A SINGLE COMPONENT PALEO-INDIAN SITE IN THE NORTH COAST RANGES, CALIFORNIA

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Archaeological investigations in the Cache Creek Natural Area, eastern Lake County, California has documented the presence of a single component Paleo-Indian assemblage. The nature, extent and distribution of cultural materials suggest this site represents a single event. A discussion of site formation processes is discussed with regard to site structure, artifact diversity, and obsidian hydration results.

Considerable archaeological research has been previously conducted in the Clear Lake Basin and Cache Creek drainage. The region presents the longest well-defined sequence of culture history in Northern California. The prehistory of the Central North Coast Ranges show that there are very few archaeological traces of Paleo-Indian age and no sites with well-defined single components. The body of our knowledge concerning Paleo-Indian adaptations and life ways in this region is derived primarily from the Borax Lake site. This initial period, known as the Paleo-Indian Period, is commonly recognized as the first occupation in North America and represents a time depth of approximately 12,000 to 8,000 BP.

FIELD METHODS

This section provides the structure for research that guided site-specific field strategies and testing. It is fundamental information that directed investigative efforts undertaken in the study. Work was divided into several sequential tasks. Each task required specific methodologies and built upon the preceding step.

Fieldwork was conducted as part of the cooperative agreement between the Archaeological Research Program at California State University Chico, Bureau of Land Management, Ukiah Field Office, and the USDA Mendocino National Forest Passport in Time (PIT) project. Work took place between 1st thru 6th October, 2002.

Site CA-Lak-1581 is situated on the margin of a broad alluvial terrace overlooking the confluence of the middle fork and north fork of Cache Creek. The surface of the site is relatively flat and open with thick chamise occurring on the periphery.

Investigations began with intensive surface reconnaissance of the alluvial terrace to identify any features and artifacts. Each artifact was pin flagged and plotted onto the site base map. These data were used to aid the identification of site boundaries and subsequent placement of Shovel Test Units (STU).

One datum was established by affixing rebar into earth and served as the permanent mapping reference. The sampling grid consisted of a main east-west truncated line which provided a transect across the entire terrace and passed though the center of the surface artifact scatter. A series of one-meter square STUs were laid out at five-meter intervals along the north zero line.

Once a primary series of STUs was excavated, areas of high artifact density were identified to direct placement of additional units. Additional units were conjoined to form a large horizontal exposure. Areal exposure provided a larger sample of cultural materials from the site.

SITE STRUCTURE

The accurate assessment of site structure must be explored and documented to assist in interpretation of the nature and extent of the deposit. This includes recognition of features, definition of horizontal and vertical extent of the cultural materials, and determination of patterns in the distribution of debris.

Excavation at CA-LAK-1581 revealed a shallow archaeological deposit limited to the first 50 centimeters. A very discrete flake stone scatter extended over a small area only $10m^2$. A series of excavation units were situated around the flake stone deposit and revealed little or no archaeological

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materials outside this cluster demonstrating the limited horizontal extent of the cultural materials (Figure 1). Based on these findings the estimated site volume is 25m^3. A total of 4.7m^3 were excavated using 1/8" screens or approximately 18.8 percent of the site. Controlled excavation sampled a substantial portion of the site. Recovered artifacts are representative of the range and type of behaviors performed on site.

ARTIFACT DIVERSITY

Artifact type and diversity are traits particularly sensitive to cultural formation processes (Schiffer 1987:281) and should be considered when defining single component assemblages. Artifact diversity is considered most heavily effected by occupational span. It is expected that sites occupied only for a limited span will be characterized by low artifact diversity. Sites occupied for longer durations will represent a greater range of behaviors in the artifact assemblage. Primary refuse that differ only in artifact density might serve as a measure to measure the range of behaviors performed on site. Specialized activities such as lithic manufacture contribute to a low-diversity of artifact diversity.

The artifacts assemblage at CA-Lak-1581 consists entirely of obsidian flake debris. A total of 1364 chipped stone Borax Lake obsidian artifacts were recovered. Selected for analysis were all 321 artifacts from unit N0/W14. This unit presents the most artifacts recovered from any single excavation unit and represents 23.5 percent of the total artifact assemblage. Flake stone analysis considered six variables including technique or technology, stage along a reduction continuum, presence of cortex, flake size, type of platform preparation, and the tool to waste ratio. An exhaustive treatment of flake stone types, definitions of traits, and in-depth analysis typical of many lithic researchers is not presented in this study. The six variables are employed only in broad terms to facilitate discussion of assemblage diversity.

Technology refers to the technique of flake stone manufacture (e.g. direct percussion, pressure, etc.). Approximately 90.6 percent of the flake stone assemblage is biface percussion flakes with the remaining representing pressure techniques. The stage of reduction is overwhelmingly biface reduction, 38 percent early biface and 50.5 percent indeterminate biface. Cortex is absent on all 321 specimens. The sizes of flakes are generally small with 67 percent of the sample less than 12mm along the longest axis. Platform preparation is often used to further define reduction stage. A total of 37.3 percent of the flakes have a single facet platform, 20.9 percent grinding on a single facet, and 41.8 percent are missing the platform. No tools were identified within the flake stone assemblage.

