

Testing the Western Pluvial Lakes Tradition Hypothesis in the Northern Great Basin and Southern Columbia Plateau

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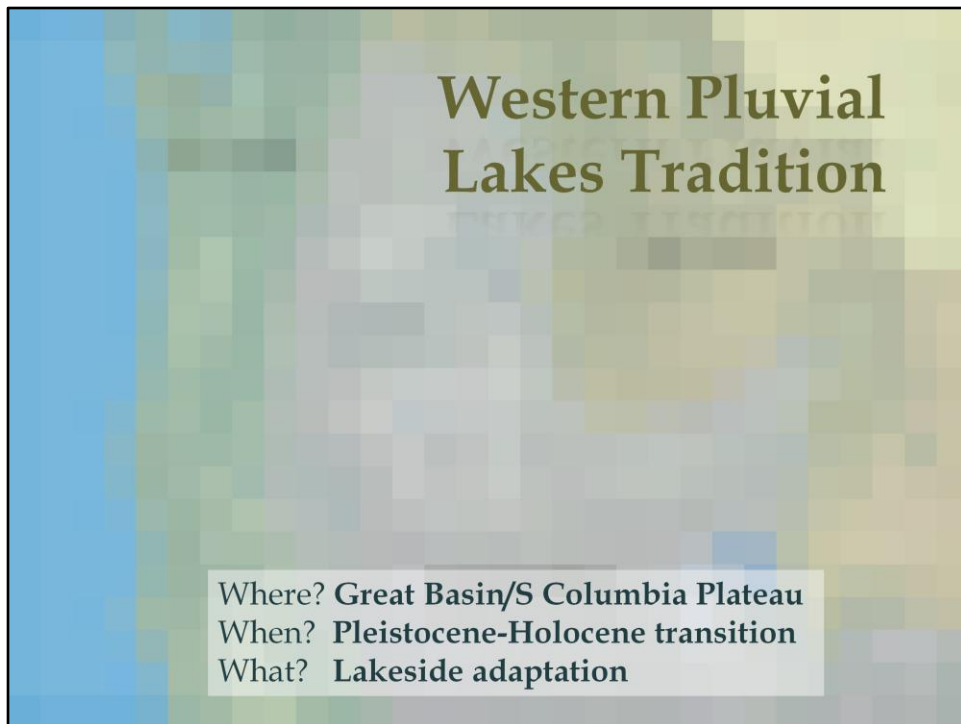
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This presentation is on my MA thesis research conducted at Simon Fraser University. The goal of my research is to analyze hunter-gatherer subsistence-settlement pattern hypotheses from the Pleistocene-Holocene transition in the southern Columbia Plateau and northern Great Basin physiographic regions. Testing regional hypotheses of subsistence-settlement patterns addresses assumptions about early site distribution in the Columbia Plateau/Great Basin region adds to our understanding of hunter-gatherer settlement in North America at the end of the Pleistocene, and contributes to our knowledge of the subsequent development of Archaic subsistence-settlement patterns.



Based largely on research in the Fort Rock Basin of central Oregon, Stephen Bedwell hypothesized that people living in the western Great Basin and southern Columbia Plateau region at the Pleistocene-Holocene transition adapted to a lake-marsh-grassland environment. Bedwell called this adaptation the Western Pluvial Lakes Tradition, noting people could travel throughout the Great Basin and southern Columbia Plateau subsisting entirely within the pluvial lake environment.

