

California Department of Parks and Recreation
Archaeology, History and Museums Division

NUMBER 30

PUBLICATIONS IN CULTURAL HERITAGE

ARCHAEOLOGY, ETHNOGRAPHY,
AND TOLOWA HERITAGE
at Red Elderberry Place, *Chvn-su'lh-dvn*,
Jedediah Smith Redwoods State Park



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JEDEDIAH SMITH REDWOODS STATE PARK**

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*PUBLICATIONS IN CULTURAL HERITAGE
NUMBER 30, 2013*



Series Editor

Christopher Corey

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Department of Parks and Recreation

Archaeology, History and Museums Division

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Archaeology, History and Museums Division
Publications in Cultural Heritage, Number 30

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By Shannon Tushingam

Editor, Richard Fitzgerald; Series Editor, Christopher Corey

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Cover Images:

Front: Tolowa Dugout Canoe on the Smith River, date unknown (Del Norte County Historical Society).

Back: Red Elderberry Sweathouse drawing by Rusty Van Rossman. Floor plan based on House 4 sweathouse, other features based on ethnographic descriptions and information from Tolowa Consultants.

Design and Typesetting:

Heather Baron, DocDesign

Printed in the United States of America

Dedication

To the past, present, and future generations
of the Taa-laa-wa Dee-ni' (Tolowa).



*Courtesy of the Phoebe A. Hearst Museum of Anthropology and the Regents of the University of California — Pliny E. Goddard (15-3318).
Mary Grimes, Clara La Fountain, Lizzie Grimes, and Bertha Stewart
at Yontocket Village, 1903.*

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Courtesy of the Coos Historical and Maritime Museum Image 007-10.5.
Ephraim Cannon Catching and Mary Moore Catching

PREFACE

Tucked away in the extreme northwestern corner of California lies a land of stunning beauty composed of a craggy coastline, deep forests, and roughhewn mountains. At its heart flows the Smith River, one of the last undammed rivers in California. Arising from its headwaters in the Klamath Mountains and emptying into the ocean some ten miles north of Crescent City, the sinuous aquamarine-colored Smith River is the ancestral home of the Tolowa people. This volume, Number 30 in our series of *Publications in Cultural Heritage*, is about the Tolowa, their deep past, their more recent history, and their rich cultural heritage as viewed from a single locality within Jedediah Smith Redwoods State Park named *Chvn-su'lh-dvn (TcuncuLtun)*, or Red Elderberry Place. Presented within is a unique blend of rigorous archaeological investigation, local history, and ethnography. This volume is the result of three years' worth of research conducted by California State Parks, National Park Service, University of California, Davis, private cultural resource management firms, and local historical societies in cooperation with the Elk Valley and Smith River Rancherias and the general Tolowa community. The unique and ongoing partnership between all these parties has led to the discovery and documentation of an extremely long occupational history spanning about 8,500 years. Among other discoveries, this project has revealed the earliest plank houses, the only semi-subterranean sweathouse recorded to date in northwestern California, and the earliest evidence of tobacco smoking on the Pacific Northwest Coast.

The Tolowa, along with their neighbors the Yurok, Hupa, and the Karuk, were all considered by Alfred Kroeber to be a southern extension of the great and distinctive cultures of the "Pacific Northwest;" yet the Tolowa were quite different with smaller houses and households, an extremely autonomous, even anarchistic political organization, and individual property ownership rather than corporate rights more typical of the northern people. These traits, combined with the importance of acorns in their diet and the use of formal sweathouses, make the Tolowa distinctly Californian despite their outward similarities to the cultures of the North Pacific coast. Lastly, and most importantly, this report gives testimony to the durability and resiliency of traditional cultures despite the overwhelming and often destructive tendencies of early western Euro-American culture.

Richard Fitzgerald
Editorial Advisor

ACKNOWLEDGEMENTS

It has been my honor and privilege to have worked at such a spectacular place and with so many wonderful people over the years. First and foremost, I wish to thank the Tolowa community for their support and friendship, and for helping me to understand the past and present of their culture. I am grateful to the Culture Committees and Tribal Councils of the Elk Valley Rancheria and Smith River Rancheria, Tolowa Nation, and the many individuals who contributed to the study including Eunice Bommelyn, Lena Bommelyn, Loren (Me'lash-ne) Bommelyn, Marilyn Bray, Richard Brooks, Margaret Moorehead Brooks, Nellie Chisman, John Green, Wanda Green, Lou Housley, Kim Krokodilos, Mabelle Lopez, Dale Miller, Kara Miller, William (Bill) Richards, Brock Richards, Viola Richards, Marva Scott, and Suntayea Steinruck. Bill Richards was the primary monitor for the 2003 field school and Richard Brooks for the 2004 and 2005 field seasons. I am thankful for their guidance, continued friendship, and for their many contributions to the study. Both of these gentlemen were generous with their prodigious knowledge, notable examples of which include: Mr. Richards bringing me and a small group of students to *Yontocket* one weekend to explain the terrible events that had taken place there and how his ancestors had survived the massacre; and Mr. Brooks spending many hours to explain and demonstrate traditional skills including salmon and smelt fishing and preparation, and acorn and swamp tea collection and preparation. I am grateful for these experiences and for countless similar acts of graciousness extended by many other community members over the years which have had a profound effect on me and the students they helped to teach, forever connecting the archaeological sites we study with a living community of people that has persisted despite incredible odds. I am grateful to Loren (Me'lash-ne) Bommelyn, Margaret Moorehead Brooks, Richard Brooks and Nellie Chisman for generously allowing me to interview them at length for the oral history study. Me'lash-ne definitely deserves special mention for his many intellectual contributions to this study, and for reviewing several versions of various works summarized here. I am grateful for the many discussions we have had over the years and truly appreciate his candor and good humor.

My most sincere thanks go to my major advisor and mentor, Robert Bettinger. I thank him for setting the bar high and am grateful for his guidance, for his early and ongoing encouragement of this research, and for the many enlightening and often colorful theoretical discussions over the years. William Hildebrandt was kind enough to propose one of the models tested in this dissertation back in the early 1980s and has been a true mentor and steadfast source of encouragement. I am also indebted to the other members of my dissertation committee, Jelmer Eerkens, Richard Gould, and Aram Yengoyan for their kindness, support, and guidance.

This work could not have been completed without the assistance of many students, and I especially want to thank the students and teaching assistants of the 2003-2004 UC Davis archaeological field schools. Many undergraduate interns also contributed to the project, including Angela Arpaia, Aaron Buering, Julie Clark, Julie Garibaldi, Katheryn Hill, Nerissa Lindsey, Nicolas Longo, Lucien Schrader, and Amy Spurling. I also thank Christyann Darwent, John Darwent, Richard Fitzgerald, Trine Johansen, Mary Maniery and her colleagues at Par Environmental, and Eric Wohlgemuth for their analytical contributions and support. Heather Baron, Wendy Masarweh, Paul Brandy, Larry Chiea, and Rusty Van Rossmann contributed to map and figure production.

I am grateful to the Far Western Anthropological Research Group, Inc., the Society for California Archaeology, and to many individuals in the California archaeological community including Janet Eidsness, Richard Fitzgerald, Dave Frederickson, Richard Hughes, Jack Meyer, Tom Origer, Jamie Roscoe, Allika Ruby, and Greg White. I also wish to thank Michael Kashgarian at the Center for Accelerator Mass Spectrometry, Lawrence Livermore Laboratories.

Karin Anderson at the National Park Service was instrumental in the development and institution of this research project, fostered collaborative work with the Tolowa, and has been very supportive over the years. I salute the efforts of the many people at California State Parks who have dedicated their careers to preserving and protecting the cultural resources under their management and for their contributions to this study, including Greg Collins, Glenn Farris, Richard Fitzgerald, John Foster, Kathy Lindahal, and Pete Schultz. At Redwood National and State Parks, thanks go to Jeff Bomke, Grant Eberly, Valerie Gazinski, Tom Gunther, Linda Mealue, Vicki Ozaki, Les Schillinger, and Rick Sermon.

This study has been funded by the Canon National Parks Science Scholars Award, UC Davis Department of Anthropology grants and the Archaeological Field School program, the Society for California Archaeology, James A. Bennyhoff Memorial Award, and California State Parks Cultural Resources Management Program Grants. Support was also provided through Californian Cooperative Ecosystem Studies Unit agreements and an Opportunities and Constraints Analysis Team project funded by California State Parks and the NPS. The Smith River Rancheria generously provided funding for monitors during all stages of fieldwork.

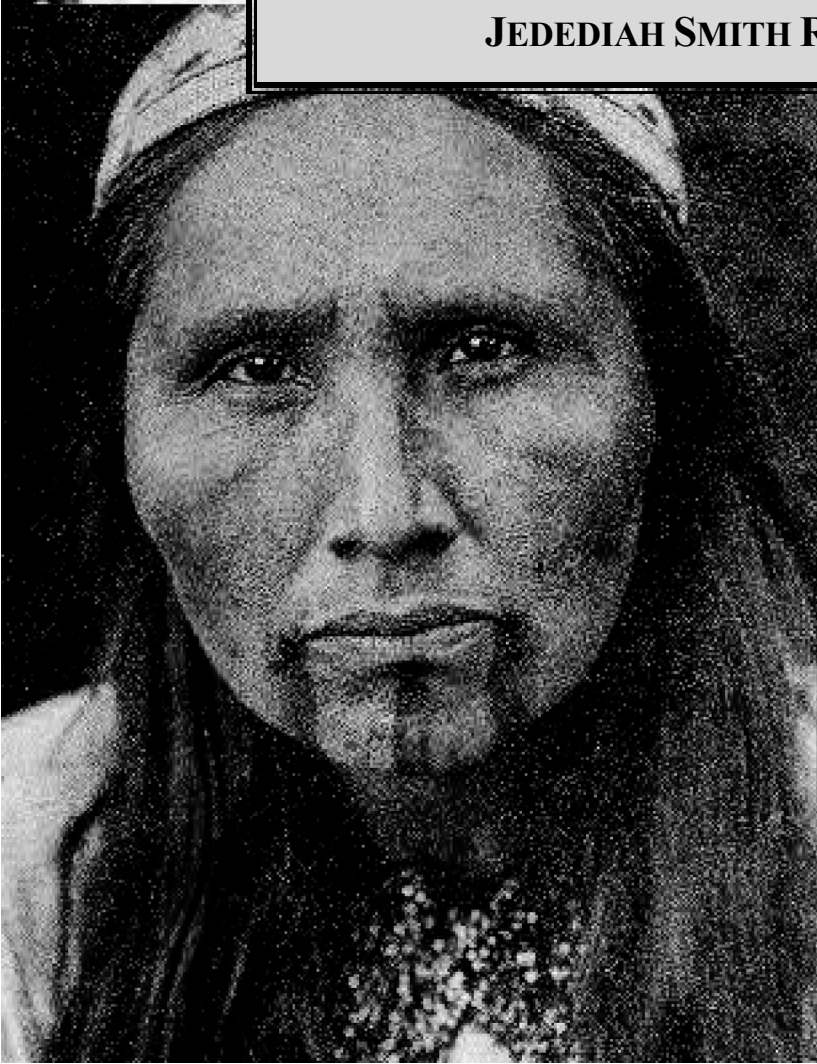
I am grateful to Richard Fitzgerald for his enthusiastic support, friendship, and for giving me the opportunity to publish this monograph. Rick has been a very patient and positive editor and I thank him for the many hours he has spent helping me to develop and fine-tune the manuscript. Thanks also to Heather Baron for producing the monograph and to Chris Corey for his copyediting skills.

Finally I would like to thank my family for their constant support, in particular my husband Miles and my children, Harrison and Greer, who have enthusiastically accompanied me on countless trips to the Redwoods since they were both very young.

Shannon Tushingham
Author



**ARCHAEOLOGY, ETHNOLOGY, AND TOLOWA HERITAGE
AT RED ELDERBERRY PLACE, *CHVN-SU'LH-DVN*,
JEDEDIAH SMITH REDWOODS STATE PARK**



*Photos on previous page from
Edward S. Curtis Photograph, Library of Congress, Prints and Photographs Division*

