Borax Lake Site: Revised (Yet Again)

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A museum archaeologist, digging in a walnut grove in northern California in the 1930s, was exploring strata laid down in extinct Borax Lake. Unlike other pluvial lakes in the Great Basin and coastal California, however, Borax Lake didn’t dry up at the end of the Pleistocene. Instead, its stable lakeshore environment was home to successive cultures well into the Holocene. The first occupation found by this dogged scientist ultimately proved to be far older than the first supposed human presence west of the Sierra Nevadas. Not only did Borax Lake archaeology refute the classic model of the routes used by the First Americans to colonize North America, it produced the first evidence of a culture contemporary with Clovis but unique to the Far West, the Western Pluvial Lakes Tradition.

In September 2006 the Secretary of the Interior designated the Borax Lake site (CA-LAK-36) a National Historic Landmark. It was recognition long overdue for this paradigm-shattering site, located two hours’ drive north of San Francisco, because for decades professional archaeologists questioned the legitimacy of Borax Lake as a Paleo-Indian site.

Layer-cake stratigraphy in a walnut orchard

The Borax Lake site is located near Clear Lake within an abandoned walnut orchard on a late-Pleistocene alluvial fan along the eastern shore of Borax Lake. The site is around 1,400 ft above sea level in the Sonoran woodland-grass vegetation zone, a mosaic of grasslands, oaks, gray pines, and chaparral typical of the Coast Ranges of northern California. The Borax Lake Obsidian Dome, a ridge near the site and less than 100 ft above the lake, contains extensive obsidian deposits that are assumed to have been the source of toolstone for prehistoric inhabitants.

During the Paleo-Indian and early-Archaic periods (12,000 to 8000 RCYBP\(^1\)) of the primary occupation of the Borax Lake site, the climate was cooler than present. It’s likely that coniferous forests covered much of the northern coast ranges at the end of the Pleistocene. After about 7000 RCYBP, the climate became much warmer and drier, developing into the present-day environment.

In early 1938, amateur archaeologist Chester Post showed fluted projectile points found along the shores of Borax Lake to Mark R. Harrington of the Southwest Museum in Los Angeles. Dr. Harrington saw they resembled fluted points found at the eponymous Clovis site in New Mexico and other Pleistocene kill sites in the southwestern U.S., and immediately the Southwest Museum launched four seasons of investigations at the Borax Lake site (1938–1946). Under Harrington’s direction they dug 10 trenches and 6 test holes.

New techniques torpedo an outdated paradigm

Harrington’s ideas of Paleo-Indian occupation in northern California also ran counter to the then prevailing theory of the earliest occupation of North America. During the 1950s and 1960s, archaeologists theorized that the Americas were first settled along a path through Alaska and down into the Great Basin and Plains regions of North America; west of the Sierra Nevada Mountains was a marginal region that presumably wasn’t settled until later, perhaps thousands of years after man’s original entry into the New World. Accordingly, Meighan placed the Borax Lake site in the Middle Central California period, roughly 7000 to 3000 RCYBP, an interpretation that excluded the Paleo-Indian component.

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\(^1\)Even though radiocarbon dating is a technique that wasn’t available to early researchers at the Borax Lake site, all dates in this article are given in radiocarbon years before present for consistency.
In 1964, Haynes and Charles Rozaire, a participant in the original Borax Lake excavations, cut 16 backhoe trenches on three transects across the walnut orchard in order to resolve the strata and dating problems encountered by Harrington. Haynes, analyzing the data with Meighan, concluded that geological evidence actually supported Harrington’s contention that the cultural material he recovered was located within and on a late-Pleistocene alluvial fan. Together they identified two artifact-bearing levels: a lower level, described as a grayish brown silt and gravel (Harrington’s Layer 2), and an upper level composed of a yellowish brown clay and gravel (Harrington’s Layer 1). The pair presumed that the artifacts found below these two levels in a dark brown gravel (Harrington’s Layer 3) had been displaced from the upper two levels by erosion and rodent activity.

After Haynes and Rozaire finished their fieldwork at Borax Lake, Meighan conducted obsidian hydration (OH) dating tests on obsidian fluted points and chipped crescents found in 1964 and during Harrington’s earlier excavations (OH dating, like radiocarbon dating, is a modern technique that simply wasn’t part of Harrington’s toolkit). The OH dates (equivalent to 12,000–10,000 RCYBP) place the obsidian artifacts in the Clovis age, and Meighan and Haynes concluded that geological evidence, projectile-point typology, and OH dating all supported Harrington’s original view that humans occupied the Borax Lake site during the Paleo-Indian Period. Harrington’s faulty conclusions about the site’s age resulted from his misidentifying early- and middle-Archaic projectile points as Paleo-Indian. It was one error in otherwise creditable scholarship that nevertheless cast suspicion over the entire collection.

Meighan and Haynes further concluded that Paleo-Indian fluted points could be paired with chipped-stone crescent artifacts. (More about crescents below.) This pairing of dissimilar diagnostic lithic artifacts is singular to the Paleo-Indian cultures of the Far West. A radical concept at the time, it was later supported by similar finds at other extinct pluvial lakeshore sites in southern California and Nevada, such as Tulare and Lake Mohave, California, and Long Valley Lake, Nevada.

