Archaeology of Oregon

by:
C. Melvin Aikens

About the Author: *C. Melvin Aikens is a Professor of Anthropology at the University of Oregon, where he has taught and pursued research in Archaeology for some 25 years.*

BLM/OR/WA/ST-93/16+8100

Cover Photo: *Archaeological work at the Dietz Site, Lake County, Oregon (photo courtesy of John L. Fagan).*

ARCHAEOLOGY of OREGON

by:
C. Melvin Aikens

1993

U.S. Department of the Interior
Bureau of Land Management
Oregon State Office
1300 N.E. 44th Avenu
Portland, Oregon 97213

Forward

The Bureau of Land Management State Office is proud to present *Archaeology of Oregon* by Dr. C. Melvin Aikens. This volume presents a synthesis of the information available concerning the prehistory of Oregon. Dr. Aikens, through analysis of the archaeological and anthropological data, has added the insights and conclusions that have come to him through twenty years of concentrated study of the subject area. The Bureau of Land Management publishes this study as a part of its "Adventures in the Past" public outreach effort and in recognition of its responsibility to make information gained through its Cultural Resources Management Program available to scholars and to the general public.

State Director
Oregon/Washington Bureau of Land Management

Preface

The Northern Great Basin, the Columbia Plateau, the Pacific Coast and Lower Columbia, the Willamette Valley, the Southwestern Mountains: these Oregon environments have been explored and their resources used by various peoples for at least the last 12,000 years. The evidence of that use has been painstakingly collected by archaeologists and historians, and their descriptions of past lifestyles based upon that evidence and considerable information provided by present day native Americans have been published in hundreds of different articles, monographs and books. Anyone wishing to learn about the prehistory and/or history of any particular area within the State can find at least some of the relevant information without the expenditure of a very great amount of time and energy.

The present work was written to provide the reader a broad vista of the various major cultures of Oregon in a single volume. Readers who are sufficiently intrigued can fill in the details for any area from the more specific publications listed in the bibliography.

Several perspectives on Oregon prehistory may be offered. Certainly one of the most valuable is by native Americans themselves. Descriptions of Oregon's traditional cultures provided by direct descendants are now gaining increased availability to the public in today's literature, such as The First Oregonians recently published by the Oregon Council for the Humanities. As is apparent, this book is predominantly derived from scientific investigations of the archaeological record conducted over the past 60 years. Interpretations provided by ethnohistories, ethnographies, and archaeological studies each add to preserving the richness and diversity of our region's cultural traditions.

A major goal in archaeology is to document the differing adaptations that groups have made to the various environments over a lengthy time period. To this goal, each chapter is organized utilizing the same themes. Thus attention is drawn, for example, to the reliance on salmon in the Columbia Gorge versus the use of roots, seeds, and small game in the Northern Great Basin. Such differences must not obscure, however, the fact that there is a fundamental similarity in the broad utilization of available resources and in the resulting annual movement from lowland to upland and return. It is useful to observe that the same broad organizing principle is found to some degree in all non-horticultural groups to the extent that they are free from certain constraints. Inferences are also drawn, whenever possible, about the changes in lifestyles that occurred through time. The lack of major, clearly defined changes within narrow time spans is a hallmark of Great Basin, western Oregon, and Plateau cultures and represents only one of a few cases where both culture and environment have remained stable over a period of several thousand years. Such stability in culture has and will continue to evoke considerable scientific interest.

Richard C. Hanes

Acknowledgements

I thank Y. T. (Jack) Witherspoon for his sense of mission and for generating the ongoing support of the Bureau of Land Management Cultural Resources Program that led originally to the writing of Archaeology of Oregon. I thank Richard C. Hanes, Jack's successor as director of this program, for his continuing encouragement and support in the completion of this third edition. Many other BLM staffers deserve thanks as well. Phil Carroll and Don Smurthwaite made all but a few of the original photographs. new photographs for the second edition were made by Gary Haase, who was responsible for graphic design and art direction. Haase also directed the production of this third edition. Wyndeth Moisen and Steve Hurst each contributed several illustrations and Kathy Helms meticulously reviewed an early draft. Michael Hamel provided considerable computer expertise in the typesetting of this edition.

Most of the archaeological specimens illustrated in the book come from the collections of the Oregon State Museum of Anthropology, on the University of Oregon campus. Don E. Dumond, OSMA Director, gave permission to photograph the specimens and made available the facilities of the museum for the project. Martha Frankel and Pamela Endzweig pulled the many specimens together for photographing, and returned them to safekeeping when the job was done. Richard E. Ross and David R. Brauner of Oregon State University made available for photography the specimens illustrated in figures 6.2, 6.3, 6.4, 6.5, and 6.6. William G. Loy, University of Oregon Department of Geography, generously permitted and collaborated in the adaption of figures 1.3, 1.4, 2.1, 3.1, 4.1, 5.1, and 6.1 from maps originally published under his editorship in the Atlas of Oregon. The contributors of other illustrations are acknowledged in text captions. The University of Oregon made it possible for me to undertake the writing of this book as part of its overall teaching and research mission, through the continuing support of its Department of Anthropology and Museum of Natural History.

C. Melvin Aikens

Table of Contents

List of Figures

List of Tables

Chapter 1

Introduction

Archaeology creates a view of the cultural past by studying the objects people have made, and by plotting the occurrence of specific artifact types across space and through time. We know from everyday experience that members of various social groups or nations make things according to distinctive stylistic patterns. These patterns reflect shared ideas about what is efficient, or attractive, or sacred. Ideas about what constitutes proper form of course vary from group to group, and they change over time. Traditional clothing styles, for example, differ from country to country, and everywhere fashions come and go. Stylistic change is reflected in many common tools and objects of everyday use. Thus archaeology, through the comparative study of ancient artifacts from many different places, can map out the regions or culture areas once occupied by prehistoric peoples of different traditions. Changes in the artifact styles of such regions over time allow the definition of cultural periods, or phases. Functional artifacts such as projectile points, milling stones, fish hooks, and carrying baskets reflect the day-to-day activities of a people. So do cultural features like firehearths, house pits, and earth ovens. Habitation residues, such as the charred bones, shells, seeds, or roots that might be sieved from a firehearth or trash pit, give evidence of a people's diet and insight into their hunting and gathering practices. Some of these same residues, and other evidence such as buried pollen or various kinds of geological phenomena, tell of biotic and climatic conditions of past times. As the archaeological inventory of a region becomes ever more fully known through systematic survey and excavation, so do the lifeways of the people who left the specimens behind.

Time Perspective

Many techniques are available to the archaeologist for determining the sequence of cultural developments over time, and for estimating the age of cultural events. Three fundamental approaches—stratigraphic excavation, typological cross-dating, and radiocarbon dating—have been of most importance to the study of Oregon prehistory (Figure 1.1). Of these techniques, stratigraphic excavation is the most basic. It has been in use almost as long as there has been a science of archaeology. Typological cross-dating is another long-established and basic technique, still extremely important in archaeological research. Radiocarbon dating was developed during the early 1950s, and has since become the principal means for measuring the age of archaeological sites.

Stratigraphic Excavation

Stratigraphic excavation relies on the elementary fact that in a series of earth layers or strata, laid down on a given spot over a period of time, the sequential order of strata from bottom to top of a deposit shows the relative ages of any objects contained in them (Figure 1.1). Much of the legendary care that archaeologists devote to excavation is spent on precisely determining stratigraphic sequence, because recovering artifact assemblages from successive time periods is essential to the analysis of cultural change. Even without other dating techniques, this method allows an archaeologist to define cultural periods and establish cultural continuity or change over time. By itself, however, stratigraphic excavation cannot establish the actual age of archaeological finds. It can place artifact assemblages in proper time sequence relative to one another, but other techniques are needed to determine ages in years. The most important and widely used technique is radiocarbon dating.

Radiocarbon Dating

Radiocarbon dating begins from the fact that Carbon-14 (hereafter abbreviated ^{14}C), an unstable radioactive isotope of carbon, is ever

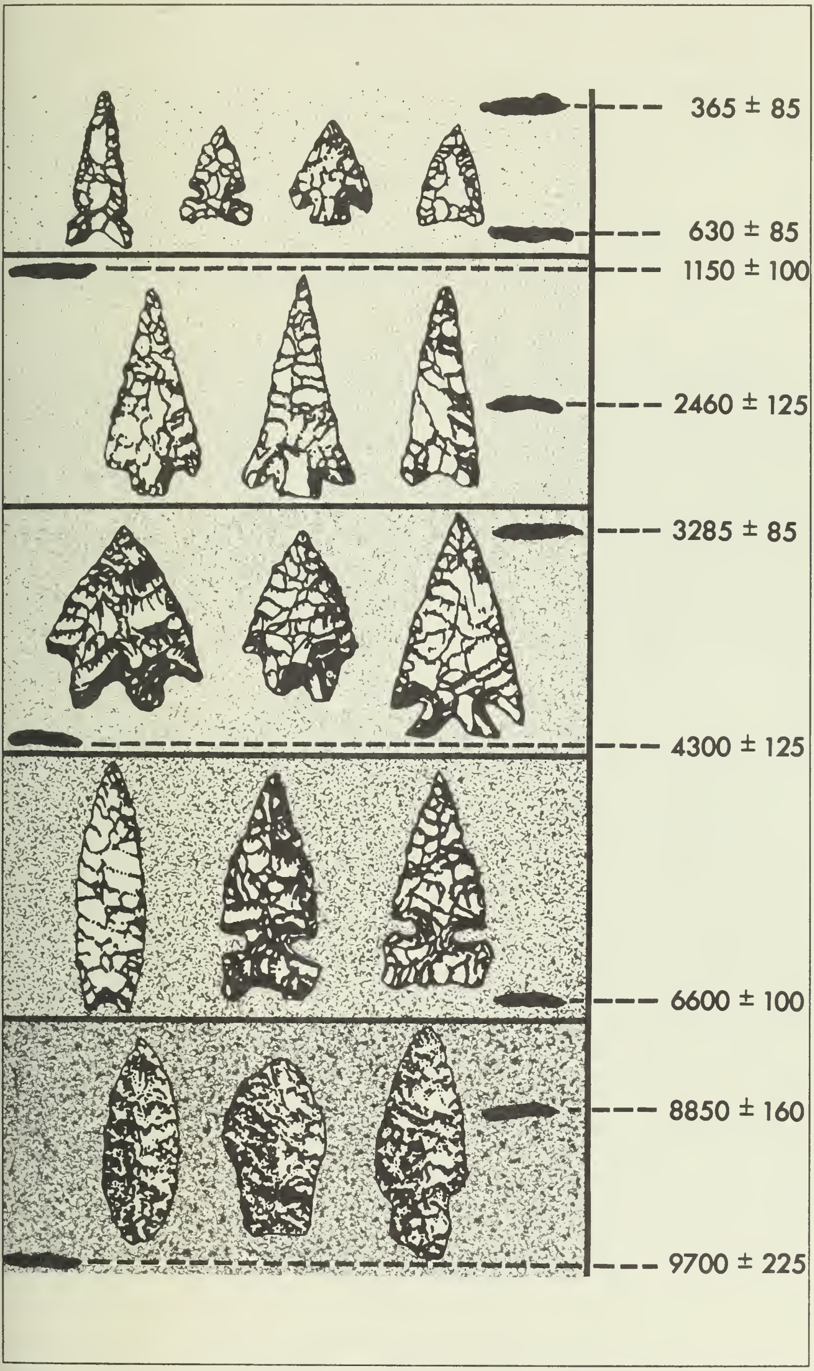


Figure 1.1 Hypothetical stratified archaeological site with projectile points and ^{14}C dated firehearths.

present in the earth's atmosphere, and is absorbed into the tissues of all living organisms as part of the life process. The ^{14}C, being inherently unstable, is subject to radioactive decay over time; release of a beta particle converts it to the stable element Nitrogen-14 (^{14}N). This decay process goes on continuously. But living organisms are always taking in fresh ^{14}C, so the amount of it they contain remains at the same level as in the atmosphere. When an organism dies, however, it ceases to take in fresh ^{14}C. After the death of an organism, therefore, the amount of ^{14}C contained in its remains decreases steadily, at a rate which is expressed as its half-life.