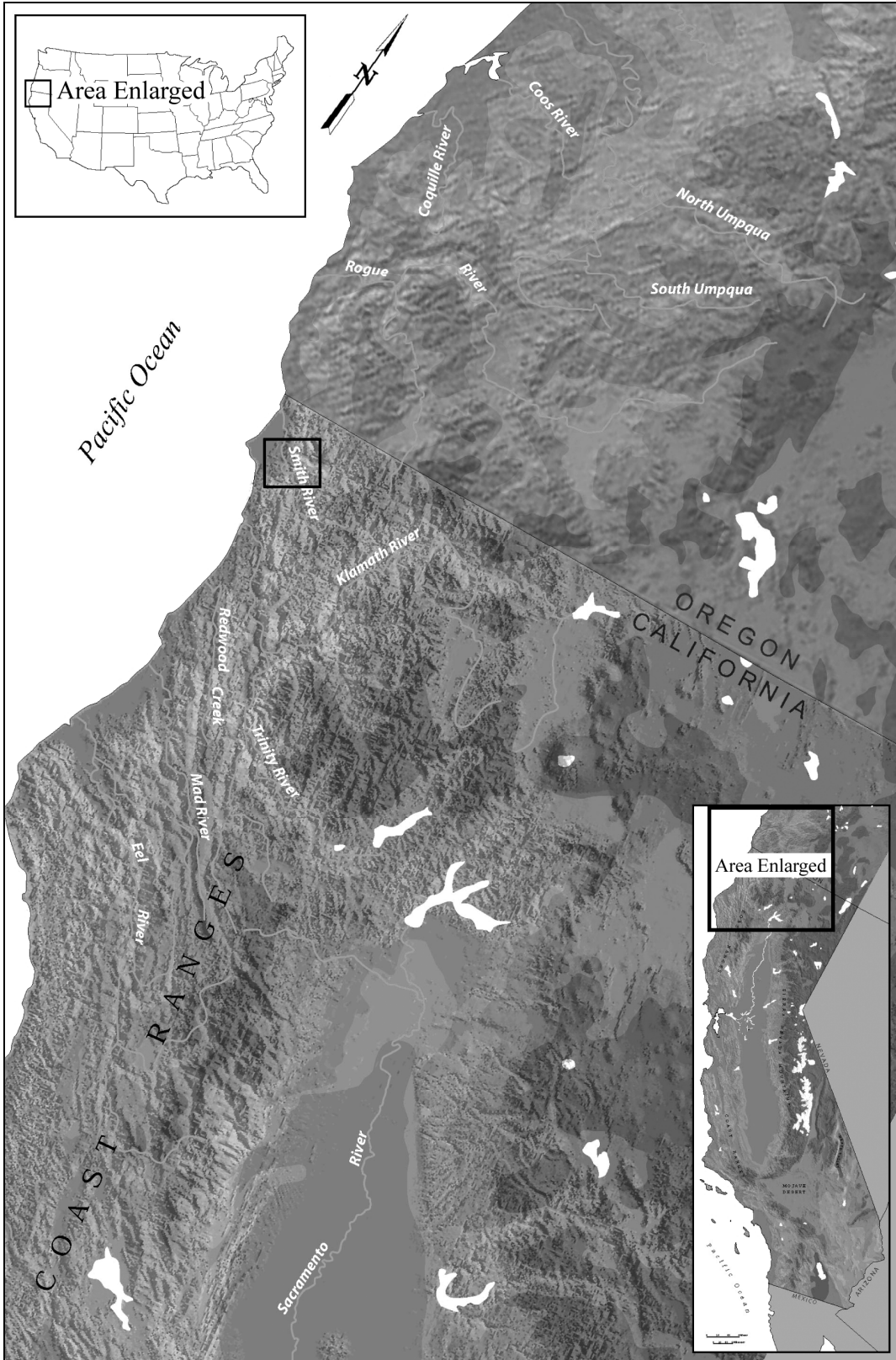
Chapter 1: Introduction

Jedediah Smith Redwood State Park is famous for its wealth of natural resources, in particular for its ancient stands of old growth coast redwood—the tallest of the tall trees—and for the salmon-rich Smith River, which happens to be the last major free flowing river in California. Lesser known, but just as impressive and significant, are the Park’s cultural and archaeological resources.

This monograph provides an overview of these cultural resources, which were documented by research designed to better understand the human history of the Smith River Basin, the ancestral and current home of the Tolowa people. The studies draw on a number of sources: archaeological fieldwork, including three UC Davis archaeological field schools and a project with Far Western Anthropological Research Group, Inc.; archival research; ethnographic studies; and oral histories with Tolowa community members. The research is conducted in an ongoing partnership between the Elk Valley Rancheria, the Smith River Rancheria, Redwood National and State Parks, and UC Davis.

When this work began, very little was known about the cultural resources in the campground and adjacent areas. As the area is covered in thick forest duff, it is easy to overlook these sites. Only a small portion of one site was previously recorded—the ethnographic village of *Chvn-su'lh-dvn* (*TcuncuLtun*), Athabascan for Red Elderberry Place (CA-DNO-26; Figure 1). Controlled auger testing led to the discovery of the additional five sites detailed here. Site excavations revealed an extremely long chronological sequence spanning from about 8,500 years ago to the Contact Period (1850-1902), the earliest plank houses, the only semi-subterranean sweathouse yet recorded in northwestern California, and the earliest evidence of tobacco smoking in the Pacific Northwest Coast.

In the last chapter of this monograph, a summary of some of the major scientific research issues are addressed. The intent of this research (Tushingham 2009) was formed by two questions: how did intensive foraging systems and the Pacific Northwest pattern develop in the region (abruptly or gradually?), and when were the two most important dietary staples of ethnographic groups (salmon and acorns) intensified? As the first large-scale effort at any interior river site in northwestern California, the answers to these questions were uncertain at the outset, but became quite clear upon investigation. The research has also helped to better understand the use of exotic obsidian in the region. The astonishing amount of obsidian recovered



Created by Larry Chiea (Tushingham 2009).

Figure 1. Study Location Map.

at the project sites—obtained from distant sources (250-350 kilometers)—was unexpected; obsidian hydration and sourcing studies on these samples have now clarified long-term diachronic trends in obsidian use.

Archaeologists in the region have traditionally drawn heavily on the ethnography, and this study is no exception. An effort, however, is also made to address gaps in the ethnographic literature, put the research in historical perspective, and understand Native American persistence and survival themes relevant to Tolowa heritage in the present day. Archival research and ethnographic interviews conducted with Tolowa consultants document previously unknown details about aboriginal land use of the Smith River Basin, and this puts archaeological findings into perspective in new ways. As most ethnographic research in Tolowa country has focused on groups who lived on the coast, this collaborative work has improved our baseline understanding of Upriver, or Ge-Deeni', Tolowa lifeways.

Collaborative research with the Tolowa community also provided invaluable historical context, particularly for the Contact Period (1850-1902). The discovery of a semi-subterranean sweathouse dating to the mid to late 1850s was unexpected; research with Tolowa participants—many of whom are direct descendants of massacre survivors—provided a better understanding of the circumstances faced by house inhabitants and completely shifted the interpretation of the house and associated assemblage. Research issues related to Native American survival, persistence, and continuity emerged from many conversations with Tolowa colleagues during and after archaeological documentation of the house. In short, the archaeological findings associated with the Contact Period sweathouse, combined with historical evidence and community knowledge, demonstrate a remarkable degree of persistence of traditional lifeways despite extreme population decline and displacement from massacres, disease, forced removals, and a disintegrating traditional economy. Furthermore, oral histories and archival research suggest that the area now known as Jedediah Smith Redwood State Park and Hiouchi Flat served as an inland sanctuary from the violence and upheaval associated with settler communities concentrated on the coast, and became the home for large Indian-white households who lived alongside the last permanent inhabitants of Red Elderberry Place. Even after the terminal occupation of Red Elderberry Place—associated with the murder of its last inhabitant in 1902 by local white settlers—these Indian-white households persisted, and this very special place continues to be of major importance to the Tolowa community to this very day.

Chapter 2: Project Context

The project area encompasses Jedediah Smith Campground and Hiouchi Flat in lands co-managed by the California Department of Parks and Recreation (North Coast Redwood District) and the National Park Service (NPS). It is located approximately nine miles from the coast along the Smith River, within an impressive old growth redwood forest. Although much of the forest forms a dense canopy, open prairies are sporadically scattered throughout the area. The project area, and much of what is now Del Norte County, lies within the ancestral territory of the Tolowa people.

ENVIRONMENTAL CONTEXT

This section summarizes important features of the present-day and historical environment of northwestern California, the goal of which is to develop a context for understanding human-ecological relationships and the structure of the archaeological record within this landscape. Included are brief descriptions of the various environmental zones present in the study area, with a focus on the Smith River-Redwood Belt zone, the location of the archaeological sites described in this monograph.

Northwestern California is a mountainous region with elongated ranges and valleys that trend in a northwesterly direction. Annual rainfall is high, creating numerous salmon-bearing streams that were of major economic importance to local Native American people. The combination of high rainfall and topographic diversity created a complex mosaic of vegetation consisting largely of coniferous forest, open prairies, and mixed hardwood forest. These habitats yielded a variety of important subsistence resources, including Roosevelt elk (*Cervus canadensis roosevelti*) and black-tailed deer (*Odocoileus columbianus*), anadromous fish, and tan bark oak (*Lithocarpus densiflorus*) acorns, which are the most nutritious of all acorn varieties in California (Baumhoff 1978).

Archaeologists have traditionally reduced environmental patchiness to four major ecological zones: (1) the coast, offshore rocks, and adjacent beaches; (2) estuaries, including river mouths, coastal lakes, and lagoons; (3) rivers (which flow through the Redwood Belt and Oak-Woodland sub-regions); and (4) the mountainous interior uplands (Table 1).

While the overall region provided abundant and varied edible plant and animal species, each ecological zone is associated with specific taxa, and the related subsistence activities (e.g., shellfish gathering, salmon fishing,

hunting, acorn gathering) would have been emphasized during certain times in the seasonal round, and at certain times in history.

The sites studied here are located along the Smith River in the Redwood Belt, a distinct environmental zone particularly rich in anadromous fish and terrestrial resources. Resources associated with the coast, estuaries, and oak woodlands could be accessed within a one-day walk or canoe ride.

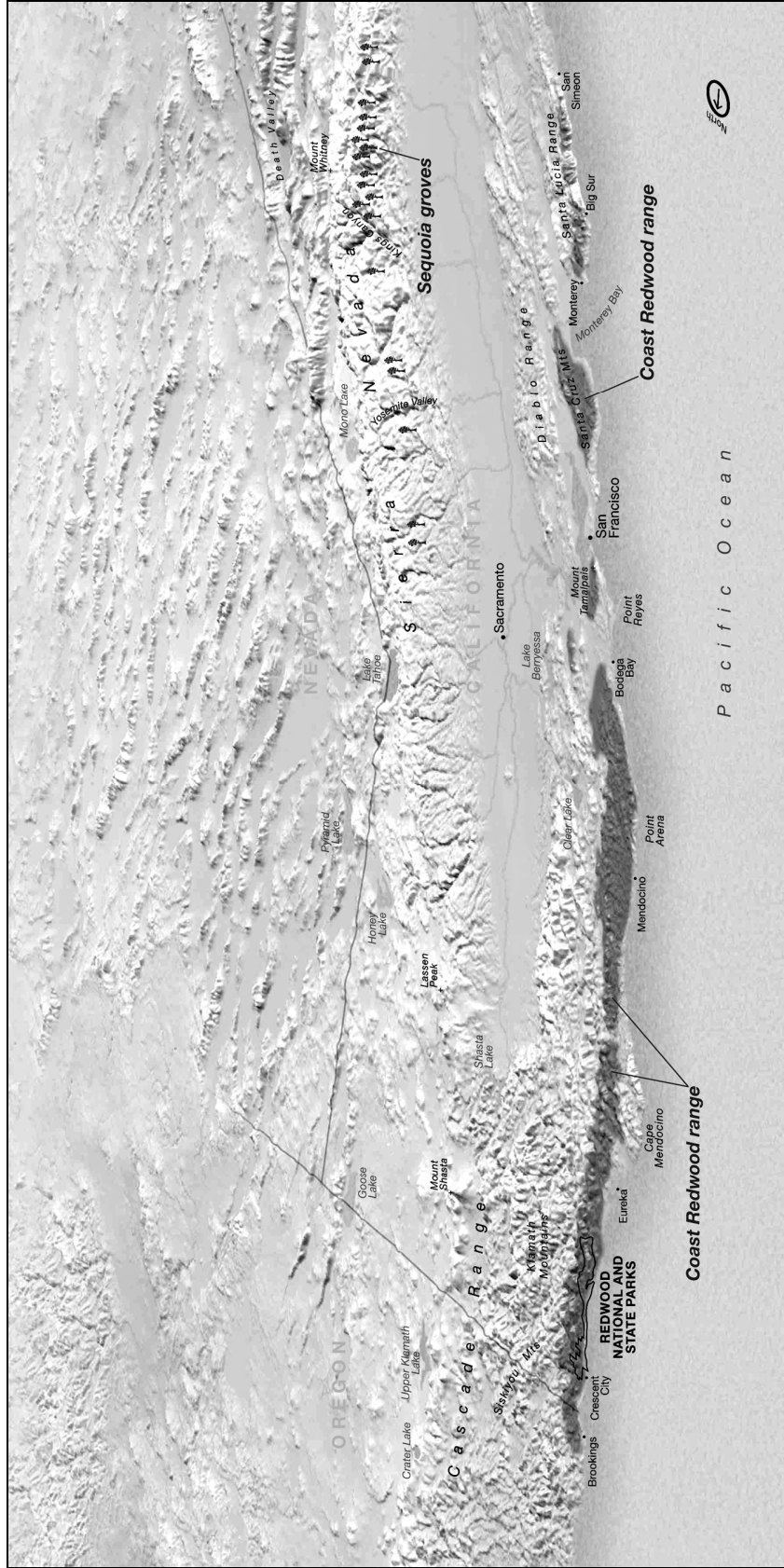
Table 1. Major Ecological Zones in Northwestern California and their Attributes.

ENVIRONMENTAL ZONE	DESCRIPTION	CLIMATE	DOMINANT VEGETATION COMMUNITIES	MAJOR SUBSISTENCE RELATED TAXA
Coast	Beach and rocky shore along Pacific Coast	Mediterranean; coastal rainforest	Coastal scrub and grasses; low elevation forest (redwood)	Sea mammals Surf fish Shellfish Pelagic fish
Estuary	Brackish water river mouths, remnant coastal lakes and lagoons	Mediterranean; coastal rainforest	Coastal scrub and grasses; low elevation forest (redwood)	Sea mammals Waterfowl Anadromous fish Camas
River: Redwood Belt	Section within north-south strip of redwood forest	Mediterranean; coastal rainforest	Low elevation forest (redwood, Douglas fir, tan oak)	Anadromous fish Acorns, berries
River: Oak-Woodlands	River section within Oak-Woodland forest east of Redwood Belt	Continental; more temperature extremes	Montane forests (tan oak, Oregon oak, madrone)	Anadromous fish Acorns, berries Elk, deer
Uplands	Non-riverine Klamath mountains	Continental; more temperature extremes; winter snow above 1,200 meters	Montane and subalpine forests (tan oak, Oregon oak, madrone)	Acorns, berries Elk, deer Roots and shoots

Redwood Forest

Along the north coast, a narrow (20-60-kilometer) strip of redwood forest is present from southwest Oregon to Monterey County (Figure 2). Redwood forest is an extremely tall, dense, needle-leaved forest dominated by coast redwood (*Sequoia sempervirens*), Douglas fir (*Pseudotsuga menziesii*), and tan oak (*Lithocarpus densiflorus*) on upper slopes. The forest is limited to areas along the coast and lower river valleys where maritime climatic conditions prevail. To the east, coast redwood is limited by the underlying bedrock of the Klamath Mountain ultramafics. The redwood forest north of the Eel River watershed is very similar to northern temperate rainforests of the Olympic peninsula in Washington state. Steep slopes, thin soils, and summertime winds sweeping over the King Range have caused a large gap in the forest south of the Eel River where mixed evergreen forests predominate. South of this gap the redwood forest is significantly different. Here coast redwood mixes with Pacific madrone (*Arbutus menziesii*), tan oak, Douglas fir, and bay laurel (*Umbellularia californica*).

