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# Borax Lake Pattern Assemblages on the Shasta-Trinity National Forests, North-Central California

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**T**HE Shasta-Trinity National Forests curve around the northern and northwestern edges of the Sacramento Valley in northern California, including within their boundaries the southern Medicine Lake Highlands, the slopes of Mount Shasta, much of the steep topography of the Klamath Mountains, and the headwaters of both the Sacramento and Trinity rivers. The approximately 1,800 recorded prehistoric archaeological sites on the Forests encompass some 8,000 years of prehistory. Cultural materials from these sites have been organized into three or four patterns with the Borax Lake Pattern being the oldest (e.g., Hildebrandt and Hayes 1984; Sundahl 1992b). Although constituting the smallest proportion of cultural remains on the Forests, materials of the Borax Lake Pattern are well represented in the Squaw Creek drainage in Shasta County and in South Fork Mountain and at the Cox Bar Site (CA-TRI-1008), both in Trinity County (Fig. 1). A considerable amount of research, primarily sponsored by the Shasta-Trinity National Forests, has been conducted in these areas. This article describes and compares the Borax Lake Pattern assemblages from these areas and proposes the recognition of two aspects within the pattern.

## THE BORAX LAKE PATTERN

The Borax Lake designation arose out of an analysis of North Coast Ranges assemblages by Clement W. Meighan in 1955. Based largely on earlier excavations at CA-LAK-36 at Borax Lake by M. R. Harrington (1948), Meighan

defined the Borax Lake Complex as represented by crescentic objects, fluted and wide-stemmed projectile points, coarse single-flake blades, manos, and millingstones (Meighan 1955:26-27, Fig. 4). Subsequent obsidian hydration studies identified the fluted points and crescents from the stratigraphically confused site as being older than the other materials, dating perhaps as old as 10,000 to 12,000 years before present. The name, Borax Lake, was retained for the wide-stemmed point assemblage which was assigned an age of 6,000 to 8,000 B.P. (Meighan and Haynes 1970:1220).

Meighan's wide-stemmed point complex was later incorporated into David A. Fredrickson's (1973, 1974, 1984; White and Fredrickson 1992) synthesis of North Coast Ranges prehistory as the Borax Lake Pattern. According to Fredrickson (1982:7-10), a pattern is an adaptive mode extending across one or more regions, characterized by similar technological skills and devices and a similarity of economic modes with respect to means of production. Patterns can be subdivided temporally or spatially into aspects. An aspect is a localized expression within the pattern, a "minimum interaction sphere" or series of interacting communities ideally equated with a linguistic community, contrasted with the "effective interaction sphere" which describes a pattern.

Fredrickson defined the Borax Lake Pattern as being "organized around both hunting and seed collecting with a technology that was apparently well adapted to the diversity of the

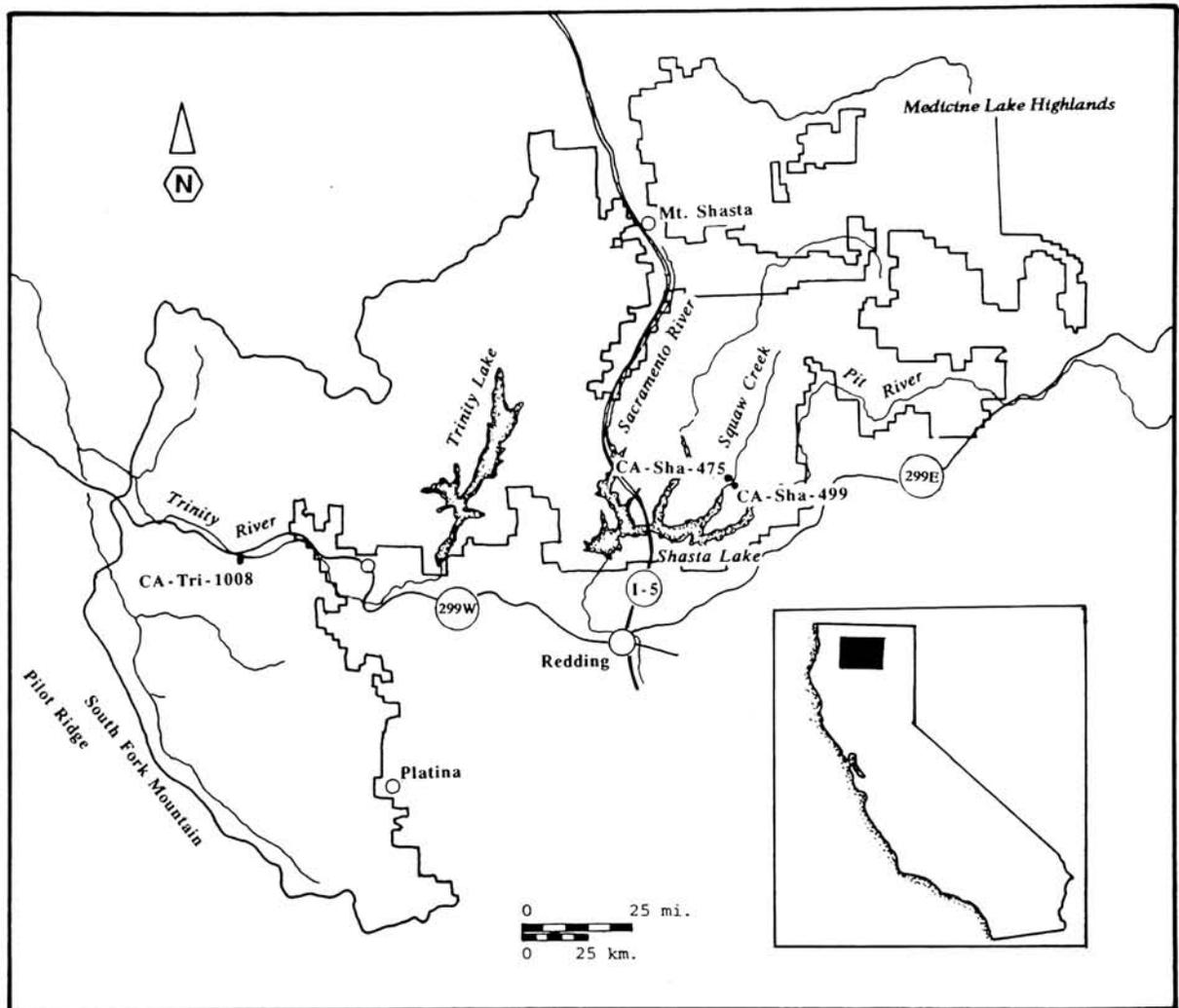


Fig. 1. Shasta-Trinity National Forests showing sites and geographic locations discussed in text.

sclerophyll communities." Technological skills included the use of the atlatl and dart, spear, wide-stemmed points made of local materials, manos, and millingstones. The economic mode reflects a generalized, highly mobile hunting and collecting strategy. Population densities were low, and social organization is believed to have been based on the extended family (Fredrickson 1973:130, 1984:497-498; Fredrickson and White 1988:84-85).