A half-life of 5568 years was determined for ^{14}C in the early days of radiocarbon dating, and is still used today . Simply, after 5568 years a piece of dead organic matter will contain half as much ^{14}C as it did when living; after another 5568 years, it will contain half the previous amount; and so on. The amount of ^{14}C in dead organic matter continually decreases until the quantity left is too small to be measured accurately. The practical limit of radiocarbon dating is about 40,000 years, although with special equipment, special techniques, and favorable circumstances, it is possible to push this limit to approximately 70,000 years in some cases.

Specimens of wood, bone, shell, or plant fiber—anything organic—can be dated by the ^{14}C method. The amount of ^{14}C remaining in a dating sample from an archaeological site can be measured in the laboratory , and from this quantity the age of the specimen — in radiocarbon years before present (hereafter BP) — can be calculated mathematically.

Radiocarbon dates are reported by laboratories in terms of a mean and a standard deviation. The mean is the calculated age in radiocarbon years. The standard deviation expresses the effect of normal random fluctuations in the measured radioactive decay rate. For a date reported as 5000 +/- 100 BP (that is, 5000 years before present, with a standard deviation of plus or minus 100 years), the odds are 2 to 1 that the actual age lies somewhere within 100 years on either side of 5000 BP. If the standard deviation is doubled, in this example to 200 years, the statistical odds become 19 to 1 that the true date lies within 200 years on either side of 5000 BP (that is, somewhere between 4800 and 5200 BP). Laboratory calculations are always reported with standard deviations, but in this book the deviations have been dropped for the sake of brevity.

All dates in the following text are expressed as years BP, or years ago, except in the rare cases where written historical documents are cited.

Virtually all archaeological dates are directly or indirectly determined by the radiocarbon method, so it is important to note that radiocarbon years are not precisely the same length as conventional calendar years. It is now known that the true half-life of ^{14}C is about 3% longer than the originally derived value, which is still conventionally used in calculating radiocarbon ages. Because so many dates were established before the new half-life was determined, and because the difference in ages calculated by the two measurements is not large, the original half-life remains the international standard.

A second factor affecting the length of radiocarbon years is that the amount of ^{14}C in the Earth's atmosphere rises and falls slightly over long intervals of time. Correction factors for this effect have been developed by running ^{14}C dates on growth-ring segments of known calendric age from bristlecone pine. This tree is extremely long-lived, and ages can be precisely determined by counting its annual growth rings. With the difference known between tree-ring (calendric) and radiocarbon ages for a sample, a correction factor can be calculated for that point in time. Many samples have now been dated by this dual method, and past fluctuations in the ^{14}C curve plotted. However, since the bristlecone pine record only goes back continuously for the last 7000 years, no correction factors are established beyond that range. Where longer ranges of time are involved, as in this book, the use of corrected ages before 7000 years ago and uncorrected ages after that point would create misleading chronological disparities of hundreds of years. A system that converted ages to the Christian calendar, using BC/AD dates, would add further complications. As a practical matter it is better to have a somewhat less exact, but consistent, system for reckoning time, than to have a mixed system that creates anomalies in the record. For the sake of clarity, therefore, uncorrected ^{14}C dates BP are used in the present text. For a fuller account of the radiocarbon dating method, including ramifications and complications not described here, see Taylor (1987).

Typological Cross-Dating

Typological cross-dating is another fundamental archaeological technique. It has long been used in conjunction with stratigraphic sequencing, and more recently with radiocarbon dating. Carefully shaped artifacts such as projectile points, or intricately crafted materials such as basketry, are often of highly distinctive types, made only in certain areas over certain spans of time. When distinctive or diagnostic types are found in stratigraphic sequence at an excavated site, their time of occurrence relative to one another is established; thereafter it is possible to infer, when the same diagnostic types are found elsewhere, the relative time of occupation of those sites. Where radiocarbon dates have been obtained for sites containing diagnostic types, the actual periods of time over which such types were made can be directly dated. Subsequently, when diagnostic artifacts are found on other sites, an archaeologist can approximate the time of site occupation based on artifact typology alone (Figure 1.1).

Reasoning From the Present to the Past

Interpretation of prehistoric artifacts, and definition of past societies, depends heavily upon analogies drawn from living groups. Traditional customs, languages, and technology have been recorded in recent times from the testimony of people who still lived or still remembered the old ways of life. This is the substance of ethnography, which guides the cultural interpretation of archaeological evidence. Ancient flaked stone arrow points, knives, scrapers, and drills, or more perishable objects such as antler digging stick handles, sheep horn wrenches, fish traps, and harpoons, can be identified because their counterparts were still made and used in recent times by descendants of America's original people. Of course, some objects made in the past have no obvious modern counterparts. These leave some puzzlement or ambiguity in interpretations, but in fact the probable function of most commonly recovered artifacts can be identified with a good deal of assurance.

Not only the tools but the traditional activities and movements of historic peoples are guides to understanding the past. In taking subsistence from their natural environment and pursuing their lives, hunting-gathering peoples like the original Oregonians gathered a wide variety of plant foods, medicines, and raw materials for household manufactures; hunted and fished for many kinds of animals; and gathered together for social activities, religious observances, trade, and the negotiation of marriages. The distribution over the landscape of natural resources, and the changing seasons, determined the locations and times of many human activities. Root crops bloomed in rocky uplands, fish spawned in rivers and lakes, marmots came out of hibernation among rimrocks and ledges, seeds ripened in grassy flats, deer were driven down from the mountains by snow. Ethnographic accounts show how traditional groups scheduled their activities and movements to fit environmental and ecological facts, and these accounts guide the interpretation of archaeological evidence.

Of course it is probable — indeed in matters of detail it is certain — that past ways of life were not identical to those known in historic times. But generally similar ecological factors shaped the lives of both historic and prehistoric occupants of any given landscape, and this validates the use of ethnographic analogies as a key step toward interpreting archaeological evidence. The archaeological facts, in turn, can show how past human activities may have differed from those indicated in the ethnographic models. Because of this intimate relationship between ethnography and archaeology, each of the following regional chapters begins with a sketch of the traditional lifeway as remembered and described by recent cultural descendants. Because climatic changes can alter the resource productivity of a region and thus affect human adaptations, each chapter also contains discussions of landscape and climate, and of time and environmental change.

Archaeological Places and Culture Areas

The archaeology of place — that is, of individual sites and specific places — is stressed in the following chapters. This follows directly from the culture-ecological orientation to prehistory. Each site was a place from which certain human activities were staged, and it occupied a position within some larger set of places where people carried out the many and varied activities of their lives. The sites described in this book exemplify various aspects of prehistoric cultural systems, but much research is still needed before a comprehensive account of Oregon's various regional systems, and their changes through time, can be written.

Traditional cultures were closely adapted to the landscapes in which they grew, and there was a strong congruence between culture and environment (Kroeber 1939). In western North America, the largest cultural and natural areas were the Northwest Coast, running from the Gulf of Alaska to about Cape Mendocino in northern California; the Plateau, extending from the Cascades to the Rockies, and north from the Columbia River drainage to well beyond the international border with Canada; the Great Basin, stretching from east-central Oregon southward to the Colorado River; and California, defined approximately by the state's modern political borders west of the Sierra-Cascades (Figure 1.2).

All of the named cultural and natural areas touch within Oregon's present boundaries. Northern Great Basin and Plateau cultures are well-attested east of the Cascades. Northwest Coast culture reached its highest elaboration far to the north, in British Columbia and Alaska, but native peoples of the Columbia River estuary and Oregon Coast pursued a very similar way of life. Oregon's Willamette Valley, a distinctive oak-grassland savanna, was geographically and culturally intermediate

Fig. 1.2. Culture areas of western North America.

between the Plateau and California. The California area extended into Oregon's Southwestern Mountains. Because of these geographical circumstances, an account of Oregon's prehistory can serve to introduce the general features of traditional native culture over much of the far west.

Language Diversity, Cultural Tradition, and Prehistory

A map of Oregon groups as they were distributed in 1850 shows great cultural diversity (Figure 1.3). Thirteen different families of languages are represented, the highest degree of linguistic diversity being west of the Cascades. Nine of these families belong to the great Penutian phylum of languages, which has representatives in Oregon, Washington, and California, and possible connections as distant as Mexico and Central America. Penutian languages dominate the western and northern parts of the state. The Northern Paiute language of east-central and southern Oregon represents the Aztec-Tanoan phylum. Aztec-Tanoan languages have an extremely broad distribution in the far west, extending from eastern Oregon to central Mexico. Much of Oregon's northwestern coast was occupied by speakers of Salishan languages, a family widespread farther north in Washington and British Columbia. Languages of the Athabaskan family were spoken in a small area of extreme northwestern Oregon, and a larger area in southwestern Oregon, extending inland from the coast along the Rogue River. The main body of Athabaskan-speaking peoples lives far to the north, in western Canada and Alaska. Finally, the Shasta, a mostly Californian people whose range extended a short distance into southwestern Oregon, used a speech belonging to the Hokan linguistic phylum. Hokan languages are spoken widely in California and Mexico, and as far south as Central America.

These distributions place the native languages of Oregon in continental perspective. They demonstrate forcefully the ethnic diversity of western North America in general, and Oregon in particular. The fact that related languages were spread over so vast an area indicates a long and complex history of migrations and dispersals, in which aboriginal Oregonians participated. The temporal scale implied is as vast as the spatial one, with a time depth spanning the period of human occupation.

The linguistic map also has more specific implications for Oregon prehistory. Long ago, people speaking an ancestral Penutian language spread widely in the Oregon country. Through normal linguistic change, this original speech community gradually split up into local sister languages. Some of these sister languages later split again, creating further linguistic diversity. By the early 19th century, many related Penutian languages had been formed through this process. The Kalapuyan family of the Willamette Valley, for example, made up a continuous chain of small, closely related languages in a pattern suggesting that Kalapuyan subgroups gradually drifted apart in their speech over some thousands of years of stable co-residence in the area. It is clear from such linguistic evidence that Penutian languages have been spoken in Oregon for a very long time.

The Northern Paiute language of eastern Oregon, by contrast, is spread over a vast area but shows very little internal variation. It is in fact a single speech, intelligible to people across hundreds of miles. This homogeneity implies that Northern Paiute speakers have not been in Oregon for nearly as long as the Penutian speakers — though it also must reflect to some degree the highly nomadic lifeway of the Paiutes, whose continual movement and social interaction over long distances would have retarded the process of linguistic divergence. Evidence from elsewhere in the far west also supports the idea that the Northern Paiutes expanded their range into Oregon's Northern Great Basin in quite recent times, perhaps within the last few hundred years.

The Salishan and Athabaskan-speakers of western Oregon represent offshoots of more northerly groups, whose homelands were in western Washington and Canada. Like the Paiute-speakers, they probably took up residence in Oregon long after the Penutian-speakers were established here. Finally, the Shasta of extreme southwest Oregon speak a Hokan language. Hokan languages in general differ greatly from one another, implying that they split apart a very long time ago. The scattered distribution of Hokan speech communities down the western side of the continent, deep into Central America, reinforces this conclusion. These indicators of antiquity make it likely that Hokan-speaking people were already present in the Oregon-California area before the arrival of the Penutian-speakers, stemming from a time when Hokans possibly occupied much of western North America.