Redwood predominates on lower slopes and stream terraces, where they tend to mix with western hemlock (*Tsuga heterophylla*) and Sitka spruce (*Picea sitchensis*) on alluvial flats. Old growth redwood forest stands can be quite dense, with little sunlight reaching below forest canopies. Undergrowth is low, dominated by forbs, berries, small bushes, and trees. Understory taxa includes salal (*Gaultheria shallon*), coast rhododendron (*Rhododendron*



From the National Park Service.
 Figure 2. Present-day Range of Redwood (*Sequoia sempervirens*) Forest in North America.

macrophyllum), thimbleberry (*Rubus parviflorus*), poison oak (*Toxicodendron diversilobum*), and huckleberry (*Vaccinium parvifolium*). In some areas the ground is covered with ferns, especially the western sword fern (*Polystichum munitum*; Sawyer 2007:279-280).

Topographic diversity and dramatic elevation changes characterize the geology of the study area. Elevations range from sea level on the coast to 6,411 feet at Bear Mountain. The highest elevations are found on the eastern edge of the Smith River watershed in the rugged Klamath Mountains.

The Coast and Estuary

The coastal strip and estuary are situated on an ancient sand dune complex with a complex geological history. Tectonic uplift, seismic activity, sea-level rise, fluvial deposition, and sediment or eolian erosion has resulted in the creation of a varied landscape which, over time, has produced several different ecological communities or micro-environments, including extensive wetlands habitats (including lakes, ponds, sloughs, and marshes), ocean beaches, river, open and vegetated sand dunes, and wooded ridges (CA State Parks 2001).

At the end of the Pleistocene (about 10,000 years ago), Lake Earl is believed to have been the former mouth of the Smith River. In the more recent past, the Smith River flowed south along *Yontocket* slough when inundated, spilling into Lakes Earl and Tolowa (or Lake Talawa), which naturally breeched into the Pacific Ocean. Currently, breaching is facilitated by moving the sand dune barrier between the Pacific Ocean and Lake Tolowa using mechanical equipment. Numerous creeks, springs, and seeps run into Lakes Earl and Tolowa, which are linked by a narrow channel. The Lakes form an estuarine or coastal lagoon system, and water salinity can be quite high, particularly in locations close to the coast and at times when the lake is breached.

This landscape supports a wide variety of flora and fauna. Fish species include an array of surf, rocky-shore, estuarine, pelagic, and fresh-water fish species. The fishery includes salmon and steelhead in the Smith River estuary, cutthroat trout in Lake Earl, and bass and crappie in Dead Lake. A diverse number of shellfish species is available on the beach, rocky coast, and estuarine settings. Lakes Earl and Tolowa are a stopover on the Pacific flyway for thousands of migrating waterfowl. Birds include the peregrine falcon (*Falco peregrinus*), mud hens or American coots (*Fulica americana*), the Canada Aleutian goose (*Branta canadensis leucopareia*), and many other species of ducks, geese, and swans. Marine mammals include California sea lion (*Zalophus californianus*), northern fur seal (*Callorhinus ursinus*), harbor seal (*Phoca vitulina*), sea otter (*Enhydra lutris*), and gray whales (*Eschrichtius robustus*), the latter of which migrate from the Arctic to Baja California in the summer months. Offshore rocks support major Steller sea lion (*Eumetopias jubatus*) breeding grounds. Terrestrial fauna consist of Roosevelt elk, deer, coyotes (*Canis latrans*), rabbit (*Sylvilagus* sp.), raccoons (*Procyon lotor*), rodents, and reptiles.

The Smith River Watershed

The Smith River is a relatively short watershed, extending approximately 32 air miles inland from the Pacific Coast. Mean annual runoff, concentrated in winters, is approximately 82 inches per year, though this figure can be significantly higher in flood years which tend to occur on a cyclical basis (Barston 2007). The head of the Smith River is

located in the rugged Siskiyou mountains, flowing first through the Oak Woodland mixed hardwood zone and Klamath mountains, then west through an approximately ten-mile-wide Redwood Belt, and finally through a four-mile-wide flat coastal strip where it meanders for approximately eight miles before emptying into the Pacific Ocean.

The watershed takes on different characteristics in each of these zones. The watershed is extremely steep and divided, particularly in the eastern mountains. Overall, more than 40% of the Smith River drainage has slopes over 50% (Table 2),

In the Oak Woodland Zone, where the terrain is quite rugged and mountainous, there are few flats and the Smith and its tributaries are quite narrow. The River widens and becomes less volatile in the less mountainous Redwood Belt, where there are more gravel bars and riffles. Finally, in the flat coastal strip, the river is characteristically wide and meandering and, as a result, has produced an extensive wetlands habitat (including a number of number of sloughs, marshes, remnant lakes, and ponds).

Table 2. Area of the Smith River Watershed in General Slope Classes.

PERCENT SLOPE	PERCENT OF DRAINAGE
0-50%	59.7%
51-70%	28.2%
Over 70%	12.1%

Notes: Data from California Department of Fish and Game (1980:Table 12), cited in Barston (2007).

The Smith River-Redwood Belt

The archaeological sites described in this report are located in the Smith River-Redwood Belt, a distinct ecological zone within the study area with a particularly rich anadromous fish resource base (Figure 3). The sites are situated along terraces above the Smith River at elevations of about 50 meters above sea level.

This zone encompasses a section of the Smith River which flows through the narrow north-south trending belt of Redwood forest, extending from west-central California to southwestern Oregon (see Figure 2). In addition to old growth and secondary growth Redwood, the Smith River-Redwood zone supports Douglas fir, tan oak, western hemlock, and Western red cedar. Western red cedars are much larger and more numerous in the northern Pacific Northwest, and they were the primary house building and woodworking source used by northern Pacific Northwest ethnographic groups, while Redwood trees were used in similar ways by northwestern California Native Americans.

Within the Smith River-Redwood Belt, the most important subsistence-related taxa were anadromous fish (especially chinook, coho, and steelhead salmon), acorns, Roosevelt elk, and deer. Other terrestrial fauna include coyotes, rabbit, raccoons, rodents, brown bears, and mountain lions. Birds include the peregrine falcon, and many species of ducks, and geese. The Smith River provided an important corridor through the Redwood belt, which is essentially a resource-poor “food desert” in non-riverine forested areas.



View towards the east.

Figure 3. Study Area: The Smith River-Redwood Forest Environmental Zone at Jedediah Smith State Park.

The Smith River Salmon Fishery

Anadromous fish were a primary staple of northwest California native groups. A wide variety of fishing methods and implements were used, from simple harpoons to communal weirs. However, most fishing was conducted by individuals and small households, while community-level pursuits (i.e., weirs) were relatively uncommon.

There is a great deal of fish species variability in river watersheds which is largely linked to season and location within the watershed. Above river mouths most species are anadromous, which historically were available during much of the year (Table 3), though fall runs were the most productive. Important species include king or chinook salmon (*Oncorhynchus tshawytscha*), silver or coho salmon (*O. kisutch*), chum salmon (*O. keta*), steelhead (*O. mykiss*), cutthroat trout (*O. clarki*), Pacific lamprey (*Entosphenus tridentatus*), white sturgeon (*Acipenser transmontanus*), and eulachon or candlefish (*Thaleichthys pacificus*). All northwest California streams had fall-run king salmon, silver salmon, and steelhead trout, though only the Smith, Klamath, and Trinity Rivers had a spring run of king salmon as well (Baumhoff 1963:174).

Steelhead are the most abundant species, and due to their jumping and swimming abilities, are found in higher streams and tributaries than other anadromous species. Chinook salmon, found on main streams and larger tributaries, are the largest fish in terms of body size and are also the fattest, particularly in lower water courses early in their spawning cycles. Coho are less agile than other anadromous fish and are found only on low gradient

tributaries. Less important species include Chum, which are small and have highly variable runs, and Coastal Cutthroat, which are present for many months of the year but are only available in estuaries (Barston 1997, 2007).

Table 3. Upstream Migration Timing of Select Anadromous Salmonids in the Smith River Watershed.

SPECIES	STOCK	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Chinook	Fall Runs*	■	■								■	■	■
	Spring Run				■	■	■	■					
Coho	Yearling Smolt	■										■	■
Chum												■	■
Steelhead	Winter Run	■	■	■								■	■
	“Blue Backs”			■	■								
	Spring Run				■	■	■	■					
Cutthroat					■	■	■	■	■	■	■	■	

Notes: * In three distinct pulses representing three genetically distinct “races” of Chinook. (from Barston 2007:75).

Climate

Regional climate is characterized by cool wet winters and mild dry summers. In general, climatic variation is linked to distance from the coast and elevation. The coast and lower elevations are characterized by a mild Mediterranean pattern, while interior upland areas have a more variable montane oceanic climate. Ninety percent of annual rainfall is concentrated from the months of October to April, with annual averages of 65 inches on the coast, to 94 inches at Gasquet, to more than 150 inches in the high elevation settings of Ship Mountain and Bear Basin (Barston 2007; Winston and Goodridge 1980). In the winter, rainfall turns to snow above 4,000 feet. Fog keeps temperatures cool in the mornings, particularly in the summer along the coast. On the coast the average summer high is 66 °F, while the winter high averages 55 °F. Interior settings are more extreme, with summer highs 10 to 20 degrees hotter and winter highs averaging 5 to 15 degrees colder than the coast.

Paleoenvironment

Temporal variation in climate was often dramatic, and is tied to the distribution and composition of plant and animal communities, fire regimes, and sea surface temperature. Geomorphic landscapes also evolved through time. Tectonic activity, coastal subsidence, fluvial deposition, and flooding are processes that can form or erase landforms; in many cases such dynamics have had profound effects on archaeological site preservation (e.g., Fitzgerald and Ozaki 1994; Minor and Grant 1996).

Through time, vegetation communities may change composition, expanding or contracting along elevation gradients in response to major climatic shifts, though local fine-grained analyses indicate that these dynamics are quite complex and can vary considerably from region to region. Offshore sediment cores (Barron et al. 2003; Heusser et al. 2000)

provide a record of how coastal conditions and coastal forests changed through time via a series of maritime climate proxies (diatoms, alkenones, pollen, CaCo₃, and total organic carbon). Terrestrial vegetation composition and climatic conditions have been reconstructed through sedimentary pollen and charcoal sequences taken from montane lake cores at Bolan Lake in the Siskiyou Mountains (Briles et al. 2005), Bluff Lake and Mumbo Lake in the eastern Klamaths (Daniels et al. 2005; Mohr et al. 2000), Twin Lakes in the southern Siskiyou (Wanket 2002), and 13 lakes and other localities in the North Coast Ranges and adjacent areas (summarized in West 1993).

Late Pleistocene (21,000-11,600 cal BP)

The Late Pleistocene begins with the period of maximum extent of glacial ice sheets, known as the Last Glacial Maximum (or LGM; 21,000-18,000 cal BP). Mean temperatures during the LGM were approximately 5.8 ± 1.4 degrees Celsius cooler than today (Schneider von Deimling et al. 2006). The Klamath Mountains were covered with ice sheets at high elevations, extending down some river valleys to as low as 1,020 meters above mean sea level (Sharp 1960). Sea levels were approximately 120 meters below their present-day levels, and ancient coastlines were located significantly further west, by about 30 kilometers. Modern estuaries had not yet formed, as rivers continued farther west along the continental shelf before emptying into the Pacific Ocean.

A gradual warming trend begins after the LGM. Deglaciation caused ocean levels to rise as much as 80 meters between 14,000 and 7000 cal BP. Wetter and warmer conditions are related to the transitioning of inland montane forests from subalpine parkland species typical of colder and dryer conditions (including sagebrush, pine, spruce, cedar, and mountain hemlock), to pine and fir forests (with oaks expanding in some areas) between 15,000 and 11,000 cal BP (Briles et al. 2005). With river systems bearing high amounts of runoff, a great deal of coarse sediment, including cobbles and boulders, was carried into lower drainage basins, and torrential flows likely “triggered catastrophic landslides and debris flows in the region,” blocking river channels for brief periods of time (Meyer 2008; Stone and Vasse 1968). Extensive erosion of the uplands triggered the formation of depositional landforms at low elevations, including floodplains, river terraces, debris fans, and the expansion of estuarine habitats, well into the Holocene (Meyer 2008).

The post-LGM warming trend, however, underwent a series of oscillations, one of which is known as the Younger Dryas (12,800-11,600 cal BP), when conditions abruptly returned to cold and dry glacial climatic conditions. In the North Coast Ranges, oaks had been increasing their range and number since the LGM, but during the Younger Dryas, the trend was briefly reversed, with pines increasing at the expense of oaks (West 2001). At Twin Lakes in the Siskiyou Mountains, there are large-scale fire disturbances, and montane and subalpine taxa such as fir and mountain and western hemlock abruptly disappear at 12,000 cal BP, events likely related to the Younger Dryas (Wanket 2002).

Early Holocene (11,600-8200 cal BP)

During the terminal Pleistocene-Early Holocene transition, global climate resumed the warming trend that began after the LGM. Sea surface temperatures measured by alkenones have two high peaks in the beginning of this period (Barron et al. 2003). Pollen sequences document increases in alder, pine, and redwood, and decreases in alder, ferns, and herbs at low elevations—vegetation changes consistent with warming and drying. Overall,

inland forests during the Early Holocene are “composed of remnants of full glacial age open pine woodlands, chaparral, and grasslands with isolates of communities that later developed into present-day associations” (West et al. 2007). Pine, oak, and cypress forest dominate in montane settings between 11,000 and 6000 cal BP (Briles et al. 2005), while North Coast Ranges remain open pine forests with fir (West 1993).