Fredrickson tied the Borax Lake Pattern of 8,000 to 5,000 B.P. to the Altithermal, a climatic regime characterized by relatively high

temperatures and low precipitation and suggested that the rapid spread of millingstone technology was linked to these drier conditions (Fredrickson 1974:46). The investigation of the relationship between the environment and human adaptation was pursued during subsequent studies on South Fork Mountain and neighboring Pilot Ridge (Hildebrandt and Hayes 1983, 1984; Hayes and Hildebrandt 1985), and G. James West was commissioned to reconstruct paleoenvironments through pollen studies. West (1985) concluded that climates in the North Coast Ranges prior to 8,500 B.P. were colder

than at present as reflected in the presence of open pine forests at that time. During the period between 8,500 B.P. and 3,800 or 2,300 B.P., oak pollen values increased and warmer, Mediterranean climatic conditions were inferred with milder winters and longer, dryer summers than those of the present. Beginning about 3,800 or 2,300 B.P., maritime climatic conditions prevailed with wet winters and moderate temperatures. Douglas fir and, in places, tan oak and chinquapin increased leading to present-day vegetation associations (West 1985, 1993).

Based on West's data, Hildebrandt and Hayes (1984:187, 1993; Hayes and Hildebrandt 1985:1) proposed that the warmest period, coinciding with dates assigned to the Borax Lake Pattern, resulted in an upland environment characterized by high resource abundance and diversity. Since interassemblage variability for sites in the South Fork Mountain and Pilot Ridge areas during this period was found to be relatively low, Hildebrandt and Hayes suggested that a "foraging" or "searcher" strategy was being practiced. Entire social groups would travel together, exploiting a wide range of resources but emphasizing those requiring little handling time such as big game and hard seeds.

The Borax Lake Pattern materials centered in Lake County have been assigned to the Borax Lake Aspect. This aspect is not yet well-defined, but is distinguished by large square stemmed, basally thinned wide-stem points with obsidian hydration values on Borax Lake (BL) obsidian ranging from 7.5 to 9.5 microns (White and Fredrickson 1992:47). Wide-stemmed projectile points have been found at many other northern California locations such as the upper Sacramento River (Basgall and Hildebrandt 1989), CA-SHA-1544 near Redding (Tyree 1992), CA-TEH-279 at Platina (Dreyer and Kowta n.d.), several sites on the high ridge which forms the boundary between the Shasta-Trinity and Mendocino National Forests (Teach 1989), several high-elevation sites on the

Mendocino National Forest (King 1974; Kuhn and Hughes 1982; Huberland 1988), and CA-HUM-245 near Hupa Mountain (Flynn and Roop 1975; Jackson 1977) as well as the locations on the Shasta-Trinity National Forests described below.

### THE SQUAW CREEK DRAINAGE

Squaw Creek is a 42-km. long tributary of the Pit River which in turn flows into the Sacramento River. The drainage has been the focus of a number of archaeological investigations over the past 20 years. Borax Lake Pattern assemblages are recognized at two sites. CA-SHA-475, popularly known as the Squaw Creek Site, and CA-SHA-499, the Chirpchatter Site were excavated by Shasta College field classes under the direction of S. E. Clewett (Clewett 1973, 1974, 1977; Clewett and Sundahl 1983; Sundahl 1990, 1992a). Both sites are situated at an elevation of 385 m. in a mixed-conifer forest environment with an average annual precipitation of 125 to 150 cm.

CA-SHA-475 has a midden depth of more than three meters and a chronology which encompasses nearly 8,000 years of prehistory as documented by radiocarbon dates (Table 1). Since organics other than charcoal have not been preserved in the acidic soils, the cultural assemblage consists entirely of lithic tools and debitage. Cultural materials have been assigned to four phases with projectile points serving as the primary diagnostics (Table 2). As demonstrated by Table 3, the obsidian hydration measurements form a pattern as would be expected in the upper three phases, but the sample from Phase I, consisting of the Borax Lake materials, has yielded hydration values statistically smaller than those registered for the stratigraphically higher sample from Phase II (Henn and Sundahl 1988). The reasons for this discrepancy are still being investigated.

The Chirpchatter Site contains a similar stratigraphic sequence, but materials are far

**Table 1**  
**RADIOCARBON DATES FROM CA-SHA-475**

Lab Number	Provenience/ feet	Radiocarbon Age/years B.P.
GaK-4219	N65-E191, 2.7-3.0	1,110 ± 390
I-13, 482	N60-E141, 2.0-3.0	1,650 ± 120
GaK-4855	N55-E146, 3.5-4.0	4,000 ± 95
GaK-3818	N40-E131, 7.5-8.0	6,530 ± 300
I-13, 481	N60-E191, 6.5-7.0	6,870 ± 210
GaK-6885	N55-E146, 7.5-8.0	7,580 ± 230

fewer and the cultural strata are compressed into a 1.5 m. depth. No radiocarbon dates were obtained from the Borax Lake Pattern levels, but the obsidian hydration studies resulted in a sequentially ordered pattern (Table 4) that complements the stratigraphic and radiometric data from CA-SHA-475.

Cultural materials assigned to the Borax

Lake Pattern from these two sites include obsidian projectile points, abundant obsidian debitage, cobble spalls, manos, millingstones, and an atlatl weight. A variety of other obsidian and metavolcanic tools are found in Phase I levels at CA-SHA-475 but are not numerous and are found in similar proportions in later phases. These include small bifaces and modified obsidian flakes with steep edge angles and acute edges, edge-modified and formed tools of metavolcanic material, and cobble tools. A single large leaf-shaped biface of chert was recovered from Phase I contexts.