Comparing the linguistic (Figure 1.3) and topographic maps (Figure 1.4) of Oregon shows a striking correspondence between major language groups and major environmental zones. The Northern Paiute range fits closely the Great Basin desert territory of southeastern Oregon, though these people were pushing into the drier edges of Penutian lands by the 19th century. Penutian-speaking groups, by contrast, consistently occupied the better watered country to the north and west. It is notable that Salishan and Athabaskan-speaking immigrants, whose homelands were in well-watered country to the north, moved into the moister Penutian territory rather than into the deserts. These correlations seem to reflect the fact that over generations people learn the plant, animal, and other resources of the natural environment which they occupy, and adapt their tools and behavior—their culture— to that environment. Ultimately, groups tend to become bound to a particular environmental setting, which their traditional body of knowledge, learned and passed down over centuries, has equipped them to inhabit better than any other. Of course individual people move across natural boundaries, learning different ways of life and different languages, but it is rare that entire groups do so (see Jorgensen [1980: 51-83] for an excellent, extended discussion of language, culture, and environment in western North America).

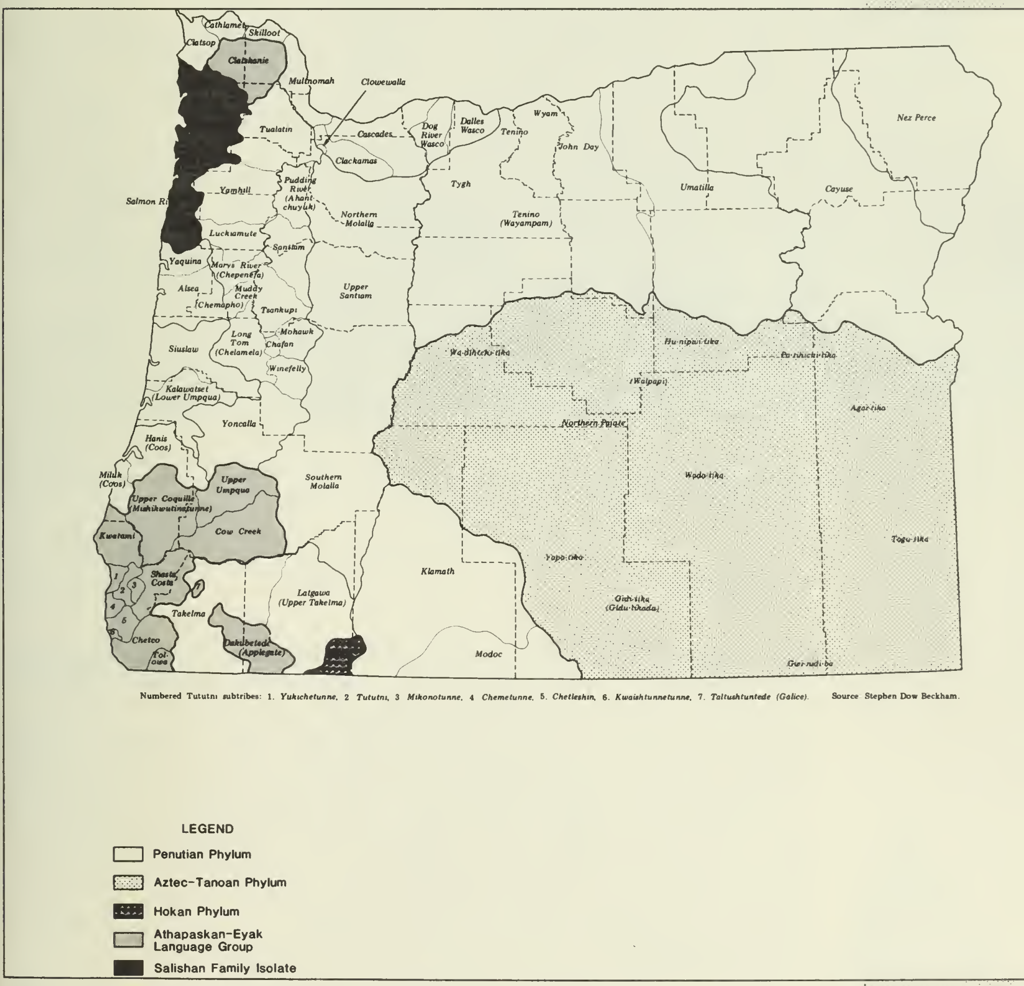


Figure 1.3 Geographical distribution of Oregon native groups in 1850.

Figure 1.4. Topographic map of Oregon.

Prospect

The subject of this book is the technological, societal, and ecological traditions that the original people of Oregon developed in adapting to their land over the immense span of time they have occupied it. Evidence of those traditions is gathered by archaeologists, who study the prehistoric sites that are the irreplaceable record of the Native American past. The work of natural scientists, especially those who study ancient environments and the changes they have undergone, is also essential to the story. Interpretation of the archaeological and environmental evidence is crucially informed by the cultural knowledge of historic and contemporary native Oregonians, who have been describing and explaining traditional ways of life to chroniclers, cultural anthropologists, and linguists for nearly two centuries (see Buan and Lewis, 1991).

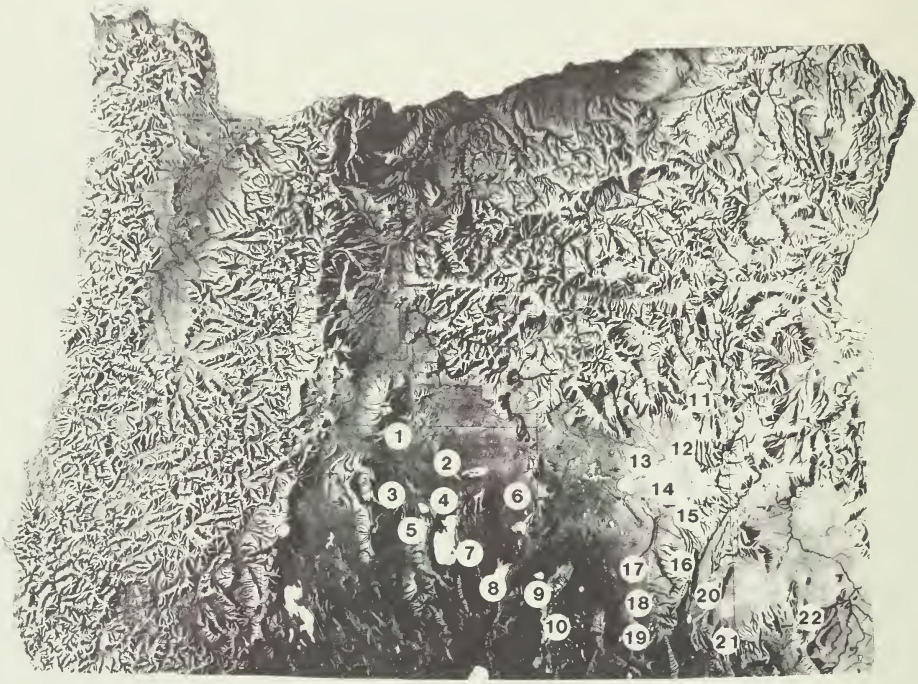
Chapter 2

Northern Great Basin

The study of Oregon prehistory was pioneered by archaeological researches in the Northern Great Basin. Beginning in the mid-1930s, work by Professor Luther S. Cressman of the University of Oregon demonstrated the high antiquity of a desert culture now known not only from Oregon but throughout the intermontane west (Cressman, Williams, and Krieger 1940; Cressman et al. 1942). This history, and the fact that some of the oldest sites known in the state are found here, make the Northern Great Basin a fitting place to begin the narrative of Oregon's past (Figure 2.1).

Ethnographic Life Way

The native people of the Great Basin, who practiced the ancestral lifeway well into the 19th century, were heirs to an extremely ancient cultural tradition. Comparison of archaeological and ethnographic evidence shows that prehistoric and historic peoples made tools, gathered plants, and hunted animals of similar if not identical kinds. The similarity is not exact, or complete: in thousands of years there were inevitably changes. Nevertheless, the life of the historic peoples is a guide to understanding the ancient cultures attested by archaeological evidence, and historic and



Key to Sites

1 – Fort Rock Cave
2 – Fossil Lake, Buffalo Flat
3 – Connley Caves
4 – Far View Butte, Big M, Boulder Village, Seven Mile Ridge
5 – Carlon Village
6 – Dietz Site
7 – Paisley 5-Mile Point Caves
8 – Lake Abert
9 – Warner Valley
10 – Long Lake
11 – Stinkingwater Mountain
12 – Squaw Pit Site
13 – Malheur Lake
14 – Headquarters Site, Lost Dune, Blitzen Marsh, Hogwallow Spring
15 – Diamond Pond, McCoy Creek, Dunn Site
16 – Steens Mountain, Wildhorse Lake, Fish Lake
17 – Roaring Springs Cave
18 – Skull Creek Dunes
19 – Catlow Cave
20 – Alvord Desert
21 – Trout Creek Mountains
22 – Dirty Shame Rockshelter

Figure 2.1 Map showing site locations in the Northern Great Basin region of Oregon.

prehistoric may be interwoven to detail some of the more timeless aspects of the desert culture.

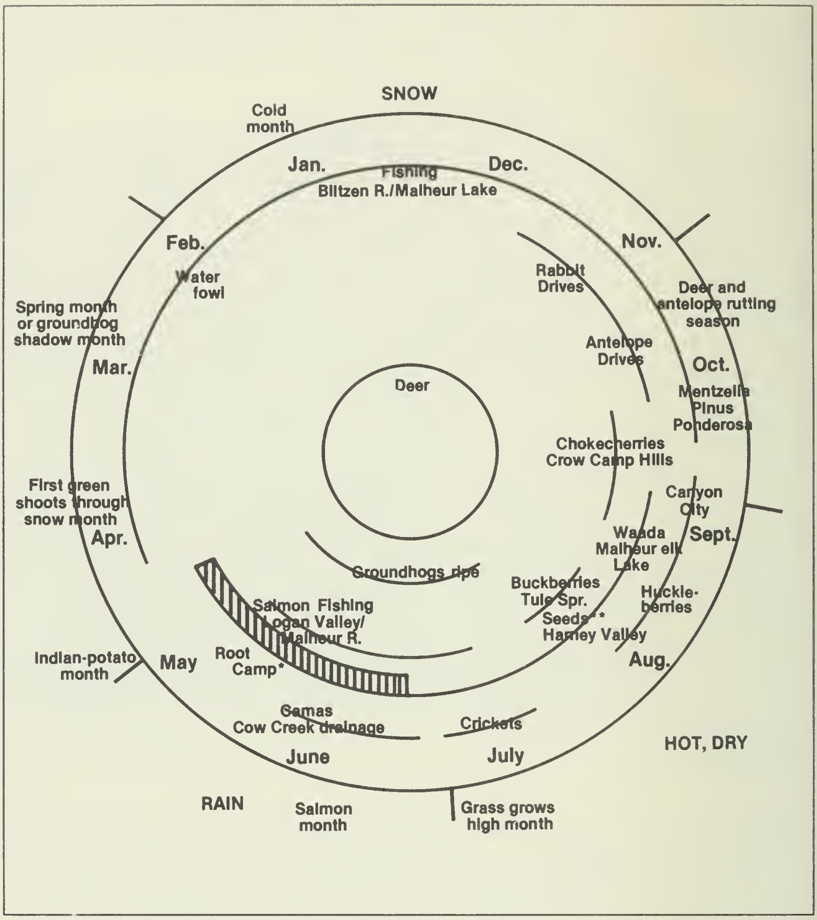
Hunting-gathering people, dependent on the free-living bounty of nature for their sustenance, perforce track the natural patterns and cycles of their environment. The annual round of eastern Oregon's historic Harney Valley Paiutes was broadly typical of many Great Basin groups (Figure 2.2).