Warm and dry conditions over the course of the Early to Middle Holocene are associated with a reduction in runoff and the ability of streams to transport large coarse sediments. Rivers began to coalesce into singular streams and deepen, as the “pace of channel down-cutting (vertical incision) through outwash deposits” accelerated (Meyer 2008).

Middle Holocene (8200-3200 cal BP)

During the Middle Holocene, continental and maritime conditions are marked by a gradual shift to cooler winters. Sea surface temperatures are one to two degrees Celsius cooler than both the Early and Late Holocene (Barron et al. 2003). The pace of sea-level inundation slows, with sea levels rising only about eight meters total between 7000 and 4000 cal BP, which allowed “sedimentation to keep pace with inundations, and permitted the formation of extensive dunes and tidal marshes along the coastal plain” (Meyer 2008).

In the Klamath Mountains, pines and oaks took over areas where redwood and cedar were once common. In the North Coast Ranges, oak pollen peaks during the mid-Holocene. Oak forests were generally more expansive, being found at higher elevations than today (West 1993; West et al. 2007). Around 5200 cal BP, coastal redwood and alder begin a steady rise, suggesting an increase in effective moisture, and possibly the “development of the North Coastal temperate rainforest” (Barron et al. 2003). Fire frequency peaks at Bolan Lake at 7000 cal BP, while at about 4800 cal BP there is a marked decrease in fire events, possibly associated with open vegetation communities and consequent fuel load reduction (Mohr et al. 2000)

Late Holocene (3200 cal BP-present)

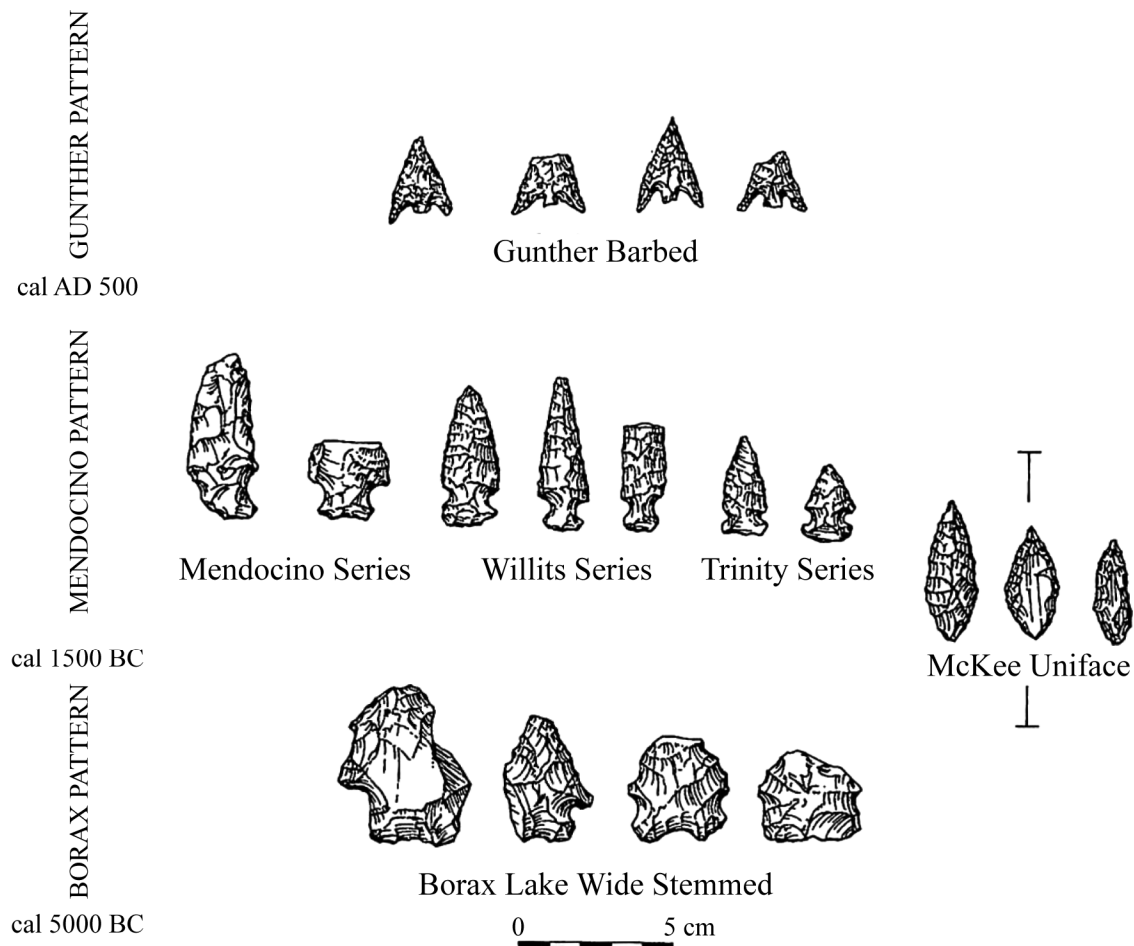
Fall and winter sea surface temperatures began to warm again around 3200 cal BP, eventually stabilizing to modern levels (Barron et al. 2003). By the Late Holocene, vegetation communities have generally reached their modern state. In montane settings, pine and fir dominate, while fir increases around 2,000 years ago (Briles et al. 2005). Alternating changes in the amount of redwood and alder versus pine pollen in coastal forests are indicative of cyclical, rapid changes in effective moisture and seasonal temperature, associated with enhanced El Nino-Southern Oscillation Cycles (Barron et al. 2003).

The Medieval Climatic Anomaly (1300-700 cal BP), also known as the Little Altithermal, is part of a globally recognized climatic anomaly in the Late Holocene, associated with an unusually warmer and/or drier climate. Droughts were common worldwide during this time, and were likely devastating in arid areas. In northwest California, a notable peak in fire frequency occurs at 1000 cal BP, likely associated with drought conditions (Mohr et al. 2000). In coastal forests, redwood and alder decline around 700 cal BP, but recover shortly thereafter (Barron et al. 2003). Overall, climatic changes appear to be part of the climatic cycling characteristic of the Late Holocene. Native burning to increase flora and fauna habitat and quality increased the mosaic-like quality of present-day forests (Anderson 2005).

ARCHAEOLOGICAL CONTEXT

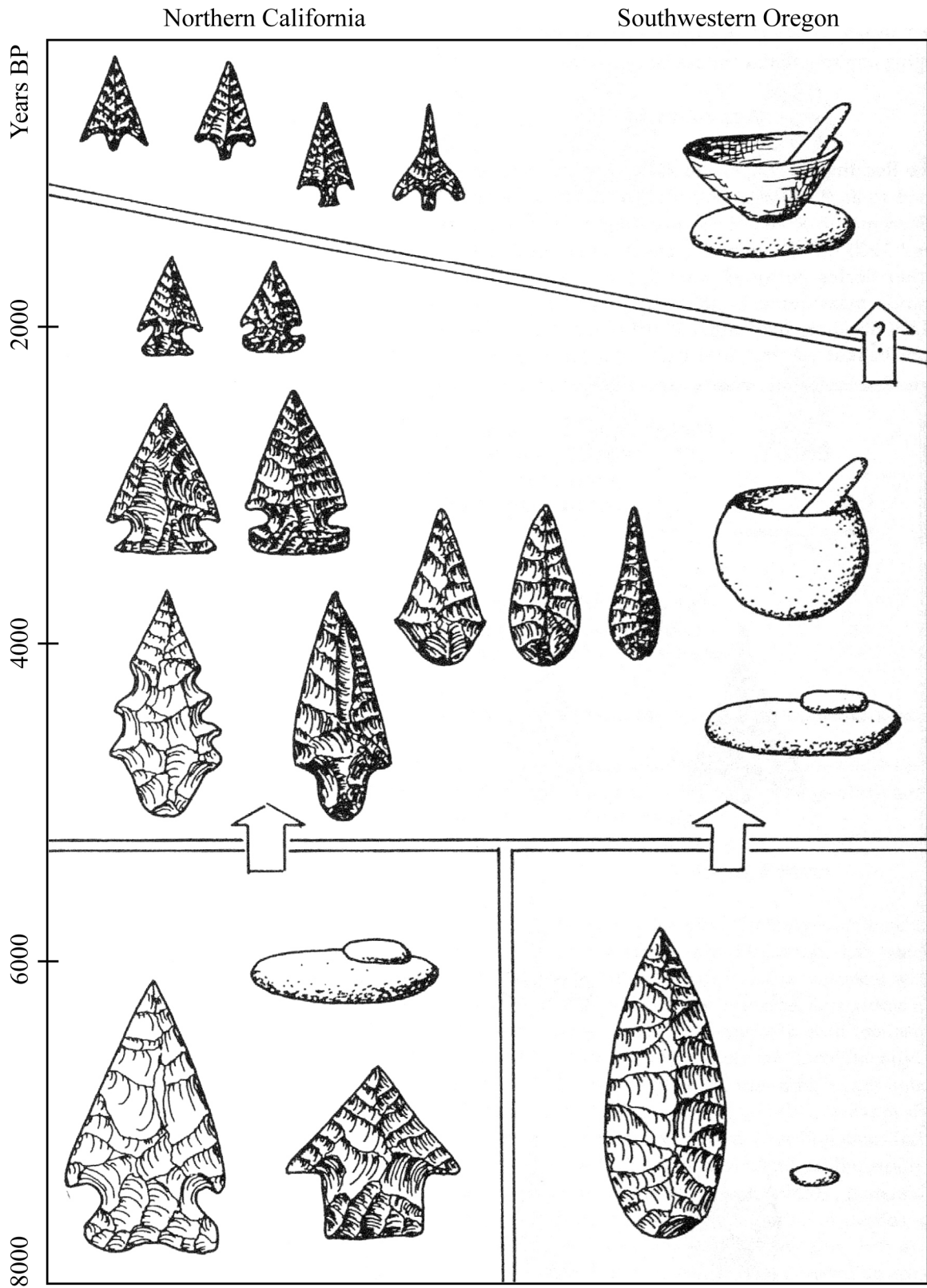
Very little is known about human occupation of northwestern California and southwestern Oregon during the Pleistocene-Holocene transition. After 10,000 cal BP, the record is more well-defined. In northwestern California, temporal units include the Borax Lake Pattern (10,000-4500 cal BP), the Mendocino Pattern (4500-1500 cal BP), and the Gunther Pattern (post-1500 cal BP) (Fredrickson 1984; Hildebrandt 2007; Hildebrandt and Hayes 1993; Hildebrandt and Levulett 2002; Figure 4). The Contact Period as a historical unit commences at 1850-1852, during the Gold Rush of the northwestern mines which marked the first large wave of settlers into the region.

Archaeologists have recognized similar time periods and adaptive modes at sites postdating 5000 cal BP in southwestern Oregon (c.f. Aikens 1993; Clewett and Sundahl 1990; Schreindorfer 1985; Figure 5). Convincing Borax Lake sites have not been found in Oregon. Early sites in southwestern Oregon are part of the Glade Pattern, which begins around 9000 cal BP. Also known as the Cascade Pattern or Marial Phase, the terminal date of the Glade Pattern is the subject of some controversy, but is generally set around 5000 cal BP.



From Hildebrandt and Levulett (1997:306).

Figure 4. Temporally Diagnostic Projectile Points from Northwest California.



From Clewett and Sundahl (1990:43).

Figure 5. Northwest California and Southwest Oregon Chronological Sequences.

Late Pleistocene-Early Holocene (>9000 cal BP)

Debate over the role of coastal migrations in the peopling of the New World has focused on the southern California coast where there is ample evidence of human settlement as early as the late Pleistocene. As an ice-free corridor was likely open along the Pacific coast by 14,000 cal BP (Dixon 2001; Mandryk et al. 2001), exploitation of coastal resources may have been a critical component of early colonization. Well-publicized archaeological discoveries from the Channel Islands dating to the Late Pleistocene (e.g., Erlandson et al. 2011; Jones 1991, 1992; Rick et al. 2001) seems to support the view that coastal environments are highly valuable to hunter-gatherers “since it is expected that colonizing populations are free to choose the most optimal resources available” (Jones 1991:1). Following the assumption that coastal resources rank high and that the coast and estuaries are logically the primary locations which hunter-gatherers would exploit, several scholars have proposed that the antiquity of settlement in northwestern California may be much greater than has been revealed in the archaeological record (Davis et al. 2004; Erlandson et al. 1998; Fitzgerald and Ozaki 1994; Gmoser 1993; Jones 1991, 1992; Minor and Grant 1996; Punke and Davis 2006). Pointing to the region’s high resource potential, these researchers contend that early sites have not been discovered due to limited excavation and poor site visibility caused by tectonic subsidence and Holocene sea-level rise. Several researchers predict that more fieldwork in coastal and estuarine settings would produce a vastly different understanding of northwest California prehistory, particularly if guided by geoarchaeological data to determine the location of ancient landscapes.

A contrasting view holds that the existing archaeological record is a fairly accurate reflection of prehistoric events (Hildebrandt 2007; Hildebrandt and Levulett 1997, 2002), pointing to the fact that despite intensive survey of the King Range National Conservation Area, an area minimally impacted by Holocene sea-level rise, no evidence of intensive coastal settlement was found predating 700 cal BP (Levulett 1985; Levulett and Hildebrandt 1987; Waechter 1990). The late coastal settlement of northwestern California is held to be the result of the region’s superior terrestrial productivity, which effectively lowered the value of coastal resources. According to these scholars, north coast foragers will focus earlier on interior resources such as salmon and acorns simply because they rank high here—that is, they are more productive than in southern California, which has superior coastal and inferior terrestrial resources. In sum, people did not move to the coast until they are forced to move to new resource patches due to population pressure.