The descriptions that follow are summarized from reports on the two sites (Clewett and Sundahl 1983; Sundahl 1990, 1992a). The Borax Lake series projectile points are separated into three subtypes: a large expanding stem variety, a square-stemmed type, and a smaller version of the expanding stem variant (Fig. 2). The largest variety, consisting of specimens with stem widths greater than 20 mm., average 12.2 g. in weight. Blades were probably long and triangular but most have been reworked such that the lengths have become shorter and

**Table 2**  
**VERTICAL DISTRIBUTION OF PROJECTILE POINTS FROM CA-SHA-475**

Phase	Projectile Point Type	Number in Collection	Mean Depth for Type (ft.)	Standard Deviation (ft.)
IV	Gunther series	37	1.30	0.70
III	side-notched	45	2.74	1.58
	small corner-notched	64	2.01	1.40
II	large corner-notched	31	4.64	2.59
	McKee uniface	92	3.78	1.64
	leaf-shaped	120	3.97	1.80
	Squaw Cr. contracting stem	267	4.85	2.04
I	deeply serrated points	40	5.24	1.37
	reworked Borax Lake points	38	5.81	1.79
	Borax Lake square stem	64	7.05	1.41
	Borax Lake wide stem	48	6.74	1.88

**Table 3**  
**OBSIDIAN HYDRATION STATISTICS BY PROJECTILE POINT TYPE**  
**GRASSHOPPER FLAT/LOST IRON WELLS OBSIDIAN, CA-SHA-475**

Phase	Projectile Point Type	Number in Sample	Hydration Values in Microns		
			Range	Mean	Standard Deviation
IV	Gunther series	7	1.2-3.0	2.33	0.63
III	side-notched	12	2.1-5.6	3.63	0.85
	small corner-notched	10	nvb-4.3	3.74	1.08
II	large corner-notched	1	1.3	1.30	--
	leaf-shaped	4	4.5-6.3	5.40	0.93
	McKee unifaces	10	4.4-4.8	4.52	0.13
	Squaw Cr. contracting stem	10	3.9-5.3	4.83	0.42
I	deeply serrated	6	4.3-5.6	4.95	0.50
	reworked Borax Lake points	7	3.7-5.2	4.48	0.55
	Borax Lake square stem	14	3.7-5.3	4.34	0.47
	Borax Lake wide stem	19	3.7-5.5	4.35	0.48

**Table 4**  
**PROJECTILE POINT AND OBSIDIAN HYDRATION SEQUENCE**  
**FOR CA-SHA-499, GF/LIW OBSIDIAN**

Level (cm.)	Diagnostic Points/ Micron Values	Flakes/Fragments/ Micron Values	Mean Hydration for Level
0-30	Gunther series 1.7, 1.9	N/A	N/A
30-70	Clikapudi notched	3.5, 3.6	3.6
	3.1, 3.7, 3.7, 3.7, 3.8	3.6, 3.8	
70-120	McKee unifaces	3.7, 4.7, 4.8	4.8
	4.4, 4.6, 6.7	4.9, 5.4, 5.4	
120-170	Borax Lake	4.8, 5.3, 5.5	5.6
	5.2	5.5, 5.5, 5.6	
		5.6, 5.7, 7.2	

wider relative to widths. Basal margins are flat or convex in two-thirds of the sample and indented or notched in one-third. The square-stemmed variety averages 5.6 g. in weight. Basal margins are usually flat, but occasionally

are convex or slightly concave. The smallest Borax Lake points, all under 8.0 g. in weight and averaging 4.8 g., show evidence of extensive reworking. Many are wider than they are long, and the blades are often more rounded

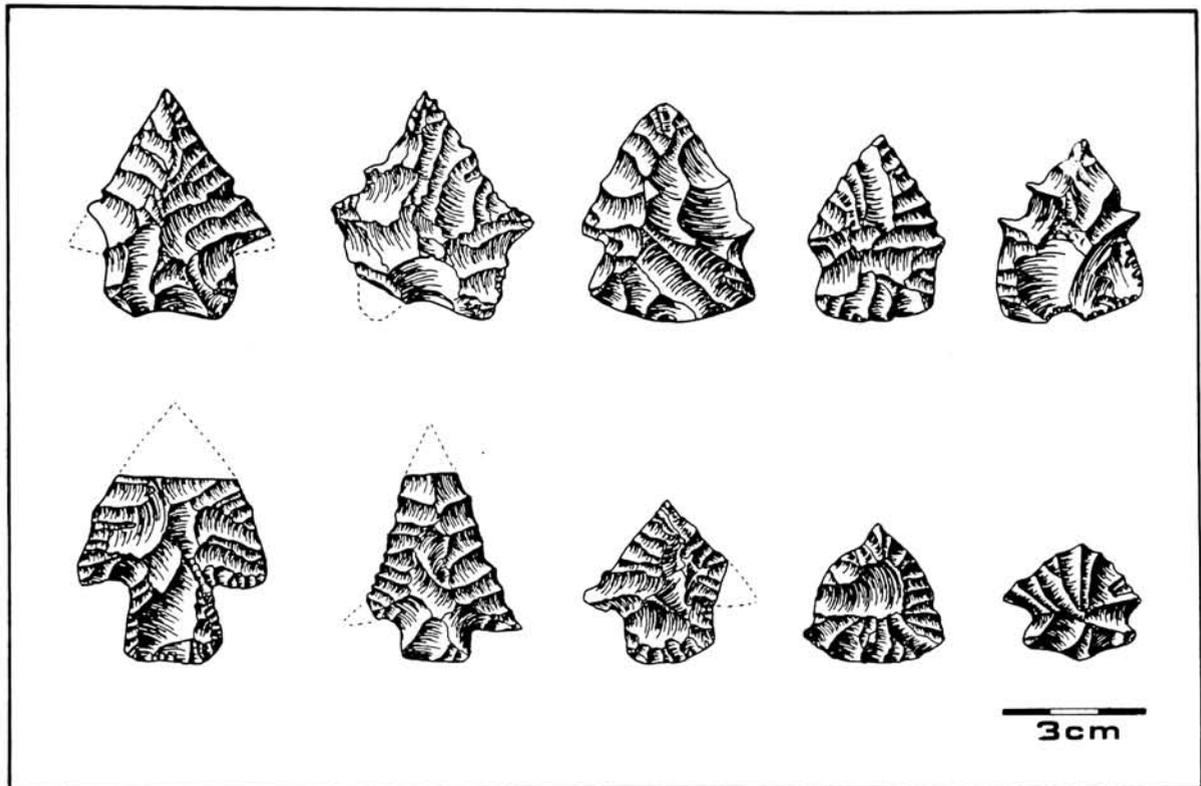


Fig. 2. Borax Lake series projectile points from the Squaw Creek drainage.