March was the spring month when the groundhog first appeared. People were at this time still living in their winter encampments near Malheur Lake and the modern town of Burns, eating primarily stored foods and such game as could be obtained. April was the month when the first green shoots appeared through the snow; by late April or early May, the Indian-potato month had begun. This brought the first major economic and social event of the new year, the spring trek to the root camp. The root camp of the Harney Valley people was actually not a single locality but a vast area in the barren (to the eyes of the uninformed) hills around Stinkingwater Pass, on the northeastern rim of the Great Basin. There "Indian potatoes"— bitterroot, biscuitroot, yampa, wild onion and other species—grew in inexhaustible quantity. People congregated in large groups, some coming even from 50 or 100 miles away to participate in the harvest. Some remained at the root camp as long as a month or so, building up stores for the following winter and enjoying the company of friends and relatives from miles around. The gathering was intertribal, with non-Paiute groups from the Columbia Plateau region across the mountains also participating. Archaeological remains from Stinkingwater Pass suggest that this pattern probably dates back to at least 4000 BP (Pettigrew 1979).

While the root camp was still in full swing, groups of men moved on to the headwaters of the Malheur River. A tributary to the Columbia, this river carried spawning salmon. Women joined in the fishing as they concluded their work at the root camp, and the task of catching and drying salmon for winter stores continued for several weeks. The time by now was late May-early June, the salmon month.

About this time, vast fields of blue camas lilies bloomed between Malheur Lake and the surrounding foothills. Their starchy white bulbs were harvested in great quantity and baked in large earth ovens for winter stores. Marmots were also "ripe" at this time, and special trips were made to collect them in the rocky foothills. People moving back toward the Harney Valley from root and salmon camps in the mountains conducted these harvests, and stored the proceeds in caches to be retrieved for winter use.

July was the month when the grass grew high. Crickets thrived, and were collected to be dried, pounded, and stored as a protein-rich food. The relatively rainy and cool spring gave way to the hot, dry summer. During



Seasonal round. Many and varied local resources were utilized, including seeds, roots, berries, fish and game. The general pattern was one of intensive exploitation by small family-based groups, as among the Owens Valley Paiute (Steward 1933) and the Surprise Valley Paiute (Kelly 1932). Larger groups came together regularly at the root camp, salmon fishery and wada (seed-gathering) sites. Traditional lunar month names translate into brief descriptions of characteristic activities or seasonal conditions for each period. The annual cycle of movement was driven by seasonality and the correct time for gathering various species.

* Species collected include: *Calochortus macrocarpus, Lewisia rediviva, Camassia quamash, Lomatium cous, L. canbyi, L. gormanii, L. hendersoni, L. nudicaule, Perideridia bolanderi, P. gairdneri, Allium madidum, A. acuminatum, A. macrum, Fritillaria pudica, Trifolium macrocephalum, Mentha arvensis, Achillea millefolium,* and *Penstemon speciosus.*

** Species collected include: *Wyethia amplexicaulis, Balsamorhiza hookeri, Sisymbrium altissimum, Atriplex species, Elymus cinereus, Suaeda depressa, S. intermedia,* and *Oryzopsis hymenoides.*

Figure 2.2 Harney Valley Paiute seasonal round. Based on Couture (1978); Couture, Housley, and Ricks (1982); Whiting (1950); see also Fowler (1986), and Fowler and Liljeblad (1986).

July and early August, people dispersed in small groups, roving where they could hunt elk and small game, catch fish, and gather the first currants and huckleberries of the season.

In late August and September, the seeds and berries of many plants were ready for harvest. The Harney Valley Paiute were called the *Wadatika,* or "Wada-eaters," being so named for a low-growing plant extremely common at places around the shore of Malheur Lake and other desert lakes. The wada plant yielded a seed that was tiny but available in great quantity. The Wadatika congregated in large groups to collect it as well as the seeds of goosefoot, Indian Ricegrass, Great Basin Wild Rye, mule-ear, and other desert plants. At suitable locations buckberries, huckleberries, and chokecherries were also harvested, and elk were hunted.

October-November, the rutting season for deer and antelope, was the time for deer hunts, antelope drives, and rabbit drives. Seeds of shooting star and ponderosa pine were collected. Winter encampments were established at traditional places which were near water and not too far from previously established food caches.

The cold months of the year, from December through April, were spent in winter encampments. People ranged out for fishing, waterfowling, and hunting, but the stores of dried food built up during the preceding months constituted the primary food resource at this season.

The day-to-day tasks and annual cycle exemplified by the Harney Valley Paiute year are well-represented in the archaeological sites of the Northern Great Basin. Gathering activities are attested by digging sticks, carrying baskets, and milling stones; hunting is represented by the atlatl and dart, the bow and arrow, stone projectile points, and stone knives and scrapers; and extensive travel is symbolized by the rich finds of sagebrush-bark sandals from Fort Rock Cave and other sites. Among the thousands of known sites are winter villages and special activity camps of various kinds. Although the match between prehistoric lifeways and that of the historic Paiute people is surely not complete or exact, this evidence leaves no doubt of their basic similarity.

Landscape and Climate

Those characteristics of the natural landscape most critical to human settlement are topography, flora, and fauna. The three are closely related, with variations in topography — elevation, degree of slope, direction of exposure, stream courses, springs—controlling effective moisture and the distribution and abundance of both plants and animals in any given locality. In general, areas that are topographically diverse, including both lowland and highland terrain, are also biotically diverse. They offer greater possibilities for human exploitation than do relatively more uniform landscapes. The preceding sketch of the Paiute seasonal round shows clearly the importance of environmental variation to hunting and gathering people.

The natural setting to which Oregon's Great Basin peoples were adapted was a rich one, extreme and demanding yet generous to those who knew it well. The region is high plateau, with a general elevation of about 3500 to 4000 feet. In the north, the High Lava Plains is an extensive tableland, given relief by scattered volcanic buttes and cinder cones. Toward the south it merges with the Basin and Range province, which is characterized by long north-south fault block plateaus or mountain ranges with broad open valleys between. This province extends south well beyond the boundaries of Oregon, across Nevada and Arizona into northern Mexico. In extreme southeastern Oregon is the Owyhee Upland, a rough, uneven plateau that is ancient and much eroded. It is deeply cut by the canyons of the Owyhee River and its tributaries. In general, topographic relief is considerable throughout Oregon's Great Basin region, with differences of up to 5000 feet between mountain peak and valley basin.

Over all this country temperature fluctuations are extreme. Freezing, snowy winters and hot, dry summers are the rule. A large variance between daytime and nighttime temperature is also usual, especially in summer, when the temperature of a given place might be as high as 100° F. during the day, and as low as 50° F. at night. Water availability is greatly affected by altitude, with cool highlands collecting the most water and holding it the longest. In the lowlands less moisture falls, evaporation is rapid, and aridity is the general condition. Many valleys nevertheless contain lakes or marshes, fed by runoff. Such wetlands fluctuate greatly from year to year, and even from season to season; they are most persistent where upland moisture catchments are large, and most ephemeral where these catchments are small. Springs may be found in virtually any locality, their occurrence determined by various circumstances of geomorphology, lithic and sedimentary bedding, and faulting.

Time and Environmental Change

The first Oregonians known to archaeology lived near the end of the Pleistocene, when world climate was in transition from the cold of the glacial age to the warmth of the postglacial. Glaciers in the Cascades, Steens, and Blue mountains dwindled and disappeared. Modern Malheur, Harney, Summer, Abert, and Warner Valley lakes are shrunken remnants of great Pleistocene water bodies. Many pluvial lakes have vanished completely, as in the Catlow Valley, leaving only broad, level plains. High on hills around valley basins, three or four or more old beach terraces can often be seen, running for miles. In some parts of eastern Oregon, beach lines occur as much as 350 feet above the basin floors; the lakes that made these beaches were not only of vast extent, but deep.

Animals that went extinct at the end of the glacial age included giant ground sloth, giant bison, camel, and horse. Species that survived to the present include antelope, deer, mountain sheep, and bear; migratory and upland birds; rabbits and other small mammals; various fishes; and predators such as cougar, bobcat, and coyote. Plant species of late glacial times were essentially those seen today in the region, but boreal trees such as whitebark pine, spruce, and fir were more abundant. Timberlines stood lower, and alpine species were thus more broadly distributed. The sagebrush-grassland communities of lower elevations were probably richer in grass cover and more diverse than they are today.

Pollen evidence shows that by about 9000 BP, cold-tolerant trees were colonizing high terrain previously covered only by arctic tundra vegetation. Sagebrush, juniper, and other species followed these trees upslope as temperatures continued to rise. From about 7000 to 4500 years ago there was general aridity, and many Great Basin lakes dried completely. This aridity is commemorated by extensive dune fields along modern shorelines, formed as prevailing winds carried fine sediments off dried lakebeds exposed by evaporation. A Neopluvial rebirth of the lakes was well under way by 4500 years ago, related to global cooling that also brought traces of Neoglaciation in the Cascades and elsewhere. This somewhat cooler, moister regime has continued to the present time.

A now-classic interpretation of postglacial climate summarizes these intervals as Anathermal (cooler, moister than today) 9000-7000 BP; Altithermal (warmer, dryer than today) 7000-4500 BP; and Medithermal (conditions as today) 4500 BP to present (Antevs 1948, 1955). Detailed paleoclimatic evidence shows, however, that temperature and moisture fluctuated quite extremely even within these periods; in the midst of generally dry times there were marked wet phases, and just as markedly there were dry phases during generally wetter times (Mehringer 1977; 1986).

The degree to which large-scale climatic changes may affect the local occurrence of particular plants and animals is of direct importance to human use of a landscape. The topographic and biotic diversity of an area are critical variables. Global or regional shifts in temperature are less likely to wreak major changes in species availability within a topographically diverse area than in more uniform terrain. Precipitation and evaporation of moisture are greatly affected by temperature, which varies directly with altitude. A rise in temperature, that through increased drying could eliminate important plants and animals from a flatland biotic community over a large area, might affect species distribution much less dramatically in an altitudinally varied landscape. There a given plant species might have to shift its range only a few hundred feet up slope to stay in a setting of sufficient moisture, and the animals that fed on it could readily follow. Thus, the extent to which climatically induced environmental change over time might affect the long-term human settlement pattern—the placement of hunting, gathering, and dwelling sites over a landscape—depends critically on specific local topographic variables. Environment and its changes are manifestly of great importance to human ecology, and some of the ways in which they affected prehistoric Great Basin communities will appear below.

Cultural Chronology and Time Markers

The passage of time is reflected in the tools and other objects people make. The earliest known occupants of the Great Basin fashioned large lanceolate and leaf-shaped points of flaked stone, which seem to have been used primarily as tips for heavy thrusting spears. Clovis fluted points, representing the earliest well-defined and widespread artifact type known in North America, have been found at several localities in Oregon. At the Dietz Site, in the Northern Great Basin, a number of fluted points and the stone flaking debris from their manufacture constitute the most important Clovis discovery yet made in the region (Figure 2.3). Such points have not yet been ^{14}C dated in Oregon, but many dates from the Clovis, Lehner, Murray Springs, and other sites in New Mexico and Arizona show that Clovis fluted points were in widespread use between about 11,500 and 10,600 BP (Haynes 1980). Closer at hand, Clovis points from the East Wenatchee Site in Washington have been dated to approximately 11,250 BP by their direct association with a volcanic ash of known age (Mehringer 1988; Mehringer and Foit 1990).