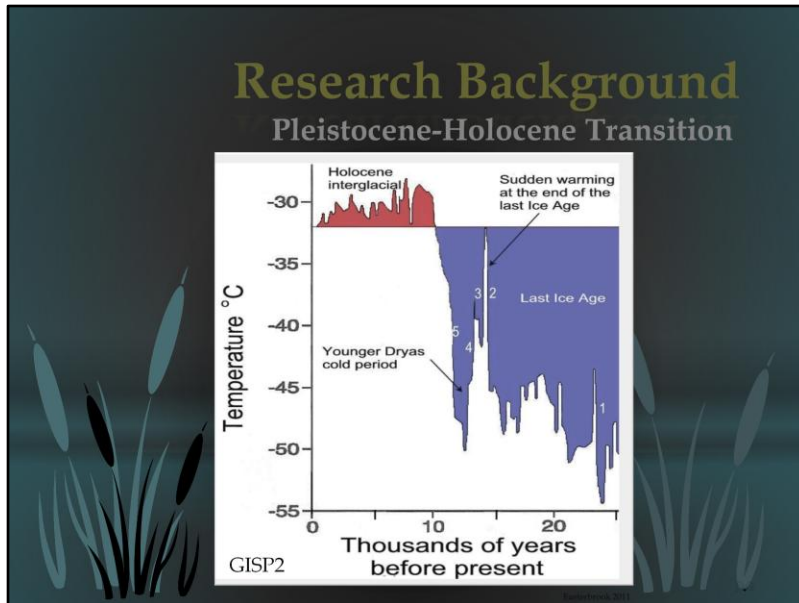
Bedwell originally suggested this tradition was marked by unstemmed leaf-shaped bifaces which he believed dated to about 8,000 to 11,000 years ago. Archaeologists have since extended this to include the stemmed biface assemblages dated to the Pleistocene-Holocene transition, which are commonly found on relict lake margins throughout the Great Basin.

My goal is to test the hypothesis that early sites in this region are clustered near lake margins. I accomplish this via spatial analyses of archaeological sites located on the Burns and Vale Oregon Bureau of Land Management districts of eastern Oregon.

Presentation Overview

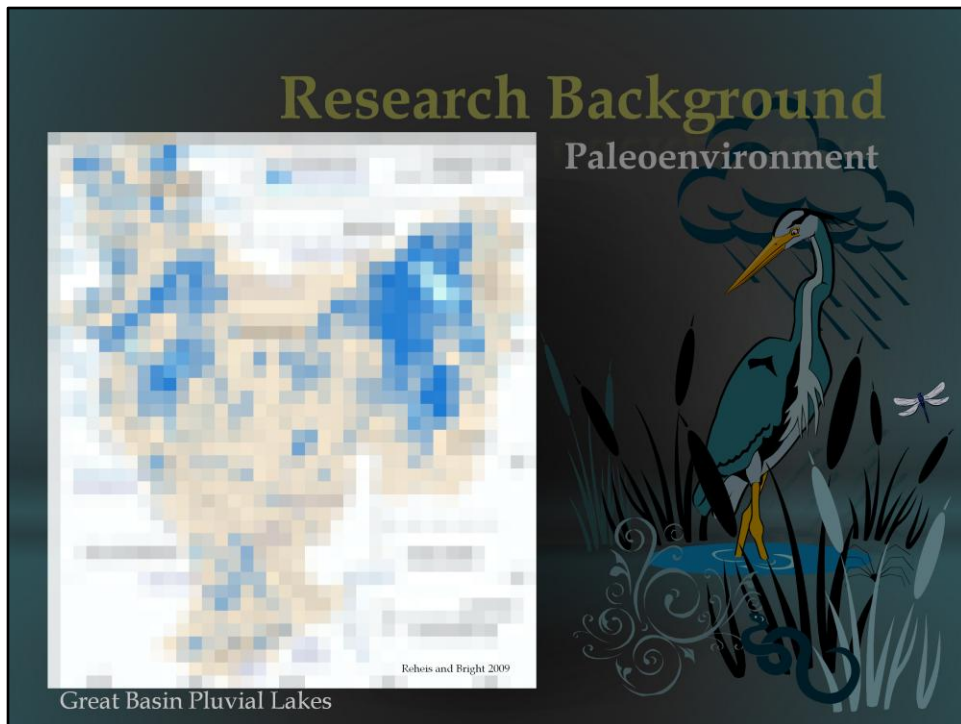
- Research Background
- Objectives and Challenges
- Data Collection and Analysis
- “The Past is Present”

In this presentation I will summarize the regional background research that led to my thesis objective, discuss the challenges in regional data access that impacted this research, and then briefly explain the data collection strategies and analyses employed in this study. I had planned to conclude with what I believe the preliminary results add to our understanding of regional subsistence-settlement patterns. My research is still in progress, and an unresolved part of this process is consultation with stakeholders on how this information is being disseminated. So I will discuss some general observations about spatial patterning in the study region. I will conclude the talk by connecting my research to the theme of this year’s conference “The Past is Present” by considering how the heritage of our discipline impacted this study.