than pointed. It was proposed that the largest variant served as spear tips, the square-stem subtype as atlatl dart tips, and the smallest variety, when no longer suitable as points, were used as scrapers or knives. The sourced sample of all three subtypes is overwhelmingly attributed to the Grasshopper Flat/Lost Iron Wells (GF/LIW) obsidian source from the Medicine Lake Highlands (as defined by Hughes 1982, 1986). In contrast, obsidian from the subsequent phases is predominantly from the Tuscan source found south of the Pit River.

Cobble spalls are large round, oval, or pear-shaped flakes with flat ventral surfaces, struck from one face of an andesitic cobble. Lengths average 102 mm. Edges, which usually have angles in the 20 to 40 degree range, are rarely given any further edge modification, although a very small percent exhibit retouched edges. Wear patterns are difficult to detect on

the coarse andesitic material, but edge polish and striations are visible on a few specimens.

Manos from the Squaw Creek drainage were divided into five types: unshaped, partly shaped, oval-shaped, rectangular shaped, and small. The unshaped manos are most characteristic of the Phase I levels in both CA-SHA-475 and CA-SHA-499. Generally smaller than the shaped and partly shaped specimens, these are naturally shaped cobbles, some fairly irregular, with very minimal or no edge battering. Where battering occurs, it most commonly is limited to the ends. These manos tend to have small flat facets located near one edge at an oblique angle to the major facial plane rather than central facets, although centrally located facets are present on a few. More than 50% combine two, three, or four lateral facets on one or two faces (Fig. 3, left), with a maximum of eight facets on a single artifact. Millingstones appear

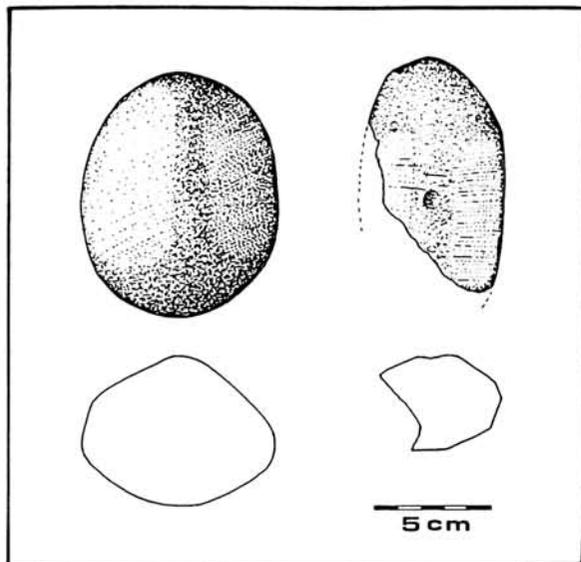


Fig. 3. Manos from the Squaw Creek drainage (left) and Cox Bar Site (right).

to belong to a single type which may be described as a large, flattish river-smoothed stone with a single flat grinding surface.

A completely ground artifact from the 6.5 ft. level of CA-SHA-475 is believed to be an atlatl weight. It measures 9.0 cm. in length and is encircled longitudinally by a groove of varying width and depth (Fig. 4). One surface has a wide, shallow U-shaped groove 2.6 cm. wide in the center and 3 mm. deep running the full length of the stone. The groove on the opposite surface is relatively narrow and U-shaped. One portion of this groove extends from one end to about 5.5 cm. on the body of the artifact and measures 6 mm. in width by 2 mm. in depth. The remainder of the groove is 9 mm. in width but is less than 1 mm. in depth. A small stain of red ocher, measuring approximately 3.0 cm. by 1.5 cm., can be observed on one edge of the artifact.

The Phase I materials from Squaw Creek were interpreted as representing small family groups practicing a subsistence pattern based primarily on hunting. Seed grinding activities were practiced, but do not appear as important

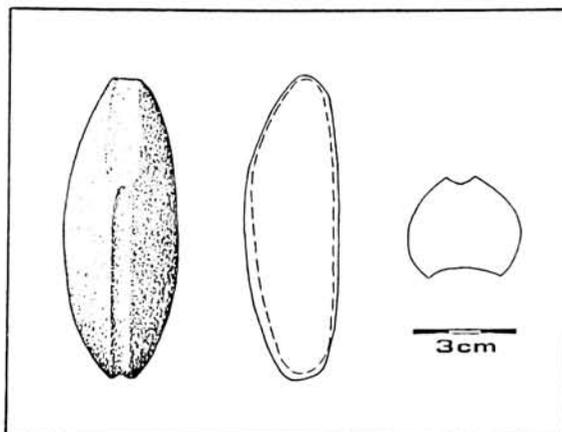


Fig. 4. Atlatl weight from CA-SHA-475 on Squaw Creek.

as during later phases. There are no clues to seasonality except that part of the annual subsistence tasks may have included forays to the Medicine Lake Highlands to collect obsidian. If so, this must have been during the summer, and sites in the Squaw Creek drainage may represent a winter habitation area.

### SOUTH FORK MOUNTAIN

South Fork Mountain, lying approximately 120 km. west of the Squaw Creek drainage, is a 67 km.-long ridgeline bounded on the west by the Mad River and on the east by the South Fork of the Trinity River. The crest of the mountain, which today forms the boundary between the Shasta-Trinity and the Six Rivers National Forests, is broad and contains numerous springs and the headwaters of many small perennial creeks. Elevations are primarily above 1,540 m. with peaks rising to more than 1,850 m. Slopes are conifer-covered, but the crest features many open glades, a result of shallow rocky soils. Annual precipitation is around 175 cm. Numerous chert quarries are known within the general area.