The Western Stemmed point complex directly follows Clovis. It has been ^{14}C dated between about 10,800 and 7500 BP at many sites throughout the intermontane west, with scattered indications that it might go slightly

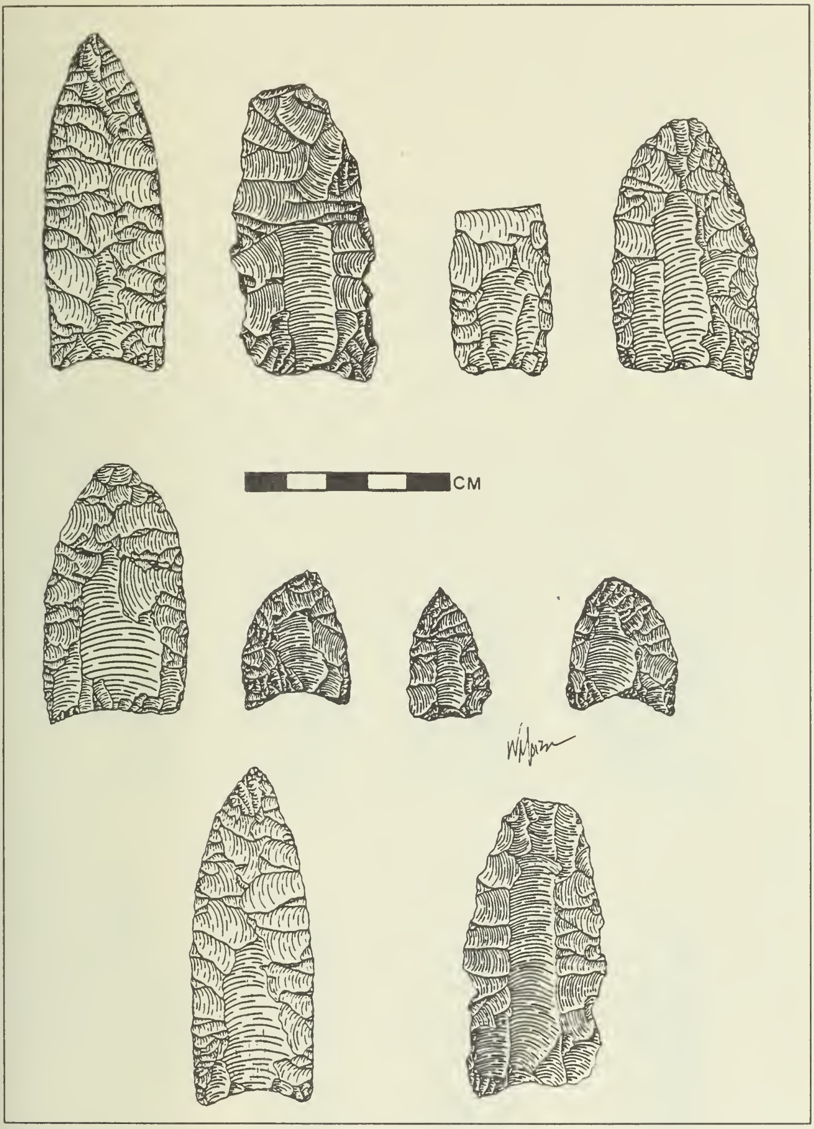


Figure 2.3 Clovis fluted points from the Dietz Site, central Oregon.

farther back in time (Willig and Aikens 1988: Table 3). The Windust type, which belongs to this complex, has been found widely in eastern Oregon. In size, form and basic technology it appears closely related to the Clovis type. Remarkably, a point found at Glass Butte in central Oregon appears to be a perfect example of the Clovis type when viewed from one face, but an excellent example of the Windust type when viewed from the other face (Mack 1975). The technological similarity, as well as the overlap in time between the two types, indicates a continuity of cultural tradition between them (Figure 2.4). Also part of the Western Stemmed complex is the Lake Mojave type, while some large leaf-shaped points appear to be comparably early.

Figure 2.4 Projectile points from the Early period, Northern Great Basin, Oregon. At upper left is shown the fluted face and unfluted obverse face of a point from Glass Butte. Note the similarity between the unfluted face of this point and the accompanying stemmed Windust points. Large leaf-shaped points appear at lower right.

Another series of types marks the period 8000-3000 BP. These points are smaller, used to tip light javelins or darts that were hurled with the aid of an atlatl, or spear-thrower (Figure 2.5). The Cascade and Northern Side-notched types often occur together, though the Cascade point first appeared before the Northern Side-notched type. These two types are common throughout the Northwest, but reach their southerly limits approximately at the latitude of the Oregon-Nevada border. Points of the Elko and Pinto series occupy essentially the same time span. They co-occur in Oregon with the Northern Side-notched and Cascade types, but continue far to the south as well, being common throughout the deserts of Nevada and Utah, and extending into southern California.

Small points made for the bow and arrow mark the last 3000 years of prehistoric time (Figure 2.6). Widespread throughout the western deserts are the Rose Spring, Eastgate, and Desert Side-notched types. Most common in eastern Oregon are the Rose Spring and Eastgate types. These are closely related and grade together, the inclusive category being termed Rosegate. These types date from approximately 3000 BP down to historic times. The relatively less common Desert Side-notched type was probably made from about 1000 BP onward in some parts of the Great Basin. In Oregon, Desert Side-notched points seem to be very late, and arrows dating to the historic period are commonly tipped with them.

While other projectile points were also made, the types named here are the best-defined and most readily recognizable, as well as being the ones dated with the highest degree of confidence. Since the time spans over which they were made have been established, these types afford the archaeologist a means of roughly dating human occupation at any location where they occur. In cases where organic matter datable by the ^{14}C method is absent, they often provide the only evidence for assessing the age of prehistoric remains. For this reason projectile points are particularly valuable as archaeological evidence.

Dietz Site

Clovis Paleo-Indian occupation is particularly well-attested at the Dietz Site, near Wagontire in central Oregon. This is an extensive scatter of flaked stone artifacts and lithic debris found along the edge of a small dry lake, in a sub-basin of now-vanished Pluvial Lake Alkali. The artifacts lay exposed on the surface, though geomorphic research suggests that buried specimens may occur in places. Studies yielded 61 complete and

Figure 2.5 Projectile points from the Middle period, Northern Great Basin, Oregon. Top row: Cascade willowleaf (2), Black Rock Concave-base (3); Middle row: Humboldt Lanceolate (2); Northern Side-notched (3); Bottom row: Elko Eared (3), Pinto Indented base (2).

fragmentary fluted points, 25 blanks, and 25 fluting flakes that are identifiable with the Clovis lithic tradition. Also found were 31 large stemmed and shouldered Windust-like points, assignable to the somewhat younger Western Stemmed tradition. Grinding stones were found near some of these latter specimens. Some of the obsidian toolstone came from Horse Mountain, less than a mile away; the rest was from yet unidentified

Figure 2.6 Projectile points from the Late period, Northern Great Basin, Oregon. Top row: Rose Spring (3), Desert Side-notched (2); Middle row: Rose Spring; Bottom row; Eastgate Expanding stem.

sources farther afield. No ^{14}C dates could be obtained at the Dietz Site, but its early occupation is thought to be as old as 11,500 BP, based on dates elsewhere for the Clovis culture. The later occupation is dated between about 10,800 and 7500 BP, based on ^{14}C dates for Western Stemmed artifacts found at other sites (Fagan 1988; Willig 1988).

Five areas of the Dietz Site were Clovis concentrations, with fluted points, flute flakes, and biface projectile point blanks broken during fluting attempts. No stemmed points were found in these places. Two areas, one at a slightly higher elevation along the base of the ridge west of the site, and one at the north end of the site, yielded only large stemmed points and associated flaking debris.

As described by Fagan (1988:397) "The Clovis tool kit used at the Dietz site included large and small fluted points; biface blanks, knives or preforms; end scrapers; side scrapers; flute flakes; multiple-tip gravers; single tip gravers, some of which were made from broken points; percussion-produced blade-like flakes and flake tools; possible wedges; hammerstones; and abrasive stones. In addition, based on the debitage it is suspected that batons of wood, antler, bone, or ivory were used for percussion flaking." The tool kit of the Western Stemmed tradition shared bifacial blanks, preforms, knives, and biface thinning flakes with Clovis, but also included manos, metates, gravers, spokeshaves, scrapers, and crescents, which were not found associated with Clovis artifacts at the Dietz Site.

In sum, the Clovis and Western Stemmed assemblages from the Dietz site are very similar but not identical (Figure 2.7). Evidence from other Great Basin sites suggests that the Clovis culture probably gave rise to the later Western Stemmed pattern, although some controversy remains on the point. Fagan (1988) believes that two different groups of people are represented, the Clovis folk being more narrowly focused on a hunting lifeway than were the Western Stemmed folk. Willig (1988) on the other hand stresses continuity between the Clovis and Western Stemmed cultures, believing that together they represent sequent stages of a developing broad-spectrum hunting-gathering "Paleo-Archaic" adaptation that was the basis of later Great Basin desert culture.

Fort Rock Cave

A pioneering glimpse of this Great Basin culture came from 1938 excavations in Fort Rock Cave, located some 50 miles west of the Dietz Site (Cressman, Williams, and Krieger 1940; Cressman et al. 1942). Fort Rock Cave is important in the history of archaeology because, in yielding a large trove of well-preserved sagebrush-bark sandals from beneath an ancient layer of volcanic ash, it indicated the high antiquity of Great Basin culture. Later research confirmed that this ash was chemically identical to that thrown into the atmosphere 7000 years ago by the cataclysmic outburst of Mount Mazama. This huge eruption formed the great caldera

Figure 2.7 Paleo-Indian stone tools from the Dietz Site.

now known as Crater Lake in the southern Oregon Cascades. Settling to earth over a vast area of the Northwest, Mazama ash was preserved in many geological deposits as an easily-recognized bed of clean, white sediment. It is widely used by archaeologists today as a time horizon marker, when they find it in prehistoric sites.

In 1951, shortly after the development of the ^{14}C dating technique, a sandal of Fort Rock type was directly dated at 9000 BP. Further work at Fort Rock Cave in 1966 and 1967 produced yet earlier dates. Deposits not reached during the previous excavations, because they lay beneath large rocks fallen from the cave ceiling, yielded four ^{14}C dates which grew in age with increasing depth: 4450, 8550, 10,200, and 13,200 years BP (Bedwell 1973). The earliest date was assayed on flecks of charcoal from black-stained earth thought to represent an ancient firehearth. This earth lay on top of gravels rounded by the wave action of now-vanished Pluvial Lake Fort Rock, which near the end of Pleistocene times stood at the elevation of the cave. At or near the level of the oldest ^{14}C date were found two projectile points, a fragment of a milling stone, and a handful of small chipped stone cutting and scraping tools (Figure 2.8). Direct association between the artifacts and dated charcoal is not fully documented, but at the least it seems clear that the specimens are bracketed between 13,200