There have been very few sites in the region that predate 9000 BP. As observed by Erlandson et al. 2008:2237), early dating sites in the southern Pacific Northwest Coast are exceedingly rare, with “no well-documented Early Holocene sites along the Washington Coast, only one from the Oregon Coast, and none from the northern California Coast.” The most conclusive evidence for early coastal occupation in the region north of Duncan’s Point Cave (CA-SON-348/H) in Sonoma County comes from Indian Sands (35CU67), a coastal bluff site in southwest Oregon that produced a radiocarbon date of $10,430 \pm 150$ ($12,300 \pm 490$ cal BP) at the base of an artifact-bearing level (Davis et al. 2004). Erlandson et al. (2008:2237), however, point out that “no clear evidence has been presented that the dated charcoal was cultural in origin or that the ^{14}C date was not affected by the old wood problem...until further evidence is presented to support the presence of a terminal Pleistocene component, we consider 35CU67C [the Indian Sands site] to be an Early

Holocene site.” In any case, early occupation at Indian Sands is likely related to chert quarrying (Davis et al. 2004), in contrast with a later occupation dating to the Late Holocene and is associated with shellfish procurement (Moss and Erlandson 1998).

Other evidence in southwest Oregon predating the Pleistocene-Holocene boundaries includes two fluted projectile points on the Rogue River (Minor 1985) and a Clovis point base recovered during test excavations at the Winchuck site (35CU176) on the mouth of the Winchuck River, just north of the California border, though its association remains unclear (Fagen 1990; Flenniken et al. 1992; Hemphill 1990).

Further south in interior northern California, Post Pattern/Western Pluvial Lakes tradition materials (fluted points and stone crescents) have been recovered at the Borax Lake site (CA-LAK-36) near Clear Lake in Lake County, but datable material that is unmixed with later components has not been found. Other sites at Clear Lake (CA-LAK-510) and Cache Creek (CA-LAK-1581) have produced obsidian with high micron readings, pointing to a Paleo-Indian occupation, but lack diagnostic artifacts and carbon for dating (DeGeorgey 2004; Hildebrandt 2007; White 2002). Isolated fluted points have been found near the coast in Mendocino County at site CA-MEN-1918 (Simons et al. 1985). Two Post Pattern stone eccentrics, possibly bear effigies, have been reported from CA-SON-977 at Laguna de Santa Rosa in Sonoma County (Origer and Fredrickson 1980:21; Moratto 1984:516, Fig. 10.14). A similar crescent has been recovered at an unnamed site near Bodega Head (Moratto 1984:516).

Borax Lake Pattern (8000-5000 cal BP)

Initially defined by Fredrickson (1973, 1974, 1984), the Borax Lake Pattern represents an extremely long, wide-ranging cultural tradition found at sites throughout the North Coast Ranges. The artifact type associated with the Borax Lake Pattern is the Borax Lake Wide-stemmed projectile point, a large dart point with a wide, square stem, which is often indented and basally thinned. Serrated bifaces, ovoid flake tools and edge-flaked tools are common, as are a wide range of domestic tools, such as milling slabs and handstones. Borax Lake sites likely reflect multi-activity base camps, where people employed a relatively mobile subsistence-settlement approach, focusing on a wide range of both plant and animal resources, but placing a minimal emphasis on storage (Hildebrandt 2007; Hildebrandt and Hayes 1983, 1993; Hildebrandt and Levulett 1997).

In the general region, numerous Borax Lake Pattern sites have been located in upland areas on Pilot Ridge and South Fork Mountains (cf. CA-HUM-573 and -367; Hildebrandt and Hayes 1983, 1993) and along the Trinity River near Big Bar (CA-TRI-1008; Sundahl 1992; Sundahl and Henn 1993). The earliest domestic structure discovered in northwestern California dates to 7945 cal BP during Borax Lake times (Fitzgerald and Hildebrandt 2002). The structure, identified in the uplands of Pilot Ridge, included three discrete rock clusters possibly representing post supports around the small remnant of a compact floor and associated milling and chipped stone tools. In contrast to the substantial rectangular plank houses of later time periods, the house was likely circular and was used as a less permanent shelter.

Borax Lake sites have also been found in interior settings along Clear Lake (White 2002) and at CA-MEN-1711, a site in the Mendocino mountains (Huberland 1989). These

southern sites might be older, according to obsidian hydration data, and generally lack milling gear, possibly reflecting “an earlier pre-Archaic hunting focus” (Hildebrandt 2007).

Borax Lake Pattern sites are rare in coastal settings. An important exception is CA-HUM-513/H, located near McKinleyville about 1.5 kilometers from the coast. Preliminary investigations at the site by Roscoe (1995) revealed an artifact assemblage consisting of both flaked and ground stone tools, but no evidence for marine resource use (e.g., no shellfish remains). Due to the widespread prairie and marshland habitats in the area, and the large number of projectile points and butchering tools found, Roscoe (1995) argued that the hunting and processing of large game (predominately Roosevelt elk) was likely a major activity at the site. Borax Lake Widestem points have not been found in southwestern Oregon, with the possible exception of site 35JA53, which is located just over the California border on the Applegate River, approximately 75 miles from the coast (Brauner and Nisbet 1983).

Glade Tradition (9000-5000 cal BP)

The Glade Pattern represents an extremely long tradition in southwestern Oregon that is a regional manifestation of the Northwest Coast-wide Cascade Pattern, which has been well defined at sites from the Columbia River Basin. Connolly (1986, 1988) originally proposed the subdivision to emphasize that Glade artifacts are found much later in the record in southwestern Oregon than in other parts of the Northwest Coast. Assemblages are dominated by leaf-shaped projectile points (foliates) and wide-necked stemmed points. Other characteristic artifacts include stone bowl mortars, hammer/anvil stones, edge-faceted cobbles, and a linear flake technology frequently expressed as “thick-bit” end scrapers. The Tradition is hypothesized to represent a terrestrially oriented subsistence strategy, with sites consisting predominantly of temporary seasonal camps occupied by small groups of highly mobile hunter gatherers (Connolly et al. 1994).

Glade Pattern sites have been excavated mainly on the Rogue and Coquille Rivers. According to Schreindorfer’s (1985) work at the well-dated Marial site (35CU86), there appears to be some temporal patterning of Glade Pattern point styles; serrated foliates are more common before 5500 cal BP, foliate points tend to be larger in earlier time periods, and there is an increase in associated stemmed and notched points through time. However, the dating of Glade Pattern foliates remains controversial. While some suggest a terminal date of ca. 3500-4500 cal BP (cf. Budy et al. 1986; Minor 1987; Pettigrew 1980, 1990; Pettigrew and Lebow 1987), others have argued that leaf-shaped points are found in Late Period sites and may represent a functional class of artifacts used for as long as 7,000 years (cf. Connolly 1986, 1988; Connolly et al. 1994; O’Neill 1989):

While chronological variation within the tradition may be observed (increased relative frequency of stemmed vs. unstemmed points in assemblages through time, increasingly distinctive shouldering on foliate points, decrease in the frequency of serrated vs. unserrated foliates, and decrease in overall size of otherwise morphologically similar points), there is clear continuity throughout the tradition recognized in conservation of projectile point form, and in persistence of other distinctive artifact types. [Connolly et al. 1994]

Connolly et al. (1994) includes the following sites and components as having post 3500 cal BP Glade assemblages: the PSG I component at Point St. George (CA-DNO-11), 2260 ±

210 BP (Gould 1972), the lower component at South Umpqua Falls Rockshelters 600 ± 50 BP (Minor 1987), and at the Stanley Site (35DO182; Connolly 1986).

Middle Holocene (Borax-Mendocino) Transition (6700-3300 cal BP)

As observed by Moss and Erlandson (1995:33), “the Middle Holocene (ca. 6700-3300 BP) represents a crucial temporal gap along much of the Pacific Coast.” This is certainly the case in northwestern California where few sites dating to this period have been identified and the timing and nature of the transition between Borax Lake Pattern and Mendocino Pattern is poorly understood. For example, Hildebrandt (2007:91) points out that in the uplands of Pilot Ridge “Hildebrandt and Hayes (1993) could not identify archaeological assemblages falling between the Borax Lake and Mendocino Patterns, so they (probably incorrectly) pushed the age of the Borax Lake Pattern forward in time.” Hildebrandt (2007:91) goes on to forward two (not mutually exclusive) possibilities, first, that “a Middle Holocene archaeological record actually exists but is not being recognized,” or second, that “some of the problem may stem from the xeric climate conditions of the Middle Holocene...which may have negatively impacted the anadromous fishery and other important resources, perhaps causing a dispersal of human populations in this interval.”

Diagnostic artifacts that date to this interval include the McKee Uniface, which in northwestern California is commonly found at sites with “Oregon series” points. McKee Unifaces are thick leaf-shaped unifaces, originally defined by Baumhoff (1985), and appear to date between 5000 and 3000 cal BP, corresponding to the late end of the Borax Lake Pattern and continuing into early Mendocino Pattern assemblages. Large serrated lanceolates from Pilot Ridge sites are referred to as “Oregon series” points by Hildebrandt and Hayes (1983, 1993). Though they lacked a datable assemblage at Pilot Ridge, as observed by Greg White (personal communication), the points are identical to those found at sites along the Rogue and Applegate Rivers in southwestern Oregon. At the well-dated Marial site (35CU84), they are commonly found in deposits dating to between 5500 and 2500 cal BP, with a peak at 4000 BP. Finally, Squaw Creek series points are large contracting-stemmed projectile points which also date to this period (Basgall and Hildebrandt 1989).

Mendocino Pattern (5000-1500 cal BP)

The Mendocino Pattern in northwestern California dates to between 5000 and 1500 cal BP. Most sites appear to represent seasonal camps of highly mobile hunter-gatherers with a terrestrially focused diet. Time-sensitive artifacts for the Mendocino Pattern include corner and side notched darts of the Mendocino and Willits series. Other artifacts found in Mendocino assemblages include handstones, milling slabs, flake and cobble tools, and less commonly, cobble mortars and pestles (Hildebrandt 2007).

North of Mendocino County, coastal Mendocino Pattern sites generally date to later than 2500 cal BP and include Humboldt Bay (CA-HUM-351; Eidsness 1993), sites along the King Range (CA-HUM-351; Hildebrandt and Levulett 2002; Levulett 1985), and the lower component at the Point St. George site (CA-DNO-11) dating to 2260 ± 210 BP (Gould 1966a, 1972). In the uplands at Pilot Ridge, Borax Lake multi-activity sites were replaced by specialized Mendocino Pattern hunting camps, a change that led Hildebrandt and Hayes (1993) to hypothesize that village sites had emerged at around 3500 BP in lowland riverine settings. The settlements were supported by the intensive use of salmon

and acorn; an adaptive shift made possible by the development of sophisticated extractive technologies (e.g., fish weirs); and the establishment of permanent storage facilities (e.g., plank structures).

Gunther Pattern (1500-150 cal BP)

The Gunther Pattern is marked by a dramatic increase in site frequency, the appearance of sedentary villages along the coast of California and rivers in southwest Oregon, and a general increase in cultural elaboration and artifact diversity. Several major changes occur in the coastal archaeological record of northwestern California, particularly at later Gunther Pattern sites from Humboldt Bay north, including CA-DNO-11 at Point St. George (Gould 1966a); CA-HUM-129 at Stone Lagoon (Milburn et al. 1979); CA-HUM-118 at Patrick's Point (Elsasser and Heizer 1966); and CA-HUM-169 at Trinidad (Elsasser and Heizer 1964). Use of upland locations appears to be marginal during this time, sites being visited relatively infrequently for hunting and gathering purposes (Hildebrandt and Hayes 1993). In southwestern Oregon, Late Period sites are very similar to those of northwestern California, though the time period is sometimes separated into an interior pattern (the Siskiyou Pattern, beginning ca. 1700 cal BP) and a coastal pattern (the Gunther Pattern, ca. 1100 cal BP). Key Late Period sites in southwestern Oregon include 35SC5 at Bandon (Cressman 1952), Gold Hill (Cressman 1933a, 1933b), 35CU61 at Pistol River (Heflin 1966), and 35CU37 at Lone Ranch Creek (Berryman 1944).

Assemblages include high frequencies of straight to contracting-stemmed Gunther series projectile points. Late triangular arrow points include Gunther series (Gunther Barbed, Gunther Variant, and Gunthersnake), Rattlesnake Corner Notched, Corner Notched and Desert Side Notched points. Gunther Barbed points have straight to contracting stems and characteristic long barbs or tangs which are usually lower than the base (Treganza 1958:14). Gunther Barbed points are widely distributed throughout northern California and Oregon and are found as far north as the Columbia River, Washington, and as far south as Tulare Lake in California's Central Valley. This type dates to as early as 1500-1800 cal BP, but shows an increase in frequency after this time, and were used up to the Contact Period (Treganza 1958; Justice 2002). Though work remains to be done to refine the Gunther Series chronology (Jaffke 1997), Gunther barbed points seem to have longer and more defined barbs later in time Gould (1966a). Gunther Variant points have longer length-to-width ratios than Gunther Barbed points and do not have long barbs or tangs. This type fits Treganza's (1958) definition of an "ill-defined" barbed or tanged subtype and are similar to what Jaffke (1997) calls Early Variant Gunther Points, which have wide, long, and usually contracting stems with neck widths greater than 7.0 millimeters. Three of these points were recovered at CA-MEN-428B at MacKerricher State Park from a component with the following dates: 1500 ± 80 BP, 1680 ± 80 BP, and 1680 ± 100 BP (White 1989). Rattlesnake Corner Notched points are small corner notched points with a narrow neck width and straight-to-convex basal edges (Baumhoff 1985; White 1979:178) and are Late Period to Contact Period markers, probably appearing 900-600 years ago. North of Round Valley, Rattlesnake Corner Notched points are rare in areas where Gunther Barbed points dominate. Gunthersnake points resemble Gunther Barbed points but have an expanding base similar to Rattlesnake Corner Notched points. They are likely an intermediate form between the two points and may be a very Late Prehistoric to Contact Period marker for the area.

