. In all, 1925 discrete sites are evidenced within the data set, with multiple sites of cultural overlap throughout various ages. Accordingly, many sites are depicted two or more instances across the three settlement times, indicating a continually occupied location with evolving point techniques over time.

Maps. Basemap data employs ancient ice coverage maps from Northern North America, the extent of determined ice sheet coverage in the represented time period. Coupled with a standard, state map of the United States and Canada, the composite map allows for the plotting of data points in comparison to known ice sheet location. In addition, data signifying reconstructions of ancient biomes was correlated with ice sheet coverage to illustrate estimated biome and ice coverage.

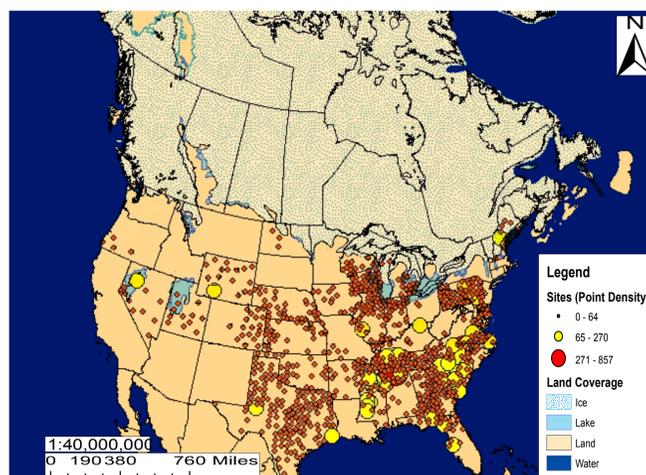
The purpose of this project is to determine and illustrate any connection between ice sheet recession and PaleoIndian migration, in comparison with biome creation. It is hypothesized that PaleoIndian groups will remain far from ice sheet, seeking fertile, temperate areas as locations rich with food.

Limitations

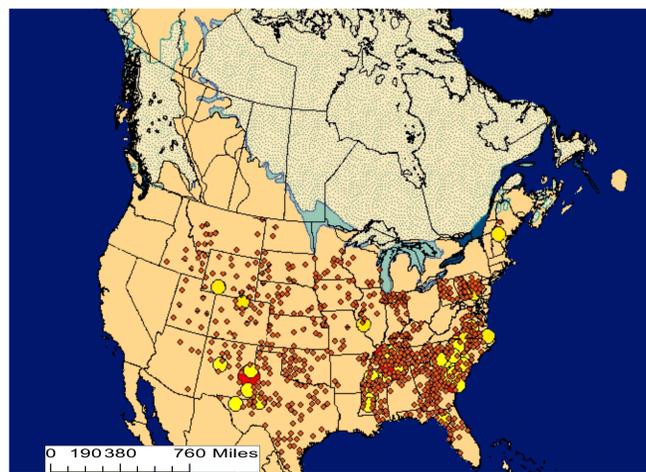
- Pre-Clovis period in Southeast indicated by heavy settlement
- Not all of the sites are depicted, but only those known today
- Data is not compared to ancient natural resource locations, likely places of intense occupation
- Differences in settlement style and artifact distinctions are not fully exemplified

Methods

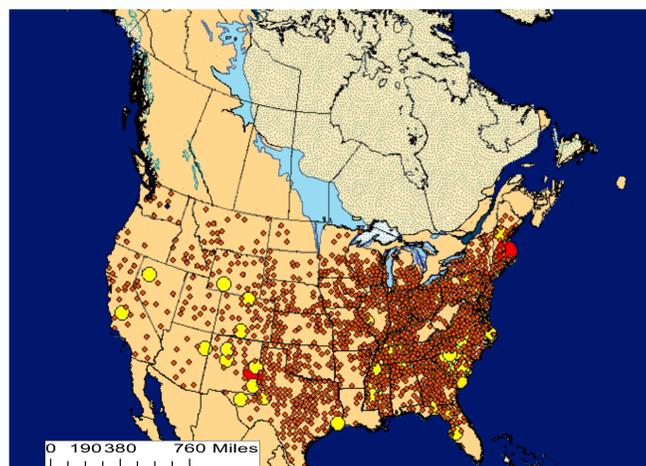
Data was plotted over a standard map of the United States and Canada. In the first column of maps, ice sheet coverage is compared to points, each marked by the density of fluted points found, a correlation to the amount of inhabitants. In the second column, data was manipulated by the **Directional Distribution** tool and paired with maps of biome coverage in the relative time periods. Using **ArcGIS** and **Photoshop**, maps were rendered so that a comparison between environment, ice, and population movements could be made.