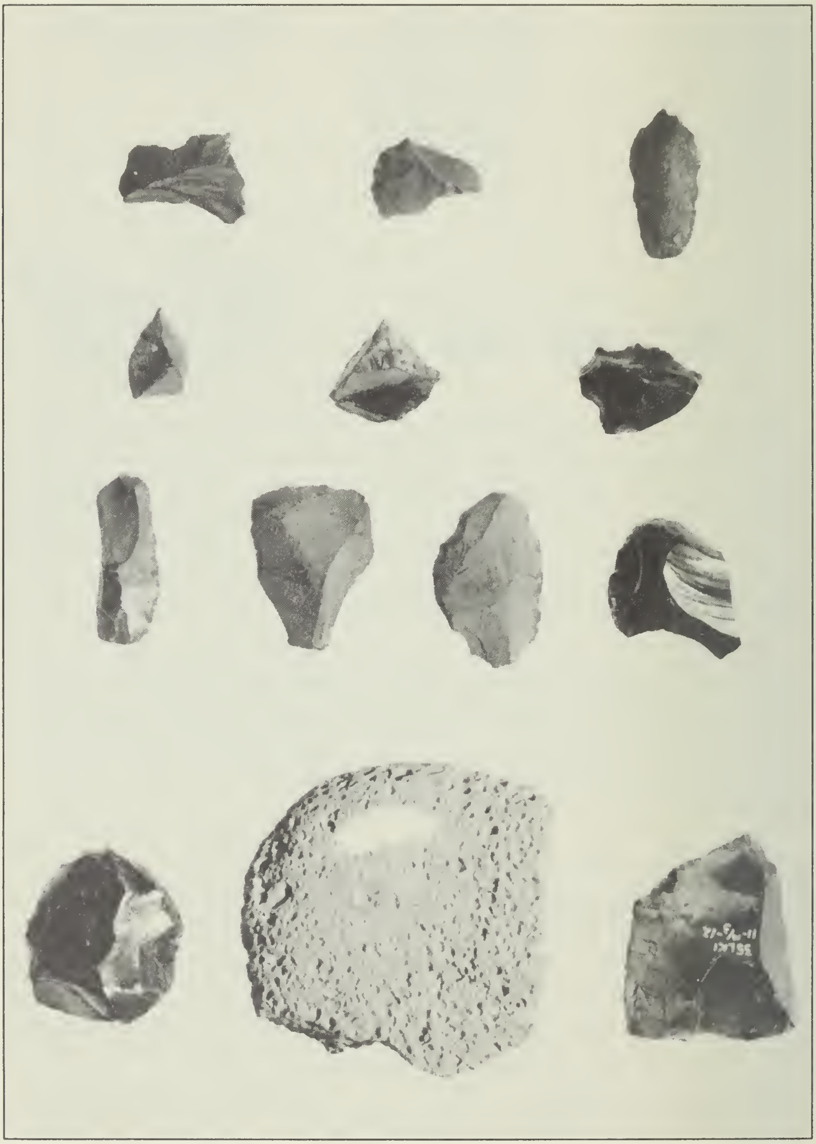


Figure 2.8 Early assemblage from above lake gravels at Fort Rock Cave. The projectile point at top right appears to be a much-resharpened Lake Mohave specimen.

and 10,200 BP. One of the points, a Lake Mohave-like specimen, is broadly assignable to the Western Stemmed complex mentioned above, elsewhere dated by many ^{14}C determinations to the interval 10,800-7500 BP.

Fossil Lake

Skeletal remains of a camel found at Fossil Lake, east of Fort Rock, may represent an early Paleo-Indian kill site. A stone flake, a biface fragment, and the broken pieces of a large projectile point were found very near the bones. A ^{14}C date on camel bone was 9965 BP. Because the finds were all from the surface, it is not certain that the bones and artifacts are of the same age, but the typology of the projectile point—a large lanceolate—is congruent with such an age assignment (Minor and Spencer 1977).

Buffalo Flat

Two early sites on Buffalo Flat, south of Fossil Lake, tell a surprising tale with remarkable clarity. Excavations at 35LK1881 revealed a shallow pit roughly 6 by 10 feet across, which contained abundant charcoal of sagebrush and shadscale. Among some 14,000 bones or fragments, nearly 10,000 were identifiable to some level of specificity. Most specimens were of jackrabbit, a few were of cottontail, and the bulk of the less specifically identifiable fragments were assignable to the Leporidae, which includes both jackrabbits and cottontails. A few lithic flakes and the base of a stemmed point accompanied the bones. Four ^{14}C dates were 9,120, 8950, 8800, and 8080 BP.

Less than a half mile away, at 35LK2076, was found a group of four smaller but otherwise similar beds of rabbit bone. With these were associated three Great Basin Stemmed points, a broad-necked point, and a number of flakes. An age very close to that of LK1881 was obtained, based on ^{14}C dates of 8,870 and 8780 BP. The association of rabbit bones with points conventionally thought—because of their large size—to have been used for large game is striking. Undoubtedly the large points were used as butchering tools rather than projectile tips on this occasion.

The superabundance of bones and charcoal at these sites makes it clear that the rabbits were taken *en masse* in drives, and processed on the spot. Drive hunting was the pre-eminent method by which Great Basin people took rabbits in ethnohistoric times, and the evidence from Buffalo Flat demonstrates unambiguously that rabbit drives were already an established practice by about 9000 years ago (Oetting 1993).

Connley Caves

A quite detailed record of early and later postglacial occupation came from the Connley Caves, about 10 miles south of Fort Rock (Bedwell 1973). Excavations in a series of small rockshelters along the base of a bluff found artifacts both above and below a thick layer of volcanic ash. This ash was identified by petrographic and geochemical methods as identical to that found at Crater Lake, the site of the original Mount Mazama eruption (Randle, Goles, and Kittleman 1970; Kittleman 1973). A series of ^{14}C dates—21 in all—ranged from 11,200 BP to 3140 BP, coming from levels both below and above the Mazama ash bed.

The local environment changed significantly over the time that people visited the Connley Caves. Charred wood from campfires built between 11,000 BP and the time of the 7000 BP Mazama ashfall was identified as pine. Today, the trees that stand before the Connley Caves are juniper, a species of warmer and drier habitat, while pines occur only at higher elevations. This vegetative difference is clear evidence that the climate prior to 7000 BP was somewhat cooler and moister than it is now. Small mammal and bird remains from the caves reinforce this interpretation. Bones of the pika, or rock rabbit, which today inhabits the higher, cooler mountains, were found in the pre-7000 BP levels at the Connley Caves, but not in later levels. Also consistent with these observations is the fact that the bones of waterbirds were common in the pre-7000 BP deposits, but missing from later strata. Paulina Marsh, a mile or so south of the Connley Caves, must have been quite extensive prior to 7000 BP and probably dryed significantly after that time (Grayson 1979). A long period of relative aridity ensued, until the area freshened again about 5000 years ago with the increased effective moisture of the Neopluvial.

Stratigraphic analysis of the archaeological specimens showed that human occupation of the Connley Caves was affected by the surrounding environment. The abundance of specimens beneath the Mazama ash layer suggests a relatively intense occupation during the cooler, moister period before 7000 BP. Below the ash layer was found a rich assemblage of projectile points, knives, scrapers, gravers, and drills of chipped stone. Milling slabs of ground stone, food bone refuse, and other specimens also occurred. Similar but fewer specimens indicate lighter occupation above the ash layer until some time after 5000 BP, when there was again an increase in the density of cultural remains. The light occupation, followed by a later resurgence, seems to match the mid-postglacial period of aridity followed by improved Neopluvial conditions. The latest ^{14}C date from the Connley Caves is 3140 BP; occupation probably continued after this time, but precise dates could not be determined because the uppermost deposits at the site had been mined and stirred up by artifact collectors. Nevertheless, Rose Spring and Eastgate projectile points from the disturbed deposits show that people continued to visit the site down to late prehistoric times.

Although the archaeological studies at Connley Caves told little of mid-Holocene and later times, subsequent research has revealed much evidence of more recent human activity in the Fort Rock Basin, especially following the onset of Neopluvial conditions about 5000 years ago. At the time of writing a multi-year research project of the University of Oregon continues in the area, studying the long-term pattern of human activity and settlement in relation to environmental variation and change (Aikens and Jenkins 1993). An interim report of the work is offered below.

Big M

The Big M Site lies southeast of the Connley Caves along a channel now dry, part of a meandering system that in wetter times carried overflow from Silver Lake on the south, across a stretch of flats and dunes, into Thorn Lake on the north. When precipitation and runoff were high, the same drainage system created streams and wetlands in Fort Rock Valley, still farther north (Jenkins 1993a, 1993b). Abundant stone artifacts and camp rock exposed by wind erosion show that the Big M Site was much-occupied prehistorically. A sharp boundary along the edge of a small basin between where artifacts are abundant and where they are absent shows clearly that the site was occupied at times of high water. Toads, freshwater snails, water snakes, and fish, attested among the faunal remains from the site, are further indicators of nearby water at times in the past. Concentrations of flaked stone and fire-broken rock show the locations of individual encampments, and excavations in two such places revealed living floors, firehearths, and other indications of dwelling structures. The total number of structures once present at the site has not been determined, but surface indications suggest that there may have been many. Charcoal from adjacent or superposed living floors yielded ^{14}C dates of 4910, 4905, 4880, 4755, 4550, and 3530 BP. Big M thus gives strong evidence of occupation during a time of Neopluvial freshening that is recognized from a number of Great Basin localities.

Fish bones are very well-attested in the archaeological collections from Big M (Greenspan 1993). Most of the bones are of tui chub, small fishes easily taken during the spring and early summer when they congregate in shallow, weedy waters. Some bones of sucker were also identified, and some of salmonids, most probably trout. The latter specimens were identified, however, exclusively from distinctive blackened bones that may be fossils from reworked ancient sediments, and not related to the human occupation. Four pointed fish gorges indicate one of the means by which fish were taken. Flat, slightly notched stones, probably net sinkers, suggest another means. The faunal assemblage also yielded bones of deer-sized and smaller mammals, and some birds. Atlatl dart points of Northern Side-notched and Elko types no doubt served in taking at least the larger animals.

Another important activity at Big M was the collecting and processing of seeds (and possibly roots), its prevalence shown by numerous grinding stone fragments. Indian ricegrass and Great Basin wild rye, which grow today on the sandy soils around the site, may have done so in the past (Housley 1993). But a series of soil samples from occupation surfaces, submitted to flotation analysis, regrettably produced little beyond traces of juniper and sagebrush charcoal. The poor survival of organic material at the site is probably due to its exposed character and considerable age (Stenholm 1993).

Much flaked obsidian debris, and artifacts including scrapers, knives, drills, large choppers, and hammerstones, show that tool-making and other kinds of processing were also important activities. Bone spatulas, fragments of fired clay smoking pipes, and *Olivella* shell beads suggest cultural affinities or exchange relationships with the Klamath country to the west and south. The finding of *Olivella* shells nearly 200 miles inland from their Pacific Coast source is a definite clue to long-distance contacts from that direction.

Together, the location and archaeological indicators suggest that the Big M area was most productive in the summertime, when fish availability and the ripening of seed plants overlapped. Eggshells from soil flotation samples also suggest springtime food-collecting. It is less clear, however, whether the site's occupation was limited only to the warm part of the year, since Great Basin people surely relied heavily on stored foods collected during the summer to see them through the winter. Even in the less productive winter season, wetlands settings typically provide the broadest range of subsistence items available within a relatively small compass, making them desirable places for winter settlement. Big M could well have been such a place.

Carlon Village

A large and apparently quite stable settlement not far from the Big M Site was Carlon Village, on the shore of Silver Lake (Jenkins 1993b). Devastated by artifact hunters, this site has been little investigated archaeologically. Nevertheless, surface artifacts and a number of house circles outlined by large boulders show that Carlon Village was a focal point of human occupation. Large notched atlatl dart points and small arrowpoints scattered on the site surface imply repeated visitations over the last 5000 years. Limited test excavations of apparent living floors discovered in erosional cutbanks yielded ^{14}C dates of 2040,1890, and 1780 BP. Lithic artifacts and charcoal were found on the occupied surfaces.

Flotation analysis of a soil sample from the living floor of latest date yielded traces of fish bone, mountain mahogany, and sagebrush, along with charred wood of ponderosa pine. Also recovered were many small, charred seeds, the identifiable specimens including saltsage, goosefoot, chenopod, suaeda (*wada*), grass, sedge, knotweed, and juniper (Stenholm 1993: Table 3). These botanical elements reflect the nearby wooded slopes and immediately adjacent lakebed, and most represent species that were important native food plants (Housley 1993).