The Pleistocene-Holocene transition is a glacial to interglacial transition that occurred roughly between 15,000 to 10,000 years ago around the world. The climate began warming from the Last Glacial Maximum around 20,000 years ago, causing glacial retreat, sea level rise, and changes in weather and vegetation patterns.

As the first major climate change event to occur when all large land masses were inhabited by modern humans, the Pleistocene-Holocene transition provides us with an opportunity to study how cultures adapt to climate change. Archaeological research suggests adaptations varied, but included diversification of resource collection strategies, resource specialization and migration. This period is noted for important changes in human adaptation strategies like the adoption of plant and animal domestication, storage economies, sedentary settlements, and the rise of social complexity.



In the Great Basin, the moist, cool climate of the Last Glacial Maximum supported extensive pluvial lakes. As the climate fluctuated at the Pleistocene-Holocene transition, lake levels rose and fell at different rates between basins with some extended periods of stabilization. As you can see, the maximum extent of these lakes has been mapped, but the complicated chronologies of these lake systems are only beginning to emerge. By the middle of the Holocene, larger lakes were about one-fifth or one-tenth their size at the Last Glacial Maximum.

Research Background

Paleoenvironment



The transition to the Holocene is popularly marked by the extinction of megafauna, but changes in animal habitats were of course encouraged by changes in vegetation. Stream and wetland environments were less susceptible to vegetation change, however fluctuations in pluvial lake levels would create shifts in the location and extent of the wetlands that fringed them. In large lake environments, changes in vegetation could be buffered by the overall diversity of species supported by such an environment, while seasonal flooding or drying of small wetlands could seriously impact their productivity and thus their attractiveness as resource extraction locations.

Research Background

Regional Hypotheses

Author	Subsistence-Settlement Hypothesis
Jennings and Norbeck 1955	Sedentary lake margin specialization with desert foraging
Butler 1961	Old Cordilleran Culture: Broad-spectrum to environment specialization in NW
Daugherty 1962	Intermontane Western Tradition: Broad-spectrum to local specialization in west
Bedwell 1973	Western Pluvial Lakes Tradition: Wetland focus in GB/CP to local specialization
Willig 1988/9	Broad-spectrum with wetland tethering in GB
Hoffman 1996	Broad-spectrum and mobile in GB

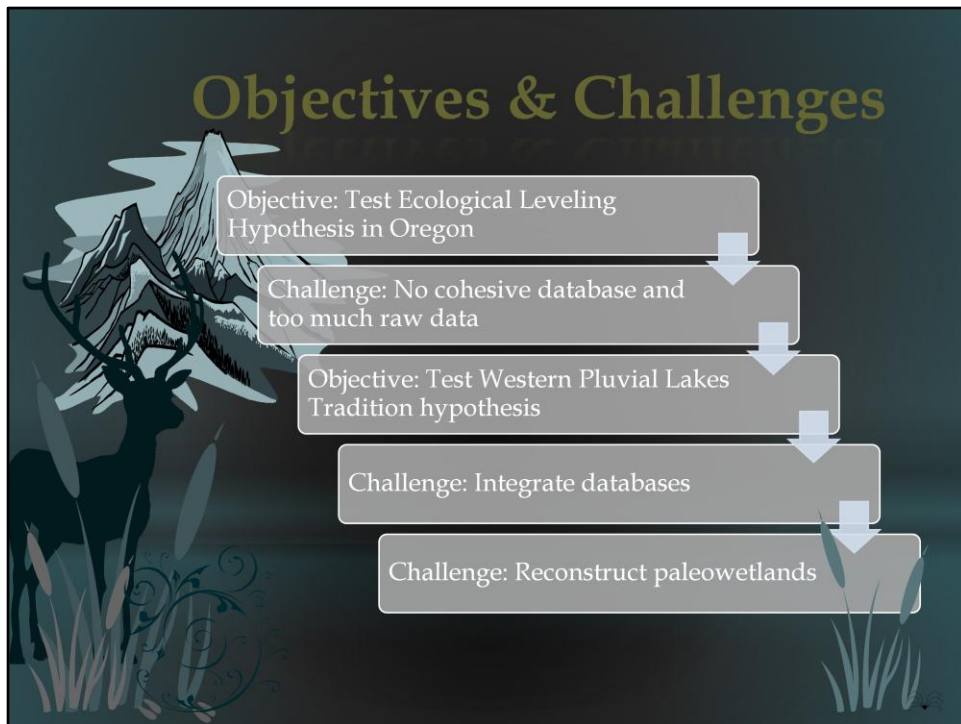
CP= Columbia Plateau NW= Northwest
GB= Great Basin