Jaffke (1997:103) introduced the subtype to address the range of variation he found in a sample of 445 late triangular points from Mendocino County. Observing that Gunthersnake and Rattlesnake points overlap in their distributions in Mendocino County, he hypothesized that the variant reflected technological influence from the Rattlesnake cluster.

Desert Side Notched points are small, triangular side notched points originally defined by Baumhoff (1957:10) and Baumhoff and Byrne (1959). They are found throughout Western North America, the earliest of which are approximately 800 years old from the Great Basin. Desert Side Notched points spread to northwestern California during the terminal Late Period and were in use through the Contact Period. While regionally rare, Desert Side Notched points are an excellent time marker for these periods.

In northwestern California, concave-based projectiles date from the Late Period to Contact Period. Following Gould's (1966a:56-57) observation that the ethnographic Tolowa distinguished these points based on size—the large points being tips for composite harpoons used in sea mammal hunting and the smaller points used as arrows—the size of concave-based points is often correlated with function (e.g., Milburn et al. 1979). The smaller points, however, may also have been used as harpoon tips for fishing or hunting small game (c.f. Bennyhoff 1950:299) and their presence in inland riverine sites suggests that they may be associated with salmon fishing (Lyman et al. 1988:84). Finally, although large concave-based points are associated with distant offshore marine mammal hunting and oceangoing canoes by Hildebrandt (1981, 1984) and Jobson and Hildebrandt (1980), Lyman et al. (1988) argue that this is unclear and that the points may have been used to hunt in nearshore environments.

Other representative Late Period artifacts include a large number of specialized woodworking tools used for the construction of permanent plank houses and canoes (e.g., adzes, mauls, and wedges) and ground stone (pestles, mauls, hammerstones, and mortars). Net sinkers are abundant at some sites, reflecting the use of stored nets for gill netting fish or capturing waterfowl. Polished stone artifacts are plentiful compared to earlier time periods, as are steatite bowls, which were used as grease-catchers usually for seal oil. Steatite was also used to fashion finely made pipes and pendants. Wealth items found in the archaeological record include zooform clubs and large obsidian bifaces. Miniature versions of both of these wealth items have been discovered in the Smith River area.

HISTORICAL CONTEXT

Direct Indian-white contact previous to 1850 was largely limited to the coast and limited by the northwestern California's inaccessibility and paucity of resources desirable to European-Americans. This is in stark contrast to the experience of central and southern California Indians, who had a much longer history of white contact (Hurtado 1988:123), where Spanish and Russian colonies were established as far north as Pomo Country in present-day Sonoma County. Until the Gold Rush, northwestern California indigenous groups largely maintained control over their ancestral territory. Waves of disease, however, did impact local populations to an extent that is not well understood.

This changed dramatically when the discovery of gold on the Trinity and Klamath Rivers inspired thousands of miners to emigrate to the region in the 1850s. The Contact or Late American Period was devastating to local Indian populations of the Northwest coast.

Disease

Although direct Indian-white contact came relatively late to northwestern California, local Indian populations suffered waves of disease which altered and reduced populations to an unknown extent (Erlandson and Bartoy 1996). Several oral accounts demonstrate that disease swept through the region as early as 300 years ago. Based on interviews with Tolowa elders in the early 1960s, Gould concluded that the village at Point St. George (CA-DNO-11) was abandoned due to a cholera epidemic in the 1700s to early 1800s. His informants told him that many people died of a painful stomach sickness which caused them to “pass blood,” symptoms characteristic of cholera (Gould 1966a:96-97). Cora DuBois’s informants described smallpox and measles outbreaks which hit the region in 1824 and 1836, respectively. Both were “very destructive” and “sweathouse practices intensified [the] danger...so that many of their once populous villages [were] left without a representative” (DuBois n.d.).

Early Direct Encounters: Explorers and Fur Traders (AD 1700s-1840s)

The Yurok village of *Tsurai* at Trinidad Bay is documented as the most frequently visited site by Euro-American explorers in northwestern California prior to the Gold Rush of the early 1850s, apparently because of its accessibility relative to other places along the north coast’s rocky shores (Heizer and Mills 1952). Humboldt Bay, for example, was generally avoided due to rough waters and to avoid direct conflict with the Wiyot (Raphael and House 2007:52).

Early encounters at *Tsurai* include landings at the village by Spanish naval officer Juan Francisco la Bodega y Quadra, in 1775, and British explorer George Vancouver, in 1793. Their diary entries represent the earliest written observations of north coast native people and lands (Heizer and Mills 1952). American- and Russian-sponsored ships also called at *Tsurai* when carrying European goods to trade for sea otter pelts during the Northwest Coast fur trade of the early 1800s (Heizer and Mills 1952).

Heizer’s 1949 excavations at *Tsurai* at Trinidad Bay (CA-HUM-169) and related documentary evidence revealed evidence of early encounters with traders, explorers, and Gold Rush miners dating between AD 1620 and 1916. Trade items such as iron swords, copper bracelets, and glass beads, along with other historic material were found in the historic component of the site along with artifacts identical to prehistoric types. There is evidence that historic contact changed the subsistence patterns of *Tsurai* villagers. For example, an increase in elk and deer bone suggests that hunting of these animals became more important, a development Heizer and Mills (1952:14-15) hypothesize is related to the introduction of guns, which would have been more effective in hunting of large land mammals than snares and the bow and arrow. Archaeological evidence of the use of guns (e.g., guns or associated ammunition such as bullet casings and cartridge primers), however, is not provided in the Heizer and Mills (1952) study.

Jedediah Strong Smith’s 1828 expedition is regarded as the first direct Euro-American contact with many northwestern California groups, including the Tolowa and Hupa (Davis 1989:369-370; Gould 1972:134-135). Smith led a party of 18 men and 300 horses in a quest to establish a trading post in the area, entering the region via

the Trinity River. He traveled through Hoopa Valley, then west to the coast, and then to the north into Oregon.

“The Time the World was Turned Upside Down”: The California Gold Rush (AD 1848-1854)

Once gold was discovered on the Trinity River in 1848, the riches of northwestern California were revealed to the outside world (Hurtado 1988:118). Visions of sudden wealth inspired thousands of miners to emigrate to the region. For local Indian populations, the Gold Rush era was a time of rapid and cataclysmic change. In the 1850s “the north became California’s dark and bloody ground” (Hurtado 1988:123).

Violent encounters commenced with the founding of major towns, including Eureka (1850) and Crescent City (1853). “Wars” of extermination took place throughout California, and “attacks on Indian villages by volunteer military companies or regular army units, and casual killings, were common until about 1870” (Heizer and Almquist 1971:27). Such violence amounted to officially sanctioned genocide (Madley 2009, 2011; Platt 2011:158-164.) The intent and attitude of the time was clearly stated by California Governor Peter H. Burnett in 1851:

That a war of extermination will continue to be waged between the two races until the Indian race becomes extinct, must be expected; while we cannot anticipate this result with but painful regret, the inevitable destiny of the race is beyond the power and wisdom of man to avert. [Heizer and Almquist 1971:26]

Native people were pursued by locally formed militias, which were subsidized through State and Federal governments. Although some of the massacres gained historical prominence (e.g., the massacres at Indian Island in Wiyot Bay, the “Burnt Ranch” massacre at *Yontocket* village in Tolowa country, and the Clear Lake Massacre of Pomo at Bloody Island), scores of people were killed throughout the region in smaller or less known encounters.

The devastation California Indians suffered in this era is well-documented and widely acknowledged (cf. Cook 1976; Heizer and Almquist 1971; Castillo 1978; Churchill 1997; Hurtado 1988; Kroeber 1961; Madley 2011; Norton 1979; Secret 2003). The massacres and upheaval of the 1850s are referred to by many Indian people as the Holocaust. The Tolowa call this “the time the world was turned upside down” (Reed 1999).

Despite the extreme upheaval, practically no archaeological studies have directly addressed this era. As noted by Lightfoot (2006:282), “in contrast with the wealth of information on indigenous encounters with European explorers and colonists, Native peoples essentially disappear from the archaeological literature with the advent of American colonialism.”

Reservations and Indenturement (1850s-1880s)

Other factors contributed to the decline of Indian populations during this time, including malnutrition, kidnapping, and forced servitude. Many native Californians in the northern counties were forcibly detained in reservations beginning in the early 1850s. Indian people were subjected to regular roundups in many places, and were forcibly removed to reservations including Klamath Reservation on the lower Klamath River, the Hupa

Reservation in Hoopa, Round Valley in Yuki territory, and the Siletz Reservation in southwest Oregon.

New settlements, mining activities, and the increasing numbers of ranching and farming operations constrained Indian people's access to traditional lands and resources. After the Gold Rush began, "the universal conversion of fertile valleys into farms, the widespread cattle ranching on the hills, and the pollution of the streams all combined to destroy the animal and plant species used for food. The transition to a white diet, although ultimately accomplished, was rendered difficult by economic and social obstacles. During the interim a great deal of malnutrition was present" (Cook 1976:347).

Forced labor was widespread and was legitimized in 1850 by the Act for the Government and Protection of Indians (Chapter 133, Statutes of California, April 22, 1850). According to Heizer (1974:219), between 1850 and 1863, as many as 10,000 Indian people were indentured or sold into "what can only be classed as a particular and local form of slavery." Citing the Statute (reproduced in Heizer 1974:220-226), Madley describes how this worked:

Under the act, children could, with consent of "friends or parents," be held and worked without pay until age fifteen (for females) or eighteen (for males). The act also empowered whites to arrest Indian adults "found loitering and strolling about," or "begging, or leading an immoral or profligate course of life." When a court received a "complaint" along these lines, court officers were required to capture and lease "such vagrant within twenty-four hours to the best bidder." Successful bidders could then hold and work their prisoners for up to four months without compensation. "Any white person" could also lease labor by visiting a jailhouse and paying "the fine and costs" for any "Indian convicted of an offence...punishable by fine." Because few Indians had access to sufficient funds, jails became low-cost labor suppliers. Finally, while the act stipulated that "forcibly convey[ing] any Indian from his home, or compelling him to work" was punishable by a fine of "not less than fifty dollars," it also read, "in no case shall a white man be convicted of any offence upon the testimony of an Indian, or Indians,"...Indians could thus be forced into unpaid work on trumped-up charges. [Madley 2011:312]

Young women and children were particularly vulnerable under this law. According to Cook (1976:61) as many as 3,000-4,000 Indian children were kidnapped during this time. Throughout this unprecedented period of emigration into California, males vastly outnumbered females, and with so few white women on the northern frontier, Indian women were sought after as domestic servants and/or for sex: "All Indians were at risk during the tumultuous 1850s, but women's chances for survival were measurably worse than men's. Brutal assaults, deadly diseases, and general privation killed women and left their communities' reproductive potential in doubt" (Hurtado 1988:188).

Resistance, Survival, and Revitalistic Movements

Native attempts at resistance were common, but typically led to retaliatory violence. In interior Humboldt County, the military had many forts and there were multiple skirmishes with Redwood Creek Indians, Mad River Indians, and Yeager Creek Indians.

Depending on the event, Indians were shipped off to Fort Gaston, Fort Humboldt, Smith River Indian Reservation, and Round Valley Indian Reservation. Many died in captivity. The Yurok participated in a revolt against settlers in 1855, the Red Cap War, which was successful for a time in stemming the flow of white settlement. The Yurok confronted intruders at a village on the south shore of Big Lagoon (*Opyuweg*), but again, this resulted in a massacre. Survival in many places depended on fleeing into hinterland areas far away from white settlements and mining centers.

Though many aspects of traditional life (such as major dances) vanished from public view so people could escape persecution and/or prosecution, they merely went underground and continue to this day. Despite the detentions and upheaval of the reservation period, Indian people maintained traditional lifeways to a remarkable degree. For example, a diary detailing the goings-on of life at Reservation Ranch, where many Tolowa were forcibly detained in the late 1800s, notes that the Indians “maintained a month-long salmon gathering, suggesting that effective organization of large-scale net fishing was something the Tolowa continued in captivity” (Collins 1998:44). Local newspapers also reported smelt fishing camps and crab harvests in the 1800s. As Collins (1998:44) puts it, the historical and archaeological evidence points to a “persistent effort on the part of the Tolowa people to carry on living as they had lived, in extended kinship-organized villages, with subsistence based on skilled fishing, gathering, and hunting.”

The Ghost Dance, a revitalistic movement or religion, spread into the area via the Siletz Reservation in the early 1870s (DuBois 1939). The Earth Lodge Cult and Big Head or Bole Maru religion are related revitalistic movements that took hold primarily in north-central California and in Pomo country in the southern North Coast Ranges beginning around this time. The Ghost Dance combined elements of traditional religion with Christianity and began after the Northern Paiute man Wodziwob (Grey Hair) received visions in the late 1860s indicating that native peoples could cleanse the world of evil and reunite the living with the dead by practicing the Ghost Dance. The Ghost Dance provided hope in a hopeless era. A return to pre-contact lifeways was greatly anticipated, but people became disillusioned as the prophecies were not realized. Although the Ghost Dance religion spread to other parts of the United States later, in the 1890s, most people in northwestern California had given up the Ghost Dance by this time.

Along the north coast, the Indian Shaker Movement, which began in Puget Sound in 1881, arrived among the Yurok in 1926, the Tolowa in 1929, and the Hupa in 1932. Although most popular in the 1930s and 1940s, people at Smith River had an active congregation in the 1960s (Gould 1966a:135), and there was a resurgence among the Yurok in the 1970s (Pilling 1978:148). The Shaker church in Smith River remains active to this day.