Boulder Village

A surprising find was a very extensive array of approximately 100 stone house rings and many small pits that were probably food caches, located in upland terrain east of the Big M and Carlon Village sites (Jenkins and Brashear 1993). Constructed in and along the base of an extensive basalt flow, the site is called Boulder Village. It is adjacent to a large perennial pond, and overlooks a vast rocky flat that in spring and early summer produces a natural crop of sego lily and biscuitroot (Housley 1993). The area is also prime antelope and deer range. These plants and animals were no doubt the dependable (and highly nutritious) foods that attracted people to the place, and made it worth their while to invest much heavy labor in building the many house features at the site.

Surface collections and limited excavations have produced flaked stone points of mostly Rose Spring types, suggesting late prehistoric occupation. These indications are borne out by ^{14}C dates of 1510, 1300, 1260, 1170, 900 and 780 BP. Dates of 500, 410, 350, 220, 200, and 190 BP, and one determination of "modern" age, also suggest a very late prehistoric/early historic occupation. The latter is supported by the finding of Desert Side-notched points, 40 glass trade beads, an iron knife blade, and a brass button. Some fragments of Western Stemmed points represent an extremely old type, but these surely were ancient specimens found elsewhere and brought to the site by its more recent occupants.

Two kinds of structures are attested at Boulder Village: large house circles made of heavy boulders, and smaller, less prominent living areas marked by few or no stones The large boulder circles were numerous, but a precise count is rendered difficult by the fact that the site lies in a large lava flow, boulders from which were used in the constructions; many indisputable structures were recognizable, but more ambiguous rock alignments were also present. The less well-marked living areas, which were much fewer, were indicated primarily by surface concentrations of lithic flakes and fragments of fire-cracked rock and milling stones.

Boulder Village was devastated by artifact collectors, who dug out essentially all of the clearly identifiable large rock circles. That these were substantial house structures is shown unambiguously by the black, rich earth thrown out of them, and by the abundance of lithic flakes, charcoal, bone fragments, and other debris littering the dirt piles. Because of the devastation however, it was not possible to date them, or interpret them further. Tests in a few undisturbed or partially undisturbed structures produced the ^{14}C dates cited above, as well as lithic flakes, projectile points, knives, scrapers, and other indications of occupation.

Botanical remains in soil samples taken from undisturbed deposits at Boulder Village are highly significant. Flotation samples from a late structure that is dated by historic trade beads were rich in seeds, including saltsage, suaeda, chenopodium, and juniper. Fragments of roots, probably yampa or biscuitroot, were also present. Samples from this and/or other structures included much charcoal of juniper, mountain mahogany, bitterbrush, and sagebrush, all of which grow on the site today. Calcined mammal and fish bone traces, as well as many charred and uncharred eggshell fragments, add to the diversity of the flotation assemblage. The fish were undoubtedly transported rather than caught near the site, considering the fact that the nearby pond is the sink of a small upland drainage system not connected to regional fish-bearing waters. Both human diet and the immediate natural setting are graphically reflected in these finds, which indicate that the occupation took place under biotic conditions indistinguishable from those of today (Stenholm 1993).

Despite the great damage done to Boulder Village, the evidence it gives of many structures and heavy occupation in an unexpected location is extremely important to broadening the picture of prehistoric land use and settlement pattern in the Fort Rock Basin. Projectile points collected by sampling surveys in the Boulder Village Upland show traces of occupation from the period 11,000-7500 BP onward, with intensified use during the last 3000 to 4000 years. Architectural associations appear, however, only in quite late prehistoric times. Further research in the uplands will elucidate these trends, and relate them to developments within the broader region (Byram 1993; Brashear 1993).

Seven Mile Ridge Cave

Another kind of occupation, probably short-term and intermittent, is known from a small cave on nearby Seven Mile Ridge (Marchesini 1993). Two ^{14}C dates of 2250 BP and 1060 BP bracket the main culture-bearing deposits, putting the occupation there within the general time range of Boulder Village and other sites in the surrounding uplands. Flaked stone projectile points, scrapers, and drills, and ground stone mano fragments, gave evidence of hunting and gathering activities at the site. This little cave is of particular importance because its dry deposits preserved fragments of basketry, sandals, and cordage showing that the Northern Great Basin textile tradition, previously known in the Fort Rock Basin only from much earlier deposits at the Fort Rock and Connley Caves, continued into late prehistoric times as well (cf. Andrews, Adovasio, and Carlisle 1986).

Far View Butte

A prominent and special place within the Fort Rock Basin is Far View Butte, which is roughly central to the Fort Rock and Connley caves to the north, Carlon Village to the south, and the Big M and Boulder village sites to the east (Paul-Mann 1993). A small, flat-topped butte that rises some 1500 feet above the surrounding terrain, it commands a fine view of the entire basin and the Cascades beyond — including Mount Scott, a remnant subsidiary cone of prehistoric Mount Mazama, which now marks the eastern rim of Crater Lake.

Surface survey on Far View Butte recovered projectile points that represent most of postglacial time. Most numerous were points of the Great Basin Stemmed type, made between about 11,000 and 7500 BP. Cascade, Northern Side-notched, and Elko types represent the period roughly 7500-2000 BP, and Rosegates the last 2000 years. The number of points found was quite small, perhaps because the butte has been a favored artifact-collecting locality for decades. Those remaining nevertheless indicate hunting there. The most likely game would have been mountain sheep, which flee to high ground when startled. Wild sheep were formerly common in the vicinity, and a number of ethnohistoric accounts from the western United States tell of archers taking up posts on high ridges or peaks to shoot animals driven up by groups of men, women, and children combing the slopes below. Such a method would have worked ideally on Far View Butte.

Another evident prehistoric function of Far View Butte is indicated by more than 250 piled stone cairns widely distributed across its top. There is unfortunately no way to date these cairns, but heavy lichen growth on the outer surfaces of the stones indicates that they have been in position for a long time. A number of small stacked cairns near the southern and eastern edges of the butte were so placed that they might have served as visual barriers to the escape of hunted animals. The many larger cairns, however, which exhibited no alignments suggesting such a mechanical function, were probably created by young people on spirit quests. Among most Northwest tribes, children were traditionally sent out to remote places to establish contact with a spirit that would help them in later life. Some, destined to become doctors or shamans, went on repeated quests. Before going, they received instruction by their elders in disciplines which would prepare them to receive a spirit helper. Commonly these disciplines involved fasting and the piling up of stones, and over time many stone cairns would accumulate in favored localities. Far View Butte was clearly one such place.

Far View Butte may also have been a plant-collecting site. In April and May the shallow rocky soil on its top produces an abundance of bitterroot, which was an important traditional food of Great Basin and Plateau peoples (Housley 1993). Native gatherers of the ethnographic period cleaned the roots they dug up by scraping them with a thumbnail, a knife, or a small stone flake. Many obsidian flakes lie scattered across the top of the butte, quite possibly because they had been used to scrape the dirty skin from newly-dug bitterroot, and discarded when the task was done (Paul-Mann 1993).

Continuing Investigations In the Fort Rock Basin

Much remains to be learned about Fort Rock Basin prehistory. The above sites, and others yet to be fully investigated, indicate that people were more or less continuously present there—at varying levels of population—over more than 11,000 years. More importantly, site-specific evidence is beginning to show concretely how people adapted to environmental changes over time, by shifting their places of residence and their exploitation of local resources as the distribution of plants and animals was affected by changing climate.

An important realization stemming from recent research is that fishing, and exploitation of wetlands resources generally, was practiced in the lowlands of the Fort Rock Basin over thousands of years (Greenspan

1990a, 1993; Jenkins 1993a, 1993b). Though fishing does not leap to mind as a major activity of people living in a desert land, in fact it is becoming clear that fishing was important throughout the Great Basin in prehistoric as well as historic times (Greenspan 1985; Janetski and Madsen 1990). To summarize very briefly the local situation, the bones of tui chubs are known from the Connley Caves in levels ^{14}C-dated between 9800 and 7240 BP, and between 4350 and 3720 BP. Dates for the Big M Site place fishing there between 4910 and 3530 BP. An occupation feature at Carlon Village, on the shore of Silver Lake, revealed traces of fish bone associated with a ^{14}C date of 1780 BP. At a site in the Silver Lake Narrows an abundance of bones was found in a firehearth dated to 1400 BP. Fish bones were also recovered from the Zane Church Site, less than a mile from Big M, where ^{14}C dates of 1290, 1210, and 700 BP have been obtained. Finally, fish remains are also known from upland sites, which must reflect transport of preserved fishes from lower elevation waters. Bones from the Ratz Nest, on an upland slope near Silver Lake, have been ^{14}C-dated by determinations of 500 and 110 BP; and traces from Boulder Village are of comparable age.

Emerging evidence, including that just cited, indicates that the Neopluvial return of favorable moisture conditions after about 5000 BP fostered the growth of an extensive wetlands adaptation in the lower elevations of the Fort Rock Basin. In addition to fishing, the exploitation of waterside plants and animals became increasingly important. Resources were sufficiently abundant and concentrated in certain locales to support little villages of substantial houses, as at the Big M Site and Carlon Village. Uplands settings were occupied only on occasion, as people camped briefly while hunting and harvesting roots and other natural crops. By about 1500 years ago, with fluctuating wet and dry cycles bringing adversity to the low wetlands settings, substantial houses were being built in the uplands. Boulder Village became a major focus of settlement at this time, as people concentrated on the opportunities there for digging and storing roots in quantity. They continued, of course, to exploit the natural resources of the lowlands at opportunity. This model, proposed on the basis of current data, will be tested and improved by future research in the area (Jenkins 1993a).

Also important to continuing investigations is the fact that the Fort Rock Basin lies along a major physiographic and ecological boundary between the wooded foothills of the Cascades and the sagebrush-grasslands of the Great Basin. In the 19th century this biogeographic line was also an ethnic boundary, dividing the Klamath on the west from the Yahooskin Band of Paiutes on the east. Linguistic and ethnohistoric evidence suggests that Paiute people were relatively recent arrivals in this region, and may have been in competition with the Klamath for land. The movement and interaction of human groups across this environmental tension zone in prehistory, and how people might have been influenced by climatic change as lakes and marshes alternately freshened and dried, will be of much interest to future research (Aikens and Witherspoon 1986; Aikens and Jenkins 1993).

Paisley Five-Mile Point Caves

Several small caves at Paisley Five-Mile Point, overlooking the eastern shore of Summer Lake, were excavated in the pioneering research program that included the early discoveries at Fort Rock Cave (Cressman et al. 1940, 1942). The Paisley caves yielded comparable evidence. Most importantly, in Cave No. 3, a small excavation revealed a thick layer of air-deposited Mount Mazama volcanic ash. Beneath it were found a series of thin strata containing flaked stone artifacts, traces of firehearths, and faunal remains that included the bones of both horse and camel. Since horse and camel went extinct at the end of Pleistocene times, the finds suggest that people were here at a very early date. Regrettably, however, the reported evidence is not sufficiently detailed to rule out the possibility that these bones were simply leavings in a canivore den that was later pre-empted by human campers. Further research at the Paisley Caves might resolve this uncertainty, though prospects for success are dimmed if not wholly eliminated by the fact that the sites have been dug over for many years by artifact collectors.