Artifact type and diversity in the CA-Lak-1581 assemblage represents a limited range of behaviors restricted to the manufacture of flake stone artifacts. Raw material use focused exclusively on Borax Lake obsidian denoting the significance of this source. Initial manufacture of flake stone artifacts occurred off site as indicated by the complete absence of cortex and high relative percentages of biface reduction debris. All behaviors appear exclusively directed toward the manufacture of flake stone tools.

OBSIDIAN HYDRATION

Obsidian hydration produces a simple measurement of rind thickness in microns. Fluted points and chipped stone crescents typical of the Paleo-Indian period have consistently returned hydration rind thickness in the 8 to 10 micron range (Fredrickson Origer 1986; Fredrickson and White 1988; Meighan and Haynes1970). In order to use the method to measure specific units of time, it is necessary to calibrate the rate of hydration rind formation to another, independent calendar measurement of time. To solve this problem field researchers have sought archaeological contexts with reliable associations.

Recently, White (2002) presented a natural logarithm equation for obsidian hydration calibration based on 18 radiocarbon and Borax lake obsidian associated pairs. To date, White's (2002) curve offers the most robust dataset of absolute dates and obsidian hydration pairings for Borax Lake obsidian.

Sixty obsidian artifacts from CA-LAK-1581 were submitted to Origer's Obsidian Laboratory for obsidian hydration analysis. Hydration band measurements have a range of +/- 0.2 microns due to normal equipment limitations (Origer 2002). Figure 2 presents the results of the obsidian hydration study. Hydration values were separated into surface and subsurface contexts in consideration of the effects of weathering and solar radiation on obsidian artifacts (See Michaels and Tsong 1980).

Comparisons of surface versus subsurface hydration rind values produced a stark variation (Figure 2). Surface hydration (n=13) showed a mean 7.0 microns and a very high standard deviation of 3.9. In contrast, subsurface hydration (n=47) showed 7.9