Map of Fluted Points During the Early PaleoIndian Period

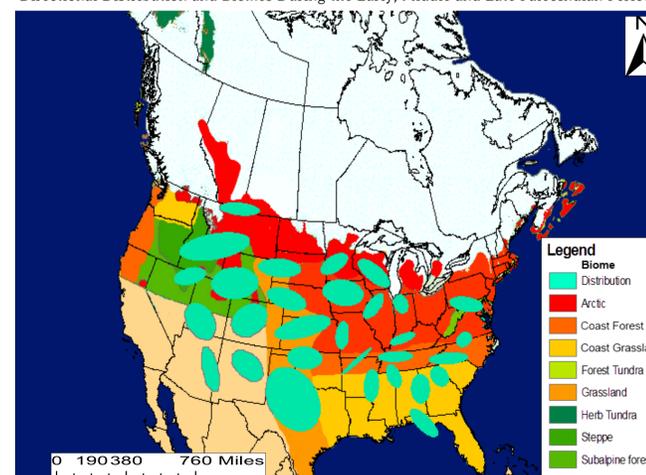


Map of Fluted Points During the Middle PaleoIndian Period

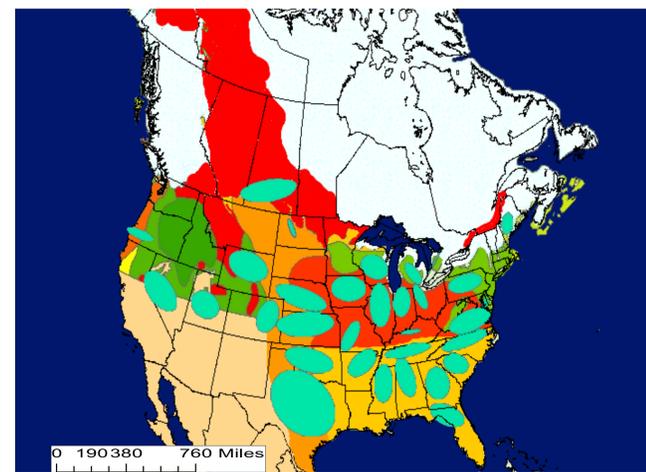


Map of Fluted Points During the Late PaleoIndian Period

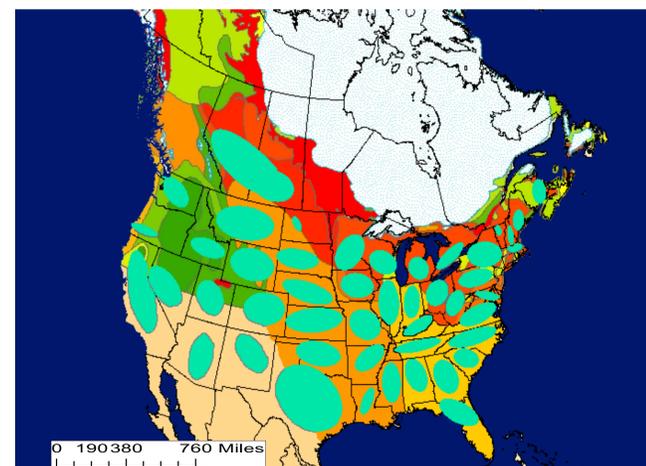
Directional Distribution and Biomes During the Early, Middle and Late PaleoIndian Periods