The prehistoric research potential for South Fork Mountain was first realized in the mid-1970s when the Shasta-Trinity and Six Rivers National Forests both began conducting archaeo-

logical surveys in the area (Jeffers 1975; Wylie 1975, 1976). It was recognized that prehistoric resources were exceptionally numerous along the crest of the mountain and that they potentially represented as much as 6,000 to 8,000 years of cultural activity (Wylie 1975). To date, more than 120 prehistoric sites have been recorded on the crest by the Forest Service. Archaeological testing and mitigation projects have been conducted at 15 of these sites (Crew 1982; Weigel and Fredrickson 1982; Hedrick et al. 1983; Vaughan 1983; Hildebrandt and Hayes 1983, 1984; Sundahl 1987).

Description, dating, and interpretation for the area are largely the result of investigations conducted by the Anthropological Studies Center at Sonoma State University (Hildebrandt and Hayes 1983, 1984, 1993; Hayes and Hildebrandt 1985). Their reports on the investigations of four sites on South Fork Mountain and 11 on neighboring Pilot Ridge, located in the Six Rivers National Forest, form the basis for most of the following description. Because soil deposits were generally shallow, chronological interpretations were largely based on horizontally discrete site areas which were divided by obsidian hydration measurements into early, middle, and late temporal periods.

The early-period assemblages assigned to Fredrickson's Borax Lake Pattern consist of abundant debitage with a chert-to-obsidian ratio of six-to-one or greater, Borax Lake wide-stemmed points, numerous large and small bifaces, ovate flake tools, edge-flaked spalls, manos and millings. The wide-stemmed points were described as generally large and thick (Fig. 5, top row) and were divided into five subgroups, four based on basal treatment and the fifth on size. Forty-six percent have deep indented bases created by removal of a series of flakes, and another 15% have deep indented bases created by the removal of a single flake on each face; 21% have shallow indented bases, 11% straight bases; and 6% are

smaller than the others with variable stem and basal forms. It should be noted that this last variant could not be specifically assigned to the early period. Only four of 108 wide-stemmed points collected from 13 sites are obsidian and the remainder are chert.

Bifaces are the most numerous category of early period artifacts and are described as having flake scars covering the breadth of both faces. All are larger than specimens described as projectile points and are leaf-shaped with forms varying from bipointed to those with a blunt proximal end (Fig. 6, top right). The bifaces are separated into four variants: a small form with serrated margins diagnostic of the early period; a small unserrated form which is the most common early period variant; a large thin form; and a large thick form.

Ovate flake tools with a completely shaped perimeter (Fig. 6, bottom right) and unformed flakes with only slight edge modification appear to be the most common flake tools in the early period assemblage, but numbers are small compared to the bifaces and projectile points. Edge-flaked spalls are made of sandstone or greywacke. They tend to be elongated and thin, and the amount of edge modification varies from near total to little or none.

Manos are divided into unshaped, which constitute nearly 75% of the total, loaf-shaped, and elongate-shaped. Wear is exhibited on broad flat surfaces. Eighty-one percent exhibit multipurpose use, indicated in many specimens by centrally pecked areas. Note is made of one specimen which is described as having multiple ground surfaces with the appearance of beveling (Hildebrandt and Hayes 1984:76). Although manos were most numerous in early period components, typological assignment by period was not undertaken and perhaps not all types belong to the Borax Lake assemblage. Millings generally are broad, unshaped flat stones with grinding surfaces which are relatively flat or slightly concave.

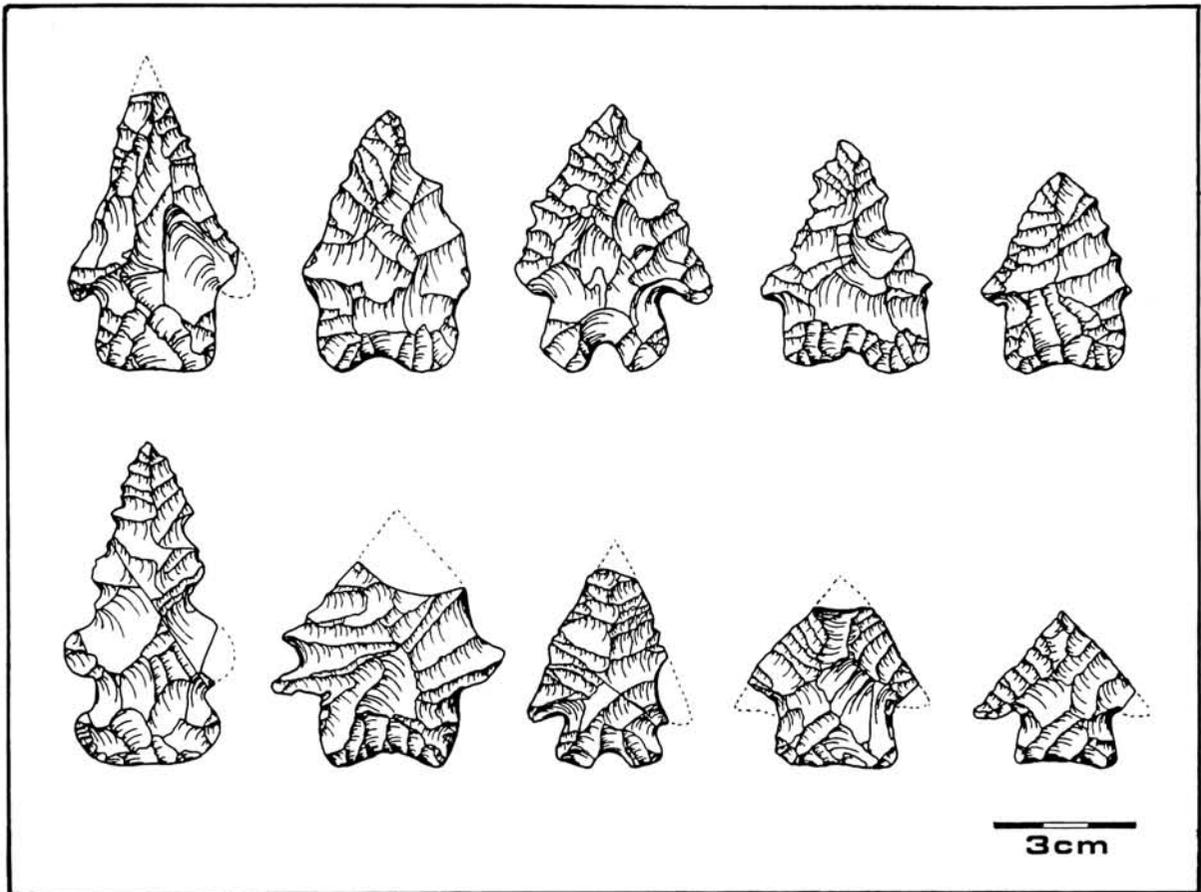


Fig. 5. Borax Lake series projectile points from CA-TRI-243 on South Fork Mountain (top row) and CA-TRI-1008, the Cox Bar Site (bottom).