The potential importance of wetlands to hunter-gatherers at the Pleistocene-Holocene transition is noted across North America. The Great Basin in particular provides one of the best-developed and longest-researched sets of theories on the use of wetlands at the Pleistocene-Holocene transition. The importance of wetland resources is noted in the ethnographic period in this region, and appears to extend to some of the earliest occupations in the region. Relatively early in the history of regional archaeological research, Great Basin archaeologists identified a mobile broad-spectrum resource collection tradition that appeared to differ from the large game hunting focus practiced by cultures in adjacent regions at this time. As more evidence emerged, archaeologists began to suggest that wetland resources were central to early economies in the region.

In their review of Great Basin archaeology in 1955, Jesse Jennings and Edward Norbeck believed a desert-adapted culture emerged following the drying of Pleistocene lakes by 9000 years ago. There was little data to support their hypothesis, but they suggested that where lakes remained, sedentary communities developed with some desert foraging practiced. In the first attempt to summarize early Northwest cultural adaptations based on archaeological evidence, B. Robert Butler hypothesized that Northwest basal cultures followed broad-spectrum adaptations, shifting to riverine and coastal foci as the climate dried into the Holocene. Richard Daugherty subsequently proposed the Intermontane Western Tradition, noting the early period in the Northwest was characterized by small groups of nomadic hunter/fisher/gatherers who began to focus on riverine resources on the Plateau and gathered resources in the Great Basin as the climate warmed.

As the number of known early sites increased, archaeologists returned to Jennings and Norbeck's suggestion that microenvironment specialization began with some of the Northwest's earliest inhabitants. For example, Judith Willig's research on the Dietz site in central Oregon concludes that while fluted and stemmed projectile points characteristic of this time period are found in a wide range of environments in the west, large concentrations of these artifacts near ancient pluvial shorelines indicates a broad-spectrum adaptation tethered to mesic habitats rather than constrained entirely to lake margins as Bedwell hypothesized.

More recently, Clinton Hoffman suggested the history of archaeological research in the Great Basin resulted in an interpretive inertia that supported the central role of pluvial lakes because researchers were focusing on lake basins rather than sampling from different environments. His spatial analysis of sites in northern Nevada suggested the adaptation was more generalized than Bedwell's original hypothesis suggested. Assuming people were highly mobile at the Pleistocene-Holocene transition, I believe that extending spatial analysis of landscape use patterns in the northern Great Basin and southern Columbia Plateau to larger research areas will enable archaeologists to gain a better understanding of subsistence-settlement patterns on a regional rather than basin-specific scale.



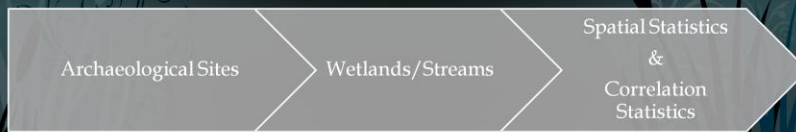
The original goal of my research was to analyze the apparent shift from heavy exploitation of post-glacial wetlands to a reliance on other local resource areas as they developed during the Holocene. The conceptual model I intended to employ, known as ecological leveling, was developed by George Nicholas, my advisor at SFU, to explain a comparable shift in the northeast at this time.