ETHNOGRAPHIC CONTEXT

Early documentation of northwestern California societies includes the journals of explorers and traders in the region (cf. Bodega 1775; Smith in Sullivan 1934; Vancouver 1793), newspaper articles (in particular Powers 1877), and accounts written by local historians (cf. Bledsoe 1881; Von Loeffelholz 1893). The largest corpus of work was produced by UC Berkeley ethnographers and linguists led by A.L. Kroeber who conducted fieldwork beginning at the turn of the twentieth century (cf. Driver 1939; Drucker 1937; DuBois 1932, 1936, 1939; Goddard 1903, 1904; Harrington 1931, 1932; Kroeber 1925,

1936; Kroeber and Barrett 1960; Kroeber and Gifford 1949; Waterman 1920, 1925). Additional ethnographic and ethno-archaeological writings were produced by a later generation of the influential Berkeley “school” (cf. Baumhoff 1958, 1963; Gould 1966a, 1966b, 1975, 1978; Swezey and Heizer 1993), which at the time dominated anthropological research in northwest California. As archaeologists commonly include an explanation of the origin of the ethnographic pattern, this corpus of work—often cited as providing the “baseline” of comparison—has been extremely influential in the development of regional historical models.

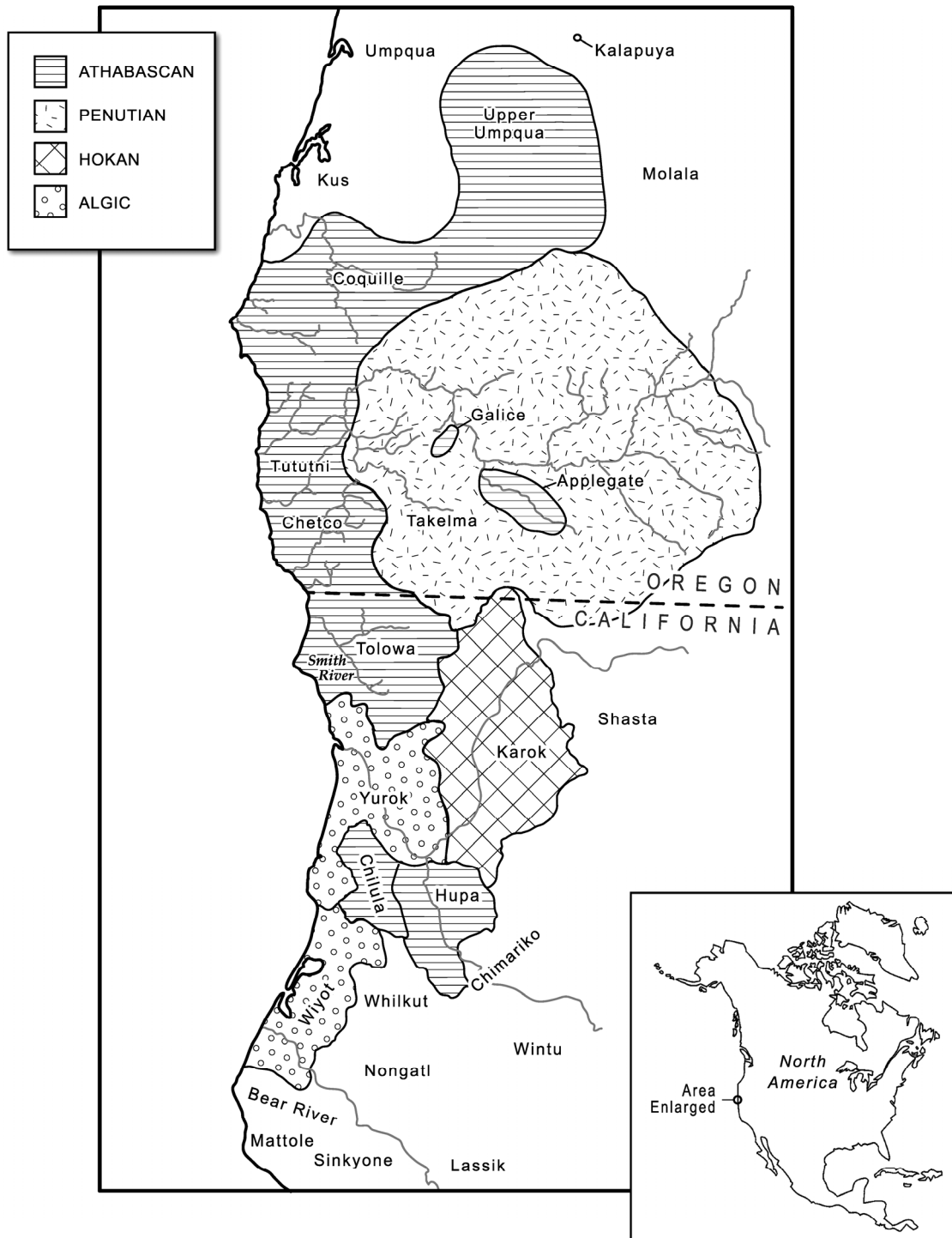
The various ethnographies are fairly consistent in their findings, though regional surveys (cf. Kroeber’s 1925 *Handbook*) are biased toward a “core area” of tribes consisting of the Yurok, Hupa and Karuk. Kroeber viewed northwest California culture to be at its height in this area, the “nucleus within the nucleus” being the Yurok (Kroeber 1925:6). Kroeber saw the Yurok as providing the most developed complex technology, arts and ceremonial life characteristic of northwestern California groups. Neighboring tribes, including the Tolowa, Wiyot, and Chilula had a “second order or degree in the civilization” (Kroeber 1925:7). The Mattole, Bear River, Nongatl, Sinkyone, and Coast Yuki were part of the “Marginal or Peripheral Northwest Area” (Kroeber and Barrett 1960). The southwestern Oregon Athabascans, including the Takelma, Chetco, Umpqua, Tutuni, Coquille, and Galice Creek shared a similar way of life and were also viewed as peripheral groups.

The following discussion focuses on groups who lived in plank houses and were classified by Kroeber (1925, 1939) as being part of the southern “province” of the Pacific Northwest Coast culture area (Figure 6). These groups, particularly those in and above Humboldt Bay to southwestern Oregon, and the land they occupied, bear clear cultural and ecological similarities to the groups of the north Pacific. Commonalities include residence within semi-subterranean plank houses organized in coastal and riverine villages, intensive and task-oriented subsistence pursuits, reliance on mass-capture technology and methods, and an emphasis on stored foods with high processing costs. Throughout the region, the household was the fundamental economic and social unit (Drucker 1983), and salmon was a key dietary staple.

Kroeber (1925) rightly showed that northwestern California was a unique Northwest Coast subarea. Compared to the northern and central Northwest Coast (from northwest Oregon to southwest Alaska), houses and households were smaller, political organization was extremely autonomous, property was owned by individuals (rather than groups), and resource intensification worked on a family level with no overarching political structure. Adding to these differences was the importance of acorns in the diet and the use of formal sweathouses, both distinctly Californian traits. As Kroeber put it, Northwestern California societies followed “the aims of the societies of the North Pacific coast with the mechanism of the societies of middle California” (Kroeber 1925:3).

Settlement and Houses

At contact, northwestern California supported relatively high populations of people who resided in semi-subterranean plank houses within permanent villages. Villages were occupied by the entire population for the majority of the year, though people would disperse to hunt, fish, and gather in temporary camps or other locations according to seasonal resource availability. The majority of villagers moved to productive resource patches at



Created by Wendy Masarweh. Shaded areas denote areas where “sweathouse group” is present.

Figure 6. Northwestern California Ethnolinguistic Groups.



From the Ericson Collection, Humboldt State University Library.

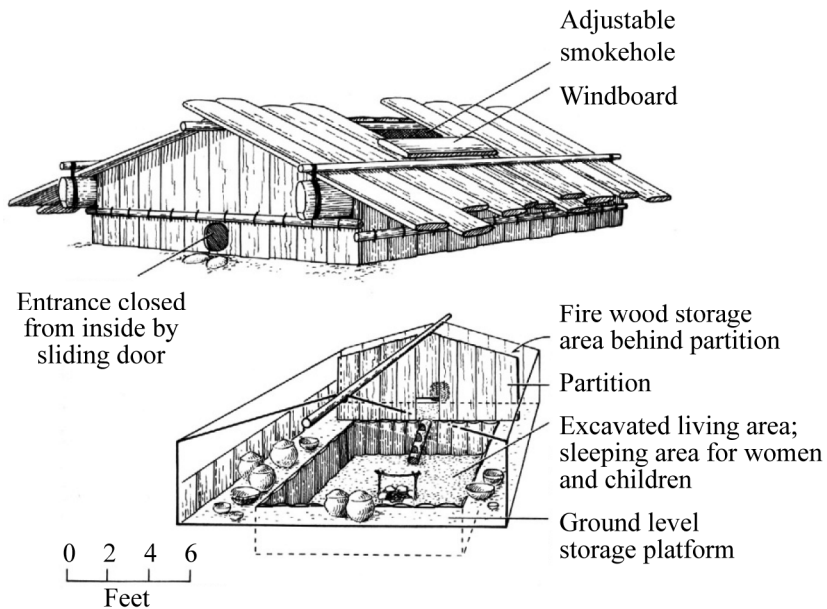
Figure 7. Family Houses and Sweathouse at the Yurok Village of Pekwan.

certain times of the year to procure salmon, smelt, or acorns; at other times of the year smaller groups or individuals traveled to offsite hunting, gathering, or fishing locations. Villages were permanent settlements typically organized in linear rows above flood zones, with house frontages facing rivers or oceans. Major villages tended to be strategically located near prime foraging locations such as estuaries, river mouths, and protected coastal areas such as coastal lagoons. Smaller or minor villages, sometimes referred to as “suburbs” in the ethnography, were typically formed when other villages became too populous or after a disagreement took place between individuals or families.

There were two types of semi-subterranean plank houses used among the Indians of northwestern California: family houses and sweathouses (Figure 7). Although houses varied in minor architectural details, their general form and function was similar throughout the region. Houses were “snug, well-made structures engineered to keep out the constant wind and rain” typical of the North Coast rainforest (Gould 1966a:24).

Construction of plank houses was a group endeavor. Houses were typically owned by male individuals who had to be wealthy enough to feed relatives during house building, which included the laborious task of splitting and preparing redwood planks using adzes, mauls, and wedges (Gould 1966a:23). Typically there were three family houses for every sweathouse, forming the sweathouse group, and these house clusters were grouped according to extended family lines (Kroeber 1925:81).

The family house was where a man’s wives, single daughters, and young sons lived (Figure 8). Family houses were square or rectangular and walls were constructed of large upright planks. Roofs were held in place with roof beams and were single pitched (with two



From Gould (1978).

Figure 8. Reconstructed Tolowa Family House.

sloping surfaces; see Figure 8 and Figure 30 on page 88) among the Tolowa, though most other groups had double pitched roofs (three surfaces; see Figure 7). A large opening in the roof served as the smokehole. Entrance holes were round or square and were often positioned to one side at the front of the house. Although the size of the family house varied according to the degree of wealth its owner held, house frontages were typically 15 to 21 feet long (Gould 1978:130; Kroeber 1925:78). An approximately ten-foot-square interior pit, two to five feet deep, was located in the center of the house (Gould 1978:130; Kroeber 1925:79). The family house was kept warm with a centrally located shallow fire pit, which was typically circular and surrounded with stones. Rich men had plank or clay covered floors, while poor men had dirt floors (Gould 1966a:24). People cooked, slept, and went about their daily business in the central pit. A five-to-six-foot-wide shelf, roughly level with the exterior ground surface, surrounded the interior pit. Houses were large storage facilities. Shelves were laden with cooking implements and large baskets containing stored acorns and other foods.

Sweathouses were the primary residence of men and post-pubescent boys. Women were not permitted entry except during special ceremonies. Sweathouses were smaller than family houses, with frontages around 12 feet long, and were square or rectangular. Unlike family houses, sweathouses were entirely subterranean and there was no storage shelf. Planks extended from the ground only on the gable ends of the house; the front and back (pitch ends) were also lined with planks but they did not extend past the ground surface. The “shed like” roof was single pitched and, among the Tolowa, was often covered in earth (Gould 1978:130). The entry was a small passage through the roof approximately 1.5 feet wide and always faced the river or ocean. A notched log ladder was used to enter the sweathouse. Sweathouse fire pits were either located in the corner of the house and had special underground ventilator shafts through which smoke could escape, or were located in the center of the house. In the latter case, there was an additional passage (an exit) and no ventilator shaft (Gould 1966a:23). When present, the exit was a 14-x-10-inch oval cut

through a plank in the gable wall to the left or right of the entrance wall. Exit holes were closed with wooden plugs. The exit was subterranean and a cobble-lined passageway extended from the exit hole to the outside (Kroeber 1925:80-81). Sweathouse fire pits were “cubical,” lined with flat stones and averaged 1.5 feet in depth, much deeper and more substantial than the shallow and circular family house hearths (Kroeber 1925:80). Floors were lined with either clay, “well-adzed planks which years of contact with human bodies have polished, or with carefully selected and fitted slabs of stone, often of considerable size” (Kroeber 1925:80).

While Kroeber noted that family houses were often relatively untidy, he remarked that the sweathouse interior was “neatness itself” and was always swept clean (Kroeber 1925:78). Men slept on individually owned wooden pillows in specific places which were named and arranged according to rank (Driver 1939:321; Kroeber 1925:81-82). Men sweated once or twice daily using direct fire (not steam) heat. They would sweat for success in hunting and gambling, and regularly prayed and sang while sweating (Driver 1939:321). Other sweathouse activities included gambling and the construction of bows, nets, and harpoons. Men ate their meals at family houses and, when inspired, visited their wives in their houses at night.

Sociopolitical Organization

Ethnographically, the household was the fundamental economic and social unit throughout the Pacific Northwest Coast (Drucker 1983). Though household size and organization varied, the common denominator is that there was no political organization beyond the local group. Members of a household were related, lived together in close proximity to one another, and performed social and economic pursuits as a unit. In contrast with the rest of the Pacific Northwest Coast, where the local group was a conglomeration of families directed by a hereditary chief, northwestern California sociopolitical organization is typified by a highly local social group structure involving family-based household organization and political autonomy. Families were politically independent, and there was no tribal sense per sé.