Obsidian hydration values for GF/LIW obsidian, the predominant type present, range from 3.2 to 5.2 microns. Hildebrandt and Hayes (1993:110) assigned a date of 6,000 to 3,000 B.P. to the Borax Lake Pattern in the South Fork Mountain area based on the pairing of obsidian hydration values and radiometric dates in the upper Sacramento River Canyon with a 7% adjustment per degree Celcius for the approximate 5 degree mean annual temperature difference between the two areas.

#### THE COX BAR SITE

The Cox Bar Site (CA-TRI-1008) is located at an elevation of 400 m. on a small remnant terrace of the Trinity River, approximately 20

km. east of South Fork Mountain. The site, occupied by the buildings and yard of the Cox Bar School, is located on National Forest land. Archaeological investigations were initiated when the school board applied for a permit to enlarge the building, and mitigation measures were undertaken by a Shasta College field class under the direction of S. E. Clewett (Sundahl and Berrien 1986; Sundahl 1988).

The school grounds proved to have a sub-surface cultural deposit of about 60 cm. in thickness, all of which is inferred to belong to the Borax Lake Pattern. Artifacts include wide-stemmed points, large bifaces, ovoid flake tools, edge-modified flakes, cobble spalls, manos, and millingstones. Chert constitutes 86% of the

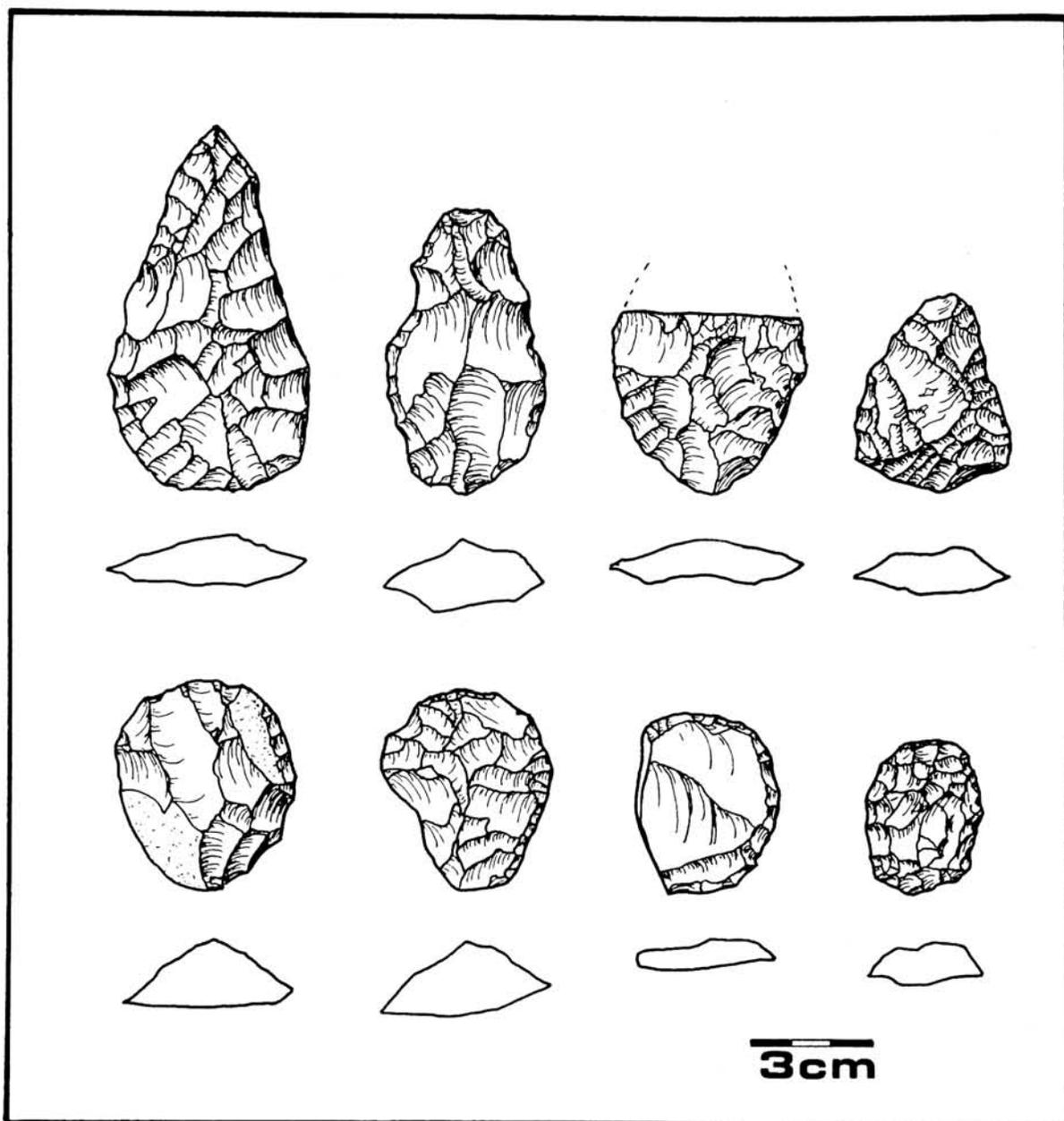


Fig. 6. Bifaces (top) and ovate flake tools; two on top left and two on bottom left from CA-TRI-1008, two on top right from CA-TRI-262 and two on bottom right from CA-TRI-243.

debitage, obsidian makes up 13%, and all other lithics are less than 1%.