In their summary of the 1964 investigations and tests, Meighan and Haynes asserted that there may have existed in the region northwest of classic fluted-point sites a variant of Folsom or Clovis culture, approximately contemporaneous with Folsom but differing from Folsom in diagnostic artifacts that included crescents in addition to fluted points. Their most startling conclusion was that settlement of the northern Coast Ranges of California had been pushed back in time. Meighan’s suggested time of initial habitation of 8000 B.C., they admitted, was open to reexamination.
By revisiting and reconsidering the Borax Lake site, Meighan and Haynes confirmed a Paleo-Indian occupation and corrected the sequencing of prehistoric cultures at the site. Their authoritative judgment established Borax Lake as the type site for the Paleo-Indian culture in the Far West area, and the early-Archaic “Borax Lake Pattern” for northern California. In March 1983, at a meeting of the Society for California Archaeology, Clement Meighan, the dean of California Archaeology, magnanimously stated that at Borax Lake, both the geology and the obsidian dating do not rule out an age of as much as 12,000 years ago for this pattern. This is vastly earlier than Early Central California, so in the essential matter of estimating the antiquity of the site, Harrington was correct and the “Berkeley School” including myself was way off the mark.

22 Clovis of a special nature in the Far West

In light of Clovis mammoth kill sites in the Great Plains and Southwest, archaeologists viewed all Paleo-Indian people as a culture of big-game hunters whose salient feature was the pursuit of late-Pleistocene megafauna. Michael Moratto noted in 1984, however, that since no typical Big Game Hunting Tradition (BGHT) kill sites had been found in California or the western Great Basin, “the mere presence of fluted points does not necessarily signal BGHT activity in the Far West.” Instead, Clovis-like fluted points were found in unusual places—along ancient lakeshores, in piedmont zones of former grassland, and in mountain passes between fossil lakes. The Far West, Dr. Moratto concluded, was a late-Pleistocene adaptation unique in North America.

The pattern of Paleo-Indian sites in the western Great Basin and California, clustered on the shores of pluvial lakes, appears to Moratto to be related to dramatic late-Pleistocene climatic changes, whereby increased rainfall, lower temperatures, and reduced evaporation led to a downward shift of biotic zones and created numerous pluvial lakes. “Between 22,500 and 12,000 B.P., during the Bonneville and Provo Pluvials,” he notes, “more than 100 lakes were formed in the Great Basin; others appeared in California’s Central Valley and even in the Coast Ranges.”

A restudy in 1964 of Harrington’s work at the Borax Lake site used extensive backhoe trenching and OH dating to examine large areas of the site stratigraphy. Not only did the new technology establish a span of 12,000 to 10,000 RCYBP for the site’s initial occupation, it also documented an extended occupation lasting into the subsequent early-Archaic period (Borax Lake Pattern). Confirming the antiquity of some of the finds considerably enlarged the known geographical range of the Clovis culture; what’s more, it also identified Western Great Basin and California variants of the Clovis culture.

Stephen Bedwell defined this Paleo-Indian lakeshore-adapted culture, which produced Clovis-like fluted points and chipped-stone crescents, as the Western Pluvial Lakes Tradition (WPLT). Moratto believes the WPLT may have evolved from the Fluted Point Tradition after 12,000 B.P., as woodlands and deep (pluvial) lakes gave way to grasslands and shallow lakes, and flourished until the onset of the Altithermal approximately 8000 years ago, when lakes began to evaporate. Although the WPLT persisted into mid-Holocene times in the vicinity of larger lakes like Borax Lake, pluvial lakes largely vanished by circa 7000 B.P., and with them the cultural tradition.

Extending the search for WPLT sites

With Meighan and Haynes’s confirmation of Harrington’s evidence for Paleo-Indian occupation at Borax Lake, archaeologists working in the Far West from the 1970s through the 1990s began investigating the shore areas of dried-up late-Pleistocene pluvial lakes, intent on determining whether the Clovis-like fluted points and crescents at Borax Lake could be found in other areas.

In their 1970 article that clarified the dating of the Borax Lake site, Meighan and Haynes mention that Clovis-like points and crescents, similar to those found at Borax Lake, had been recovered as surface finds from scattered areas along the shores of dried-up Pleistocene lakes in the Far West: Tulare Lake and Lake Mojave in southern California, and Long Valley Lake in Nevada. Moratto confirmed in 1984 that amateurs had surface-collected 30 Clovis-like specimens at Tulare Lake; although none had been dated directly, he notes “on typological grounds the Clovis-like points argue for occupation of the ancient Lake Tulare vicinity earlier than 11,000 B.P.”

Moratto records that at China Lake, another extinct Pleistocene lake in southern California, Emma Lou Davis and her colleagues identified at least 10 sites and localities with fluted bifaces and other traces of an early occupation they called “Classic Clovis.” The bifaces are sometimes associated with old shorelines or paleosols and occasionally found near remains of Pleistocene animals.