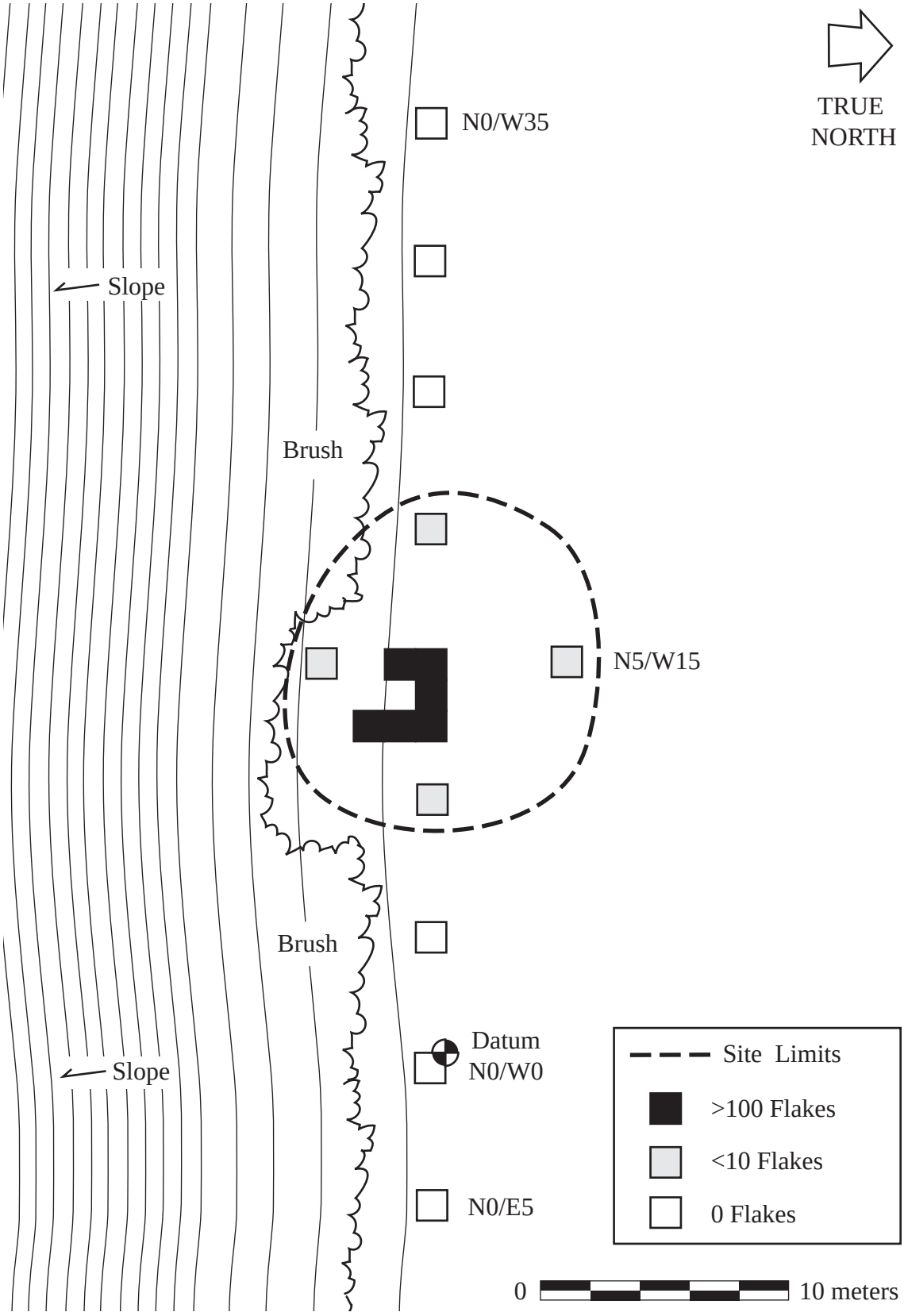

Figure 1: CA-LAK-1581 artifact density map.

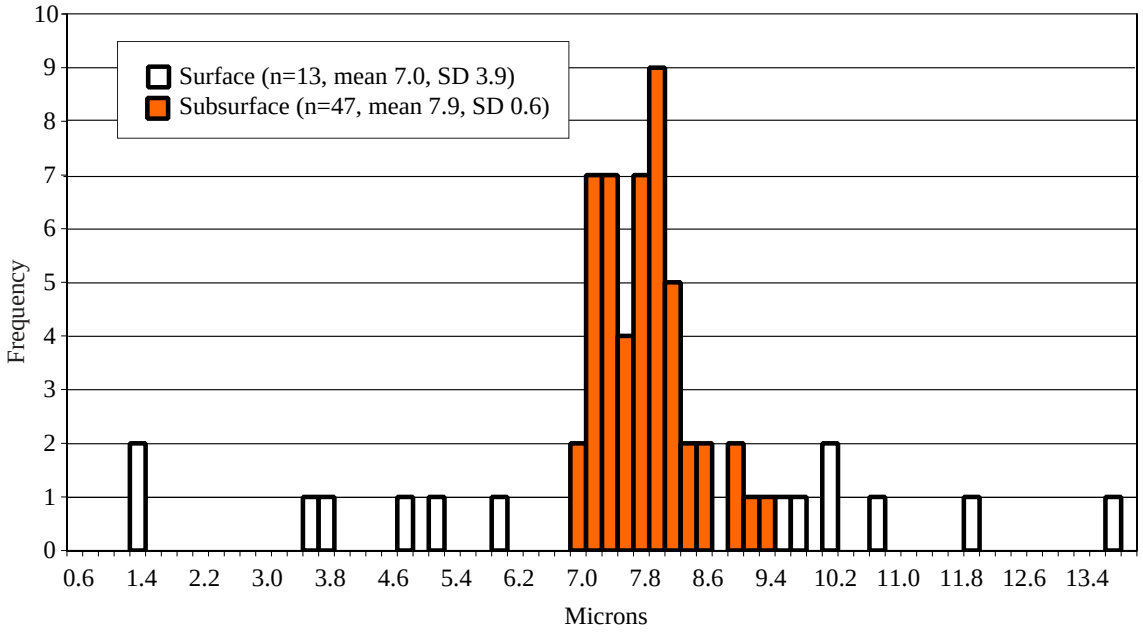

Figure 2: CA-Lak-1581 obsidian hydration results.

microns and a very low standard deviation of 0.6. The discrepancy between surface and subsurface samples likely represents the effects of weathering and solar radiation of these artifacts. As such, the subsurface assemblage represents a more reliable reflection of the obsidian hydration values for the site. A total of 43 percent (n=29) of the obsidian specimens produced hydration values greater than 8.0 microns confirming the presence of Paleo-Indian occupation.

Chronometric calibration (White 2002) for the mean obsidian hydration value from subsurface contexts resulted in an age assignment of 9,430 Cal B.P. This date correlates well with the dating of this site to the terminal Paleo-Indian Period 9,500 Cal BP.

CONCLUSIONS

The Paleo-Indian period is of particular interest to archaeologists in California and internationally. Sites of this age are rare, amounting to a handful of locations statewide.

The antiquity and presence of early Holocene archaeological assemblages within the North Coast Ranges is quite remarkable. CA-Lak-1581 may take the distinction of representing the first single component Paleo-Indian site identified in northern California.

Site structure, artifact diversity, and obsidian hydration results were examined with regard to site formation processes and for establishing temporal control. Spatial analysis and artifact clustering at CA-Lak-1581 are indicative of a discrete activity area. Artifact type and diversity suggest a limited range of behaviors were performed consistent with occupation of short duration. Obsidian hydration rind values occur in a tight cluster further suggesting a single component assemblage. Chronometric calibration of obsidian hydration rind values, as well as relative dating of hydration values with diagnostic artifacts, demonstrate the Paleo-Indian antiquity of CA-Lak-1581.

There are very few archaeological traces of this age making the site extraordinarily unique. Identification of sites of this age is an important step toward addressing enduring archaeological and anthropological questions regarding human migration into the Americas and their subsequent habitation and subsistence practices.

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