I believed this would allow me to compare differences or similarities both between and within several physiographic regions. At that time I was familiar with the Washington State Department of Archaeology and Historic Preservation databases, and assumed access to site data would be similar in Oregon. I found that the Oregon State Historic Preservation Office was working to develop a similar system, and the type of dataset I was hoping to collect would require more work than was within the scope of a Master's thesis. The solution was to narrow my focus to a smaller region. I knew that the Burns BLM cultural resources department was actively engaged in Pleistocene-Holocene transition archaeology, and had a substantial database on isolated artifact locations dating to this period. After contacting several land management agency offices in the surrounding area, I was also able to include data from the Vale BLM district.

Because my data did not cover the geographic and temporal scales I originally anticipated, I needed to reframe my thesis objective. My data is now limited to early isolated artifacts that are assigned to fairly broad spans of time. Any changes in spatial patterning that took place during the Pleistocene-Holocene transition might be invisible given the resolution of the artifact type dates (which span several thousand years). This data would however allow me to test site dispersion relative to landscape features and identify resource preferences. By testing the Western Pluvial Lakes Tradition hypothesis I could still study the potential of wetlands as reliable places during times of climate change. My new challenges were then to integrate the two district data sets and find a way to correlate these with paleowetlands.

Research Design

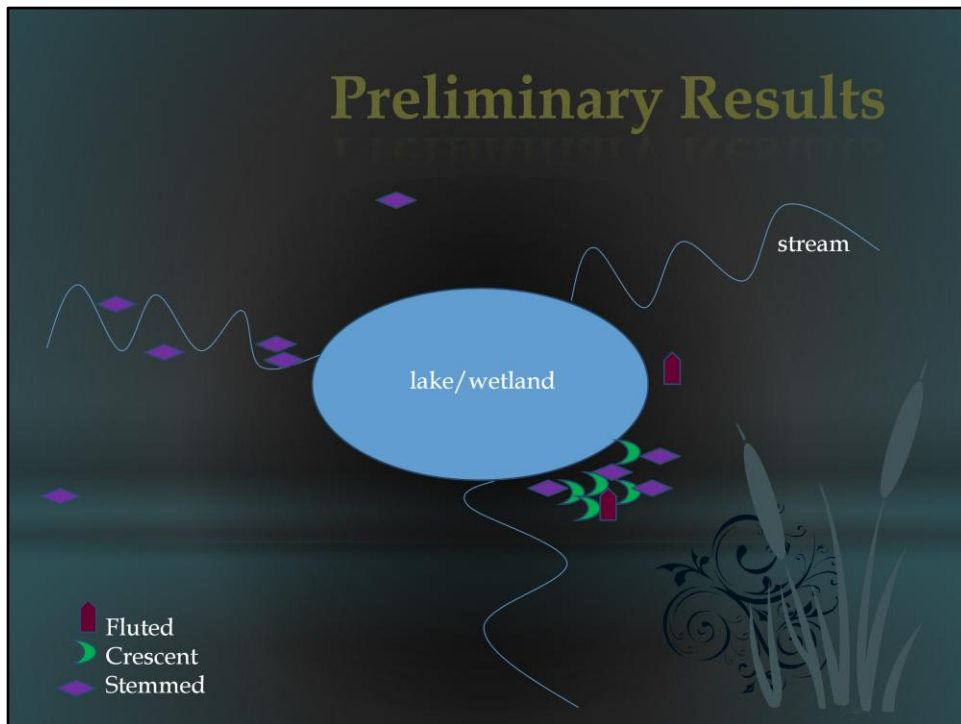
Tradition	Late Pleistocene/Early Holocene Tool Industry	cal Years BP
Clovis	Fluted	13,200-12,800
Western Stemmed	Great Basin Stemmed Series Black Rock Concave, Crescents, Haskett, Lind Coulee, Parman, Windust	13,000- 8,200
Old Cordilleran	Cascade	8,000- 5,000



Information on isolated artifacts was collected from each district. In this study I am including fluted points typically assigned to the Clovis tradition, Great Basin Stemmed Series artifacts which include stemmed bifaces and crescents or Great Basin transverse points. I also include lanceolate or willowleaf points typically associated with the Old Cordilleran Tradition. This tradition is considered Archaic rather than pre-Archaic, but provides a good opportunity to notice any changes in settlement patterning. The study includes over 750 artifacts from the Burns district, and an additional 40 from the Vale district.