In their study of the Paleo-Indian and early-Archaic peoples of the Western Great Basin, Alan L. Bryan and Donald R. Tuohy conclude that the WPLT is evidence of humans who left extensive lithic artifacts on the terraces and shores of lakes whose bioresources they exploited on their annual round. They observed that the complexion of artifacts changed over time with changes in the lake level. They also noted with regret that most WPLT artifacts, including those found at ancient China Lake, were surface finds only rarely found in datable stratigraphic context.

Crescents, sisters of the fluted point

Besides Clovis-like projectile points, the crescent, another diagnostic chipped-stone tool associated with the WPLT, has been found at Borax Lake and other Western Great Basin and California lakeshore sites. Sometimes referred to in the archaeological literature as a “Great Basin Transverse,” the crescent is thought to date from 11,000 to 8000 RCYBP, a span that dovetails nicely with the Paleo-Indian and early-Archaic periods.

Noel D. Justice notes that although crescents vary widely in shape, those usually associated with Clovis and other early sites are basically simple half-moon shapes manufactured by pressure flaking. Since Great Basin sites yielding crescents are often located near extinct Pleistocene lakes, streams, and springs, some investigators suggest that the crescent, when hafted in its middle to a spear, may have functioned as a broad missile tip effective in bringing down waterfowl. Use-wear analysis reveals that the convex side of crescents was some-
times used as a knife or scraper; with the crescent hafted endways in a handle, the concave side is thought to have been used in a manner similar to the Eskimo women’s knife, the ulu.

Justice further mentions that blood-residue analysis of crescents from sites in the Great Basin of Nevada tested positive for a number of animal and plant species, including rabbit, ducks, trout, turkey, deer, and yucca.

36 **Borax Lake, the archetypal WPLT site**

The Borax Lake site must be considered the best representative site for WPLT Paleo-Indian occupation in the Far West simply because Borax Lake, alone among pluvial lakes, didn’t dry up at the end of the late Pleistocene. From the Paleo-Indian into the early and middle-Archaic Periods—millennia of increasing regional aridity—Borax Lake and nearby Clear Lake were one of the few permanent lake environments not only in the North Coast Ranges, but also in the whole Western Great Basin and California area. Because Borax Lake was a stable lakeshore environment, successive prehistoric cultures deposited their material culture over some 9000 years. The other Paleo-Indian sites noted in the WPLT area of the Western Great Basin and California, on the other hand, consist only of surface scatters of stone artifacts from wind-deflated sites along the shorelines of the extinct lakes.

Besides the lakeshore location, prehistoric visitors also enjoyed exploitable niches in a mosaic of grassland, chaparral, oak, and pine forest environments around Borax Lake, and quarried extensive local obsidian deposits for toolstone. Their use of obsidian tools is a boon for scientists, since we can firmly date the earliest occupation of the site to the Paleo-Indian Period by OIs dating.

In 1987, the Archaeological Conservancy, a nonprofit group devoted to preserving significant archaeological sites, acquired the Borax Lake site as a permanent archaeological preserve. The Conservancy is currently working with Greg White of the University of California–Chico on a long-range research program as part of the Superior California Archaeological Research Center Expeditions (SCARCE) program, a systematic study of early-Holocene archaeological sites in north California that will also address Borax Lake and other Paleo-Indian sites in northern California. Says Dr. White, “SCARCE’s general goal is the discovery of archaeological phenomena dating to the mid- to early-Holocene, contributing to the establishment of a baseline for the antiquity and economic pattern of human colonization of the region.”

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About the author  Mark R. Barnes is a Senior Archaeologist with the National Park Service (NPS) Southeast Region Office in Atlanta, Georgia. He has worked throughout the United States and American Caribbean on National Register of Historic Places and National Historic Landmark (NHL) Programs of the NPS. He earned B.A. and M.A. degrees in Anthropology and Museum Studies from the University of Arizona–Tucson, and a Ph.D. in Archaeology from Catholic University in Washington, D.C. His research interests are Spanish colonial material culture and archaeological site preservation. Dr. Barnes is currently an associate professor at Georgia State University, where he teaches Historical Archaeology and Cultural Resource Management. He was responsible for NHL designation for the Hester site in Mississippi, the Hardaway site in North Carolina, and the Borax Lake site, all nationally significant Paleo-Indian sites.

This photo shows Barnes in Spain, May 2006, with his wife, Dr. Karen F. Anderson-Cordova. She is the Unit Manager in charge of Review and Compliance for the Georgia State Historic Preservation Office.

Suggested Readings

Barnes, M. R. 2005  The Borax Lake Site (CA-LAK-36) National Historic Landmark Study. Copy on file with the Cultural Resources Division, National Park Service, Southeast Regional Office, Atlanta, Georgia.


Overview of the Borax Lake site today, looking north. In the distance is Mark Rudo, NPS Archeologist.

Fluted points from the Borax Lake site.

Borax Lake, with extinct volcano Mt. Konocti in background, about the time of Harrington’s initial excavations.

R. J. Sayles indicates spot where a Folsom point was found, 1945. The main trench cut through red hardpan that was riddled with animal and root holes.