Directional Distribution During the Early PaleoIndian Period



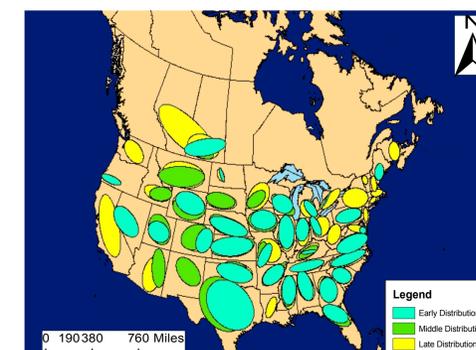
Directional Distribution During the Middle PaleoIndian Period



Directional Distribution During the Late PaleoIndian Period

Distribution

With the **Directional Distribution** tool, it is possible to estimate net direction of migration, forming a rough image of how population settlement locations changed over time. Applied to the three sections of PaleoIndian development – Early, Middle, and Late – **Directional Distribution** creates ellipses, indicative of the most dense areas of occupation. When the three distributions are compared, it becomes possible to note migration patterns over time by marking the direction and distance that regional ellipses shift or where they form. **Directional Distribution** data is plotted in parallel with biome mapping for the same restricted time periods. By matching Directional Distribution data with adjacent biome, a correlation between population migration and surrounding environment can be made. Due to gaps in data, data for the Southwest is unavailable.



Distribution areas overlaid to depict net migration. Note the northwestern and eastern trend of settlements

Conclusions

- The large expansion in the Late period **Directional Distribution** particularly indicates a distinct northern movement, paralleling ice melt and biome creation
- Sites remain well south of ice coverage zones, existing mainly in the consistently fertile Southeast
- Over time, sites generally move northward and westward, in apparent response to the reduction of ice sheet coverage and the expansion of food in game-supporting forest and grassland biomes
- Sites correlate with ice sheet location, supporting a theory of PaleoIndian movement toward newly opened land and earlier movement out of the Bering Strait into North America
- When compared to **Directional Distribution** maps, the concentration of sites parallels the reduction of Arctic regions and the growth of life supporting regions found after ice melt, forest and grassland
- Rather than stagnant groups or small-scale inhabitants, PaleoIndians demonstrate a strong connection to similar hunter-gatherer tribes, including their descendants, Native Americans
- The increased size of the ellipses in the "Late" map best depicts how, with changing climate, groups were able to migrate, expand in size, and react to marked shifts in land coverage, while remaining settled in the Southeast
- The increase in fluted point density highlights rapidly increasing population over time

Sources

Adams J.M. (1997). Global land environments since the last interglacial. Oak Ridge National Laboratory, TN, USA. <http://www.esd.ornl.gov/ern/qen/merc.html>.

Adams J.M. & Faure H. (1997) (eds.), QEN members. Review and Atlas of Palaeovegetation: Preliminary land ecosystem maps of the world since the Last Glacial Maximum. Oak Ridge National Laboratory, TN, USA. <http://www.esd.ornl.gov/ern/qen/adams1.html>.

Anderson, David G. "Southeast Project Area Historic Context." NPS.gov, National Park Service. Web. 5 Apr. 2012. http://www.nps.gov/seac/outline/02-paleoindian/se_paleo/01-intro.htm.

Anderson, David G., D. Shane Miller, Stephen J. Yerka, J. Christopher Gilliam, Erik N. Johanson, Derek T. Anderson, Albert C. Goodyear, and Ashley M. Smallwood. 2010. *PIDBA (Paleoindian Database of the Americas) 2010: Current Status and Findings*. Archaeology of Eastern North America 38:63-90.

Davis, Owen. 1998. Reconstruction of the Western USA at 11000 14C.ya..

Dyke, A.S., Giroux, D. and Robertson, L. 2003. Palaeovegetation Maps of Northern North America, 18000 to 10000 BP. Geological Survey of Canada, Open File 4682.

Meltzer, David J. 1985. On Stone Procurement and Settlement Mobility in Eastern Fluted Point Groups. *North American Archaeologist* 6:1-24.

US Geological Survey. 2006. North American Atlas – Political Boundaries. US Geological Survey. Lambert Azimuthal Equal Area Projection. Reston, Virginia, USA. 2006.