Initially I believed I would model pluvial lake and wetland locations based on basin-specific paleoenvironmental information. As I mentioned, these chronologies are complex and basin-specific. I've found that many researchers studying similar paleoenvironmental features use modern conditions to estimate ancient conditions. While the extent of large Great Basin lakes has changed substantially from the Last Glacial Maximum, some local environmental studies and observations of site locations in this database indicate that assigning a 500 meter buffer around wetland locations can account for change from the early Holocene. I'll also be including data on streams because noting any clustering at these locations serves as a way to contrast the use of watered areas.

The final products of this research are summary statistics of spatial clustering of artifacts at basin and sub-basin levels. This provides a general idea of any activity hotspots without studying wetlands specifically. It also includes correlation statistics analyzing the associations between the number of sites per type in a basin, and the extent of and distance to wetlands and streams. While the BLM's land parcels are not continuous, this study area serves as a sample of northern Great Basin and southern Columbia Plateau archaeology. Because the Bureau of Land Management maintains records of project lands, this study area also enables me to analyze the distribution of project locations to determine any biases in the distribution of survey areas.



A comparative study of ethnographic hunter-gatherer foraging trips found that hunter-gatherers travel an average of 8 kilometers around a base camp. In a large portion of the study area, any random point is strongly associated with a wetland or stream. However, the survey sampling locations are representative of the microenvironments of the region. There is a clear difference between the two districts in terms of artifact numbers and in availability of wetlands. The Burns district has nearly 20 times the number of Pleistocene-Holocene transition artifacts as the Vale district, and coincidentally quite a few more wetlands. However, project parcels are much larger in Burns and could be influencing site representation.

Generally speaking, there seems to be a strong association between wetlands and these early traditions. There are relatively few fluted artifacts in the study, but their locations are more often than not located near wetland margins. Crescent artifacts are highly correlated with wetland margins and very rarely found more than a few hundred meters from the edges of wetlands or lakes. As these are typically considered part of the Great Basin Stemmed toolkit, they suggest a particular function or aspect of settlement. Finally, stemmed bifaces are commonly clustered at wetlands as well, but seem to indicate a tethered pattern, with some clustering on streams near wetlands and wide dispersion at a distance from wetlands.

The Past is Present

Climate Change

Modeling pre-Archaic

Site Locations

Historiography




“One of the principal assumptions made in framing the Old Cordilleran culture concept is that the primary function of observation is to test hypotheses.” Butler 1965

In conclusion, the objective of my research is to gauge the importance of a particular resource base to a particular set of cultures within a relatively limited space and time frame. The research supports a very coarse-grained understanding of adaptations at the Pleistocene-Holocene transition, but it contributes to our understanding of how human cultures were adjusting to a changing world. Climate change is one of the biggest challenges facing humans today, so understanding the impacts of climate change on hunter-gatherers could provide us with some important lessons for living peoples.

Most of the research in this region notes there is a difference between early and later Holocene subsistence-settlement strategies. It's important to study early sites not only to learn about how people were adapting to the environment or climate change, but so that we can improve their representation in predictive models designed to protect these sites as cultural resources.

Finally, the history of research in an area has a huge impact on how we study the past. As I discussed in the theoretical background to this project, theories of land use patterning are constantly being improved as new data emerge. However, the earliest theories continue to be reworked and challenged, and potentially bias how we interpret or seek out new information. As I mentioned, B. Robert Butler is credited with being the first to synthesize regional adaptations and attempt to understand what was happening to cultural traditions on a multi-regional level. His Old Cordilleran culture concept was based on limited findings, and was heavily criticized. In a publication responding to his critics he devotes several pages to explaining the scientific method and writes: “One of the principal assumptions made in framing the Old Cordilleran culture concept is that the primary function of observations is to test hypotheses.” I think in the case of the Western Pluvial Lakes Tradition, we continue to see evidence that supports the idea that people were focused on pluvial lake resources at the Pleistocene-Holocene transition. To truly test the hypothesis and understand subsistence-settlement practices we need to not only look for data which confirms people were using specific resources, but which confirms they were using it to the exclusion of other resources.

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