Projectile point weights range from 3.0 g. to 20.0 g., and the few obsidian specimens tend to be much smaller than their chert counter-

parts. Shapes range from relatively long and slender to short and broad (Fig. 5, bottom row). Several feature deep blade serrations. Concave or notched basal margins are more than twice as numerous as flat or slightly convex bases.

Most of the large bifaces are fragmentary. The two most complete specimens have roughly symmetrical leaf shapes with pointed tips and convex bases (Fig. 6, top left). Small bifaces include a few with deep blade serrations. Flake tools include completely shaped oval or ovoid forms with relatively thick sections and steep working edges (Fig. 6, bottom left) and unshaped edge-modified flakes with more acute edge angles.

Six of the seven manos recovered from the site exhibit one or more small flat lateral facets at oblique angles to the major facial plane. The number of facets on an artifact varies from one to five, with one fragmentary specimen possibly having had a total of eight facets (Fig. 3, right). Five of the manos exhibit end or edge battering and three contain small pecked cavities central to one or both facets. The seventh specimen is a more conventional mano with a single flattened face. Millingstones are natural stream-smoothed stones, unmodified except for very flat, highly polished facets. One displays a dark red ochre stain on the grinding surface.

Nearly 98% of a sample of 82 obsidian artifacts and debitage was assigned to the GF/LIW obsidian source with the balance being Tuscan obsidian. Hydration values for the 80 GF/LIW specimens cluster around a mean of 5.7 microns with a standard deviation of 1.3 microns (Sun-dahl 1988:47). A suite of obsidian hydration measurements obtained by Janet Eidsness (1985) on a number of Trinity River area projectile points of GF/LIW obsidian is valuable for placing the Cox Bar sample into a local temporal framework. Much of Eidsness' sample came from CA-TRI-177, a site located directly across the Trinity River from the Cox Bar site on a flat some 15 m. lower in elevation. Eidsness' data (Table 5) indicate that the cultural assemblage from Cox Bar falls at the beginning of the Trinity River sequence.

Among the objectives of the investigation at Cox Bar was the comparison of materials from

Table 5  
OBSIDIAN HYDRATION DATA FOR PROJECTILE  
POINTS FROM THE TRINITY RIVER AREA<sup>a</sup>  
GRASSHOPPER FLAT/LOST IRON  
WELLS OBSIDIAN

Projectile Point Type	Number in Sample	Obsidian Hydration Values	
		Range	Mean
Gunther series	39	1.1-3.0	2.17
small corner-notched	5	1.0-4.3	2.86
serrated leaf-shaped	3	3.0-4.4	3.50
large corner-notched	3	3.3-4.4	3.87
small side-notched	8	3.0-5.0	4.01
McKee uniface	11	3.6-5.5	4.25
small diamond-shaped	4	2.5-6.4	4.28

<sup>a</sup> from Eidsness 1985:193

the site to those assigned to the Borax Lake Pattern on South Fork Mountain/Pilot Ridge to determine whether any differences in subsistence activities could be detected. Results (Table 6) indicate that most artifact frequencies and inferred activities are similar in both areas. The single deviation is in the flaked stone class in which flake tools are proportionately more numerous at Cox Bar and small bifaces at the South Fork Mountain sites. It was suggested that many of the small bifaces are projectile point fragments or butchering tools indicative of a greater emphasis on hunting at the higher elevations while the greater numbers of flake tools at the Cox Bar Site represent a utilization of the riverine or riparian resources available on the Trinity River or possibility an emphasis on such winter activities as hide preparation and clothing manufacture.

The cultural remains from the Cox Bar site were inferred to represent a low elevation,

Table 6  
**ARTIFACT CLASSES IN EARLY PERIOD SITES/SITE COMPONENTS:  
 SOUTH FORK MOUNTAIN, PILOT RIDGE, AND THE COX BAR SITE  
 EXPRESSED AS PERCENTAGES OF SITE/COMPONENT ASSEMBLAGE**

Artifact Class	TRI-262 <sup>a</sup>	HUM-367 <sup>b</sup>	HUM-573 <sup>b</sup>	HUM-577 <sup>b</sup>	MEAN	TRI-1008
cores	3.0	0.7	6.8	1.9	3.1	2.5
flake tools	3.0	9.8	12.2	13.5	9.6	28.7
ovoid tools	1.5	5.7	4.0	3.8	3.8	11.3
drills/gravers	--	1.7	--	--	0.4	2.5
variable flakes	1.5	--	0.7	--	0.6	-
keeled tools	--	--	--	--	--	1.9
large elongate flakes	1.5	1.1	0.3	1.9	1.2	--
large bifaces	12.1	17.4	19.3	7.7	14.1	11.3
small serrated bifaces	6.1	14.4	10.1	5.8	9.1	2.5
small unserrated bifaces	37.9	25.9	15.2	38.5	29.2	8.1
projectile points	13.6	13.8	13.9	15.4	14.2	20.0
cobble spalls	4.5	2.3	4.4	--	2.8	2.5
cobble tools	--	--	1.7	--	0.4	2.5
manos	6.1	3.2	2.0	3.8	3.8	4.4
millings	3.0	1.1	7.0	3.8	3.7	1.2
hammerstones	6.1	2.9	1.7	3.8	3.6	0.6
anvils	--	--	0.6	--	0.2	--
sample size	66	174	296	52	--	160

<sup>a</sup> Hildebrandt and Hayes 1984:138, lower T-B area

<sup>b</sup> Hildebrandt and Hayes 1983:Tables 17.29-17.31

Borax Lake Pattern occupation by people practicing a diverse subsistence strategy. Numerous different activities were originated in and around a single site and may have included some specific riverine-oriented tasks. Occupation might be expected to have been in the winter when the higher elevations were likely less hospitable (Sundahl 1988:97).

### COMPARISONS

The assemblages described above fit easily within Fredrickson's Borax Lake Pattern. The pattern presumably stemmed from a single ori-

gin where its practitioners shared a common assemblage. As people who carried or adopted the pattern settled in different parts of northern California they continued to share those elements which describe the pattern, but gradually differed in minor respects due to differences in local resources and to geographic remoteness which encourages shifts in style.