The northwestern California household was very small: a family-based unit which included a man, his wives and children, and extended family. This contrasted with the northern Northwest Coast, where several families lived in a single kin group house. As noted above, men and post pubescent boys lived in sweathouses in northwestern California, while women and children lived in larger “living” houses. This is the only area in the Northwest Coast where men lived full time in sweathouses. In the Pacific Northwest north of central Oregon, sweathouses were used, but they were never as formal (Drucker 1950).

For the Yurok, seven men typically lived in a sweathouse, each sleeping in a named, ranked area of the house (Kroeber 1925). Family households were loosely affiliated through the sweathouse group, which consisted of a series of houses whose males used the same sweathouse. On average, a sweathouse group consisted of three family houses and one sweathouse and linked three families, or 21 individuals. Thus the northwestern California sweathouse group was about as large as the classic northern Northwest Coast household, which averaged between 20 and 25 individuals of varying social status (Matson 2003; Mitchell and Donald 1988). Compared to the majority of the northern and central Pacific Northwest Coast, however, political allegiances were strikingly informal, economic pursuits

were small family-group (not communal) endeavors, and resource ownership rested in the hands of individuals rather than in the corporate group and the hereditary chiefs that led them.

The northwestern California family household was typically directed by a man whose position was based on wealth, not genealogy. It would be incorrect to refer to this man as a chief or even a headman—he did not hold any power beyond the family unit. Family households were autonomous; there was no overarching political structure, decisions were made by common consent, and there was no hereditary chief who directed economic pursuits or drove intensification. Kroeber characterized northwestern California as being in a state of loose political organization:

Where there is scarcely a tendency to group towns into higher units, and where even a town is not conceived as an essential unit. In practice a northwestern settlement was likely to act as a body, but it did so either because its inhabitants were kinsmen or because it contained a man of sufficient wealth to have established personal relations of obligation between himself and individual fellow townsmen not related to him in blood. [These groups] simply did not recognize any organization which transcended individuals and [family] kin groups. [Kroeber 1925:830]

Wealth System

The pursuit of wealth, its ownership by individuals, and its link to status are defining elements of northwestern California culture. Wealth items, including obsidian blades, white deerskins, and dentalium shell money were acquired through various means: dowries, trade, the collection of fines, or by buying them with surplus foods. The pursuit of wealth and status could be all-consuming:

The northwesterners alone have measured the precise value of every man's life or wife or grief. Every injury, each privilege or wrong or trespass, is calculated and compensated. Without exactly adjusted payment, cessation of a feud is impossible except through utter extirpation of one party, marriage is not marriage but a public disgrace for generations, the ceremony necessary to the preservation of the order of the world is not held. The consequence is that the Yurok concerns his life above all else with property. When he has leisure, he thinks of money; if in need, he calls upon it. He schemes constantly for opportunity to lodge a claim or evade an obligation. No resource is too mean or devious for him to essay in this pursuit. [Kroeber 1925:2]

Dentalium shell beads, originating in the Puget Sound area near Vancouver Island, functioned as real money in this system (Kroeber 1925:23). Money was in the realm of prestige and subsistence economies, although it was treated differently. Gould (1966a) maintains that among the Tolowa, subsistence items (such as dried salmon) could be exchanged for dentalia (contra Chagnon 1970:14; Drucker 1937:241; DuBois 1936:50).

These tended to be private exchanges between individuals. Money associated with prestige exchanges (i.e., bridewealth) were not divided: entire strings were exchanged and done so in a public setting (Gould 1966a:87). Mere possession of these items was not enough to guarantee high status within the community. Wealthy men had to defend certain rights, and:

Should someone infringe on these rights, the injured person could demand compensation or take revenge. If he did neither, he lost the respect of his fellow men. They would feel free to injure or insult him as they chose. It is clear from account after account of injuries and claims that it was not avarice which motivated demands for wergild. To make a claim showed that a man would not allow himself to be treated with contempt, that he commanded the respect of kinsmen to the degree that they would fight for him were his demands not met. In other words, here was a man of importance. One soon feels that the tokens paid were of little intrinsic value to the people themselves except as they demonstrated recognition of the recipient's position in society.... A weakling had no place in this culture. [Drucker 1937:225]

Women's labor was the link to a man's wealth quest. Women "bore the brunt of the tedious day-to-day labor of preparing and storing away food," such as the smoking and drying of fish and acorn meal preparation (Gould 1966a:70). Subsistence items were limited to the amount a man's wife could process. A man with many wives enhanced his prestige by gaining access to more processed and stored food that could be exchanged for treasures such as dentalia and woodpecker scalps (Gould 1966a:70).

Resource Ownership

In addition to wealth items, all valuable property was owned, including fishing spots, oak groves, and certain technologies. Throughout the Northwest Coast, there were commons, but all productive resource patches were owned, by corporate groups in the northern and central Pacific Northwest Coast and by individuals in northwestern California. There was a finite number of owned places and rights to these places were jealously guarded. No matter how abundant a particular resource was in these patches, ownership limited outside groups or individuals from accessing them. In northwestern California, wealthy people owned these places, and specific rules and monetary values were associated with anything of value.

With salmon fishing, for example, commons (un-owned areas where anyone could fish) were low production patches associated with the "taking of less important varieties," where simpler technology such as harpoons, gaffs, and drag nets were employed (Kroeber and Barrett 1960:4). Owned patches had high potential yields and were where complex technology, including weirs, basketry traps, and lamprey chutes, were employed. The number of owned fishing spots was limited by "environmental factors [which made] some localities suitable for building weirs or setting gill nets, [which had] special combinations of depth of water, current speed, type of bottom. Such places were infrequent" (Drucker 1983:3).

Valuable fishing spots were owned individually or shared by several people. In the latter case, a complex rotation system of rights to the fishing spot was followed (Kroeber 1925:33; Kroeber and Barrett 1960:3). Good fishing places had a real monetary value. The value of a fishing spot might be from one to three dentalia. They could be sold, given away or passed to kin by inheritance. Ownership was not limited to the vicinity of the owner's residence, and might be "far flung" (Kroeber and Barrett 1960:3-4). Ownership extended to certain technology. For example, only wealthy individuals could own and maintain large gill nets. Individuals who did not own anything could still fish—but in common areas and with the technology associated with these places.

Subsistence

Aboriginal groups were hunter-gatherers who, other than casual maintenance of tobacco patches by some individuals, did not practice plant cultivation. Resource abundance and the extraordinary economic potential of northwestern California is remarked upon in most accounts of aboriginal food-gathering pursuits. While resources were abundant, food-gathering pursuits were generally intensive and task-oriented, and storage was a key part of the system. People relied on mass-capture technology and methods such as weir and net fishing, and, again, processing costs were high, whether they were “front-loaded,” as with salmon or “back-loaded,” as with acorn leaching. Fish, game, and most roots are front-loaded resources as they are expensive to procure and process, but once stored, do not take a lot of time to prepare before being consumed. Salmon, for example, are front-loaded because they take a great deal of time to capture, prepare, and dry before being stored. The effect is intensified when taken with nets and other complex technology, which take a great deal of time to make and maintain. Weirs also involve a great deal of upfront costs, including construction and coordination. Back-loaded resources (e.g., acorns and piñon pine nuts) are comparatively simple to procure and store, but a great deal of effort is involved in processing them before consumption. Acorns, for example, can be collected and stored easily, but processing time, particularly when intensive leaching techniques are employed, are extremely costly (Bettinger cf. 1999a, 1999b).

Food processing fell to women, and the spoils of this labor were owned by individual family households; while it was often shared with needy people outside of this unit to show generosity, doing so was distinctly viewed as charity that defined a person of standing.

While people lived the majority of the year at villages, they moved to camps as resources became available. Salmon, surf fish, seaweed, and large mammals were partly or fully processed on-site and transported back on foot or by canoe along streams. Acorns were transported and processed at villages on an as-needed basis. Stores of foods were maintained within houses at main villages. Baskets of dried salmon, dried meat, seaweed, smelt, and acorns lined the shelves of family houses. Salmon and acorns were the most important terrestrial foods in the diet of Contact Period groups in northwestern California. Throughout the ethnography, salmon is said to be the primary staple, while acorns come in a close second.

Salmon

Ethnographers detailed the elaborate fishing technology that was used to take anadromous species, including Chinook salmon, silver salmon, steelhead, lamprey, and sturgeon. A great range of facilities and implements were used, from large communal weirs with associated ritual and formulistic building practices (such as the Kepel dam [Waterman and Kroeber 1938]), to simple fish spears and poisons (Kroeber and Barrett 1960).

Variability in fishing technology is best understood in terms of environmental constraints, rather than cultural differences (Table 4). “Different environmental conditions ruled the life cycles of these species, controlled the methods by which each might be taken, and gave rise to the different devices” (Kroeber and Barrett 1960:8).

Weirs include both fixed and movable types. Movable weirs were woven brush mats that were essentially a “portable fence.” They could be used wherever needed and rolled up when fishing was completed (Kroeber and Barrett 1960:29). Fixed weirs are dams made of rocks and/or wood and brush that obstructed fish on their spawning route (Figure 9). They

could be “V” shaped or straight, and could be as simple as a line of rocks or very complex constructions, with impounding corrals and platforms for harvesting fish.

Table 4. Riverine Habitats and their Associated Technologies.

RIVERINE HABITAT	ASSOCIATED TECHNOLOGY
River outlets, bars	Harpoons
Shallows	Weirs, spears, dip nets, gaffs
Riffles	Harpoons, gaffs, trapping, driving
Eddies	Lifting nets from platforms
Falls, cascades	Plunge nets, traps, harpoons, gaffs, baskets
Sluggish water, deep pools	Diving, bow and arrow, snares, poison, “sturgeon riding”
Creeks, small streams	Short weirs with basketry traps, hook and line, snigging

Notes: Data from Kroeber and Barrett (1960:7-8).



From Edward S. Curtis Photograph, Library of Congress, Prints and Photographs Division.

Figure 9. Hupa Fish Weir.

The construction of some weirs, such as the famous Kepel dam, was a communal endeavor, associated with strictly prescribed ritual. At Kepel, a formulist oversaw the construction of ten named sections that were built by ten groups of men. Each section had a gate with an enclosure where fish were taken with dip nets. The Kepel dam was torn down after ten days and was followed by a Deerskin and Jumping Dance. The entire endeavor lasted about 50-60 days, and was “the most elaborate undertaking of any kind among the tribes of the Northwestern region” (Kroeber and Barrett 1960:12). However, most weirs were smaller and less complex, and participation at even the largest weirs was purely voluntary.

There was a wide variety of fish nets, including eight forms of conical nets, four flat, and one cylindrical type. Some conical nets were staked in the water or were dragged with a canoe. The largest conical net was the lifting type (Figure 10). It was usually used at staging areas or platforms above strong eddies. The net was attached to an A-frame of poles and fastened to shore to guard against the strong current. The fisherman stood on the platform and lowered the triangular net into the water. Once the net contained a fish, it was raised, and the fish were clubbed (Kroeber and Barrett 1960:32).

Plunge nets were also mounted on an A-frame, but the poles were longer and were fastened with a crosspiece or “head bar.” The net was thrust into the water and held either to the side or the crossbar was stopped (or “caught”) with the fisherman’s head. A hat was worn in the latter case as a protection against the strong current: “the net and the frame descend until the crossbar strikes the back of the fisherman’s head, where the basketry cap cushions the blow as the frame is stopped” (Kroeber and Barrett 1960:42). V-shaped scoop nets were used in coastal environments for surf fishing. The net was lowered into a wave, and as the tide went out, the fish funneled in and the net was extracted.

Other fishing equipment include basketry traps, eel pots, gaffs, harpoons (single and double barbed; see Figure 34 on page 108), hooks, gorges, wooden fish clubs and egg mashers, crab claw alarm rattles, fish knives, eel slitters, jaw breakers, floats, sinkers, anchors, and net gauges or shuttles. There was a general pattern of technological complexity among core groups, graduating to simplicity in peripheral areas (Kroeber and Barrett 1960).

Salmon preparation methods included splitting and cutting into slices, 15-20 pieces for Klamath River groups, smoke or sun drying outdoors or indoors on scaffolds in family houses. Occasionally there were special drying houses; the Wiyot were noted to have stacked smoked fish in houses “as with cord wood, for winter” (Driver 1939:315, 381). Fish bones were ground, and grease and berries were added for taste. The Tolowa mixed ground fish bone with fish scraps to make meal (Driver 1939:381).

Acorns

Acorns were the main dietary staple of most Contact Period groups in California (Baumhoff 1963; Gifford 1936; Kroeber 1925). Acorns provide an excellent source of fat and carbohydrates and can be harvested efficiently in great numbers. The acorns of several species of oak (*Quercus* and *Lithocarpus* spp.) were available in the fall and typically prepared by an elaborate pounding and basin leaching process to remove bitter tannic acids (Figure 11).

In northwestern California, acorns were ranked second to salmon. Yet acorns were used by aboriginal groups such as the Yurok who “ate very largely” of the nut (Kroeber 1925:84). Intensive processing methods were identical to those found in the rest of California. Acorns were leached in a sand basin which was sometimes lined with grass or in an openwork basket lined with sand (Driver 1939:370). The leached flour was boiled in baskets, stone bowls, and wooden or bark boxes, heated with hot stones, was eaten as a mush or soup. Acorn flour was also made into bread, baked on stone or coals or in an earth oven or ashes (Driver 1939:315, 370). Less labor-intensive acorn processing methods employed in northwestern California included leaching whole acorns in mud, usually with shells removed first, and leaching whole acorns in a basket in a stream, occasionally after being allowed to mold in the house. Some groups also processed acorns by simply allowing them to mold in the house (Driver 1939:315).



Courtesy of the Phoebe A. Hearst Museum of Anthropology and the Regents of the University of California (15-1383).

Figure 10. Karuk Platform Net.



Courtesy of the Phoebe A. Hearst Museum of Anthropology and the Regents of the University of California — Pliny E. Goddard (15-4544).

Figure 11. Mrs. Freddie (Hupa) Preparing Acorn Gruel ca. 1901.