It is clear that the sites on South Fork Mountain and Pilot Ridge share very similar assemblages with the Cox Bar Site, and that they can be grouped together as an aspect following Fredrickson's (1982:10) use of the

term as a localized expression of a pattern, representing a series of interacting communities. On the other hand, elements of the assemblages from the Squaw Creek drainage are sufficiently different that they may be considered a separate aspect. It is proposed that the term, Northern Sacramento River Aspect, be used to describe the Borax Lake Pattern materials from Squaw Creek, and that the term, Trinity Aspect, be used to refer to the early materials from Trinity and Humboldt counties. Geographic boundaries are not established for either aspect nor are sufficient data available to include or exclude other known occurrences of Borax Lake Pattern materials.

The Northern Sacramento River Aspect is distinguished by the dominance of GF/LIW obsidian as the major flaked stone material, the predominance of Borax Lake points with flat basal margins over those with indented basal margins, and the presence of cobble spalls and unshaped manos and millingstones. The Trinity Aspect exhibits chert as the predominant flaking material with a minor use of GF/LIW obsidian, the dominance of wide-stem points with indented bases over those with flat basal margins, the common occurrence of deep serrations on point and biface blades, a high frequency of large and medium-sized chert bifaces, and the presence of an unshaped mano form with one or more lateral grinding facets. Some interaction between aspects is indicated by the presence of GF/LIW obsidian throughout both areas.

The Northern Sacramento River Aspect is the more firmly dated of the two aspects with three radiocarbon assays in the interval between 6,000 and 8,000 B.P. Obsidian hydration values from CA-SHA-499 are primarily in the 5.0-5.9 micron range on GF/LIW obsidian with a mean of 5.6 microns. At the Cox Bar Site, obsidian hydration values on GF/LIW obsidian average 5.7 microns, nearly identical to that at Squaw Creek. As environmental conditions are similar, a similar age is indicated. Obsidian

hydration values for sites on South Fork Mountain and Pilot Ridge range between 3.2 and 5.2 microns but, because of the higher elevations, these cannot be correlated directly with the lower elevation readings. A formula applied by Hildebrandt and Hayes (1993:110) converted these values to calendric dates of 6,000 to 3,000 B.P.

In an attempt to accumulate data about specific subsistence patterns of Borax Lake Pattern peoples, a set of 30 artifacts, 10 each from CA-SHA-475, CA-TRI-1008, and South Fork Mountain, were forwarded by the Shasta-Trinity National Forests to Margaret Newman at the Laboratory of Archaeological Science, California State University, Bakersfield, for protein residue analysis. Each sample contained a mixture of Borax Lake wide-stem points, bifaces, and unifacial flake tools. These were subjected to cross-over immunoelectrophoresis using 13 family- or species-specific antisera. Six artifacts returned positive results. Two Borax Lake wide-stem points from CA-SHA-475 were positive for deer residues but negative for elk. One Borax Lake point and one unifacial tool, also from CA-SHA-475, were positive for Canidae antiserum which may result from the presence of dog, wolf, coyote, or fox protein. A wide-stem point from South Fork Mountain and a biface fragment from Cox Bar both were positive for rabbit protein (Newman 1993). These limited results suggest that hunting was not limited to large game, but that mid-sized and small mammals were taken as well, at least to some extent using the same tool kit.

The Squaw Creek sites and the Cox Bar Site, located at 385 and 400 m. in elevation on major drainages, probably represent winter occupations. Although higher elevation sites corresponding with the South Fork Mountain and Pilot Ridge sites have not been found in Shasta and Siskiyou counties, the Squaw Creek residents or their trading partners necessarily

traveled to the high elevation Medicine Lake Highlands to obtain GF/LIW obsidian, and higher elevation Borax Lake Pattern sites may yet be found in the area since scattered Borax Lake points are known (Julie Kreiger Cassidy, McCloud Ranger District, U.S.F.S., personal communication 1990). If Cox Bar is correctly interpreted as a winter habitation and the high ridge sites as summer occupations, there is little seasonal variation in subsistence tasks observable in the archaeological assemblages.

It has become common practice to view hunter-gatherer populations as arranged on a continuum from foragers to collectors, the former being social groups that make numerous residential moves during the year, "moving people to the resources," and the latter living in sedentary villages "moving resources to the people" by engaging in logistical forays to gather resources (cf. Fredrickson 1974:49; King 1974; Binford 1980). Research in the northern Sacramento Valley and neighboring Shasta-Trinity National Forests suggests that groups that fall within the forager class can themselves be arrayed along a spectrum. At one end are those who practice a pattern of transhumance, following game herds and plant maturations, but with little seasonal variation in subsistence and technology. Social groups at the other end of the spectrum are equally mobile, moving seasonally from low-elevation river settings to foothill environments to high-elevation conifer forests, but use diverse technologies to harvest different resources during different seasons so that cultural remains left behind in sites in various environmental zones are significantly dissimilar (e.g., Sundahl 1993). The Borax Lake Pattern appears to lie near the former end of this spectrum. Examples of the latter end date much later in time and may indicate a response to growing populations and greater pressures on environmental resources.

It has long been hypothesized that the Borax Lake Pattern, with its emphasis on millingsone

technology, accompanied a migration into California by Hokan peoples from an original homeland in the arid southwest (cf. Taylor 1961; Fredrickson 1984:509-510; Kowta 1988:66). The Borax Lake Aspect has been specifically linked by Whistler (1988) to the ancestral Pomo. The area occupied by the Shasta-Trinity National Forests was, at historic contact, home to three Hokan groups: the *Chimariko* in the middle Trinity River drainage, the *Okwanuchu* on the upper Sacramento and McCloud rivers, and the *Achumawi* on the middle Pit River bordering Squaw Creek. Given the long cultural continuities in each of these areas, the distant ancestors of the *Chimariko* are viable candidates for those responsible for the cultural debris interpreted here as the Trinity Aspect (also see Gmoser 1993), and the *Okwanuchu*, *Achumawi*, or both may be the descendants of those who left the cultural materials here referred to as the Northern Sacramento River Aspect. The Shasta-Trinity National Forests offer excellent opportunities for the further exploration of the cultural phenomenon called the Borax Lake Pattern.

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