Lake Abert

A series of sites near Lake Abert, some 50 miles southeast of the Fort Rock Basin, also lies along the biogeographic/ethnic divide just discussed. The local biotic setting is a rich one. West and south of Lake Abert, extensive bulrush-cattail marshes were supported by the Chewaucan River, which flows out of the Cascades foothills, through the upper and lower Chewaucan marshes, and into the closed basin of the lake. The impressive number and substantial character of sites near Lake Abert were discovered by archaeological studies done in anticipation of a highway construction project:

> Altogether, in the 12 miles of eastern Lake Abert shoreline, there are so far recorded 32 prehistoric sites. Twenty-one of these are village sites with housepits, five show cultural debris on the surface but have no visible housepits, and the remaining six are clusters of petroglyphs [rock engravings] with no visible house depressions. The number of housepits in the area has reached a staggering 371. Another regularly encountered feature is the stonewalled circular house, of which there have been counted 51. We have counted 92 boulders with petroglyphs on them, and several with pictographs [rock paintings] as well (Pettigrew 1980a).

In the decade since these original studies, some 280 additional sites of various kinds have been recorded near Lake Abert. Their chronology spans the last 11,000 years (Oetting 1989, 1990). A seriation of projectile point assemblages from many sites identified six periods of occupation. The ages of these periods were determined by ^{14}C dates for projectile points of the same types at a number of far western sites, including some around Lake Abert. The resulting chronology, from the Initial Archaic beginning about 11,000 BP to the Late Archaic II, ending with the historic period, is portrayed in Table 2.1.

Period		Associated Projectile Point Types	Age
Late Archaic	II	Rosegate Series	2000 BP-Historic
(I and II)	I	Rosegate and Elko Series	
Middle Archaic	II	Elko Series	4000 BP- 2000 BP
(I and II)	I	Elko Series/Gatecliff Split Stem	
Early Archaic		Northern Side-notched	7000 BP-4000 BP
Initial Archaic		Great Basin Stemmed	11,000 BP-7000 BP

Table 2.1 The Lake Abert-Chewaucan Marsh cultural chronology (Oetting 1990: Table 3).

In addition to many surface scatters of flaked stone, often associated with fragmentary grinding stones, over 580 apparent pithouse depressions and more than 70 rock rings have been recorded in the vicinity of Lake Abert. Test excavations in some depressions show earthen embankments around the perimeters and floors with central firehearths. These features define substantial pithouses closely similar to structures made by the ethnographic (and prehistoric) Klamath. The observed site pattern is one of small village aggregations of pithouses in close proximity to marsh, lake, river, or spring. These are surrounded by a broader, more diffuse array of small, short-term activity sites marked by lithic flake scatters and ground stone manos, metates, mortars, and pestles.

Initial and Early Archaic sites were very few, and consisted principally of small lithic scatters. Pithouse villages appeared during the Middle Archaic, beginning about 4000 BP, but became numerous only during the Late Archaic II, after about 1150 BP. A series of remarkable artifiacts preserved in nearby Chewaucan Cave (Figures 2.14-2.17, 2.19, 2.22) are probably of Late Archaic age, but the site, dug by private collectors, has not been dated. No historic artifacts were found, but the latest ^{14}C determinations obtained from the Lake Abert research are 170 and 110 BP, which reach into the 19th century.

Today Lake Abert is an aquatic desert, with mineral-rich waters that support only tiny brine shrimp, fairy shrimp, water fleas, and algae. However, the abundant archaeological evidence suggests the lake was more productive in the past. It has been speculated that by late prehistoric times, the waters had dropped so low as to concentrate toxic minerals at disastrously high levels. With this, the lake biota which had supported the human population vanished, and people were forced to abandon the area (Pettigrew 1985). A competing idea is that the human abandonment of Lake Abert in late prehistoric times was not due to environmental deterioration—springs and the Chewaucan River would in any case have given potable water—but rather to aggression by in-migrating Paiute peoples who drove previous Klamath inhabitants away from the desert lake and back into their higher, wooded heartland to the west (Oetting 1990).

Aother intriguing possibility is raised by the observation that with severe desiccation and shrinkage of the lake in the late summer of 1992, aquatic vegetation and water birds not previously common at Lake Abert quickly appeared around newly exposed fresh-water springs that normally are drowned by the briny lake (William J. Cannon, personal communication). Perhaps the truly productive periods fostering human occupation around Lake Abert were, counter to commonsense intuition, not those times when lake levels were high, but when they were extremely low!

Here at Lake Abert the question previously raised of how ethnic and biogeographic boundaries may be related, appears in a somewhat different form. Further study is needed to resolve the problem. On the one hand the history of Lake Abert, its chemical composition, and its fringing biota, must be studied in sufficient detail to advance the discussion about environmental and cultural change from reasonable speculation to demonstrated fact. On the other hand, "aggressiveness" on the part of Paiute immigrants cannot simply be taken as a given psychological trait, and consideration of more general factors that might have stimulated territorial expansion is required.

Warner Valley

Warner Valley, east and south of Lake Abert, was another major theater of prehistoric human activity in the Northern Great Basin. Well-watered by runoff from the high Warner Mountains to the west, the valley is filled with a chain of lakes and wetlands. In wet years an extensive series of potholes and sloughs forms among the sand dunes toward its northern end. On the east rises the abrupt vertical fault scarp of Hart Mountain, a table land some 3000 feet above the valley floor. Research in this area has attended closely to the ecological context in establishing an account of subsistence and settlement patterns over thousands of years (Weide 1974; Fowler, Hattori and Creger 1989; Cannon et al. 1990).

On the floor of Warner Valley have been found deep, rich village deposits, marsh-edge processing sites, dune field camps, and rock art displays. In the uplands, rock rings on high overlooks appear to represent both house circles and hunting blinds; grinding stones and pithouse depressions near small seasonal lakes mark plant-gathering areas; and lithic scatters and isolated artifacts suggest hunting activities. Rock art is also common; indeed Hart Mountain is the place of some particularly interesting and important rock art research cited in a following section. Regrettably, heavy pillaging of archaeological sites by private collectors has destroyed much of the area's prehistoric data base. In spite of this damage, however, it has been possible to suggest a far-reaching interpretive model of wetlands and upland occupation that will guide future research. Depicted graphically in Figure 2.9, this model proposes that:

> The populations which wintered in the lowland areas surrounding Warner Lake during the past 7,000 years were using a tethered subsistence strategy, with the lowland lake basin as the primary focus of subsistence activity.... A substantial portion of the period between April and August was spent in the uplands, harvesting and processing plant materials such as bitterroot (*Lomatium spp.*), wild onion (*Allium spp.*) sego lily (*Calochortus macrocarpus*), camas (*Camassia quamash*), wild carrot (*Perideridia spp.*), ponderosa pine (*Pinus ponderosa*), chokecherry (*Prunus virginiana*), wild currant (*Ribes aureum* and *Ribes cerum*), and huckleberry (*Vaccinium membranaceum*). While in the uplands they also hunted, procured lithic materials and gathered wood. Recent Harney Valley Paiute, according to informants (Couture et al. 1986), met with members of neighboring groups in large upland gatherings, where activities included gambling, trading, arranging of marriages, and general socializing. We would suggest that this pattern may be of long standing, and that archaeological investigation of the sites identified as major upland occupation sites will show additional evidence of these activities (Ricks and Cannon 1989:7, cited in Fowler, Hattori and Creger 1989; Cannon et al. 1990:179).

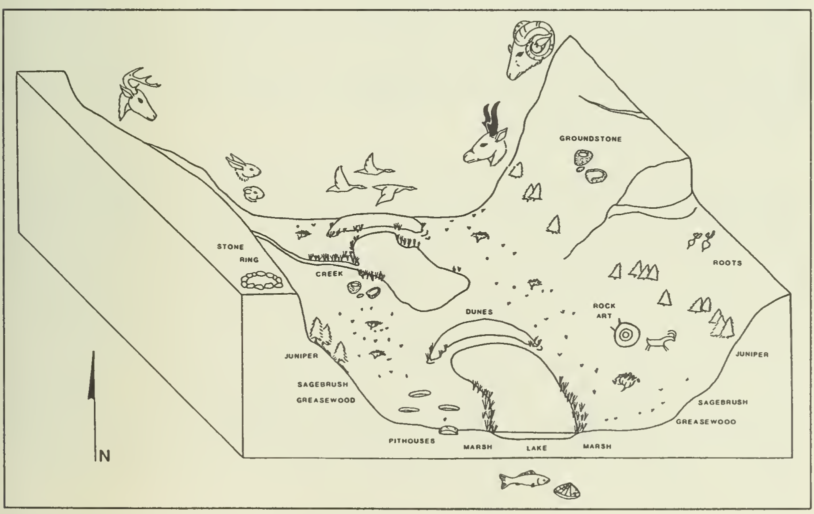


Figure 2. 9 Schematic model of prehistoric subsistence and settlement in the Warner Valley. From Cannon et al. (1990: Figure 2).

Ongoing research in the Warner Valley, including systematic survey, paleoenvironmental studies, and other work is expected to further explore and develop the basis of this general model (Fowler, Hattori, and Creger 1989).

Catlow and Roaring Springs Caves

Eastward beyond the Hart Mountain upland is Catlow Valley, where Catlow and Roaring Springs caves yielded important inventories that have long defined the desert culture of the Northern Great Basin. Excavated in 1937 and 1938, the caves are of central importance to the history of scientific archaeological investigation in Oregon (Cressman, Williams, and Krieger 1940; Cressman et al. 1942; also Wilde 1985). Both are located west of Steens Mountain, about 30 miles apart along the eastern edge of the Catlow Valley. Catlow Cave stands on the highest beach line of Pluvial Lake Catlow, which occupied the valley during Pleistocene times. Roaring Springs Cave, named for the rushing flow of nearby artesian springs, is similarly situated. Both command broad views of the ancient lakebed, now sagebrush-grassland spotted here and there with patches of marsh and small shallow ephemeral lakes or ponds.

The age of human occupation at Catlow and Roaring Springs caves was never directly established, since they were excavated before the development of ^{14}C dating. Their ages have since been approximated, however, by comparing their artifacts to those from other ^{14}C-dated sites. Sandals of sagebrush bark from Catlow Cave include specimens of the Fort Rock type, ^{14}C-dated at Dirty Shame Rockshelter (see below) between 9500 and 5850 BP. Other sandals compare to specimens dated between 6200 and 2750 BP at Dirty Shame. Some of the basketry is comparable to textiles that extend into late prehistoric times at Dirty Shame, including traces of Northern Paiute coiled basketry. A few sherds of Northern Paiute/Shoshoni pottery were also found on the surface at Catlow Cave. Most of the same artifact types were found at Roaring Springs Cave, implying the same period of occupation. But since the earliest sandals there were of a type dated around 6200 BP at Dirty Shame, a somewhat later beginning is suggested.

A more specific chronology is provided by a restudy of projectile point types and their distributions at the two Catlow Valley caves (Wilde 1985). Both sites contain the same types, in very similar though not identical percentages. Great Basin Stemmed points, very few in number, represent an ancient type, but Northern Side-notched, Elko Eared, Humboldt Concave Base A, Gatecliff Split stem, and Elko Corner-notched points place the main earlier occupation between about 7000 and 3000 BP. Later types—Rosegate and Desert Side-notched—were even more numerous. The predominance of Rosegate points suggests that the heaviest occupations were between about 3000 and 1000 BP, but a number of Desert Side-notched specimens indicate continued visitations up to perhaps 200 BP (Figure 2.10).

^{14}CYr BP	DSN	CT	RG	ELKO	GSS	HUM	NSN	GBS
0-200								
200-400	•••••	•	•••					
400-600	•••	••						
600-800	•							
800-1000	•	•	••••••	••				
1000-1200		•	••					
1200-1400			••••					
1400-1600	••		••	•				
1600-1800				•••				
1800-2000				••				
2000-2200				••••		••		
2200-2400			•	•••				
2400-2600								
2600-2800			•	••				
2800-3000				••••	•	•		
3000-3200				•••	•	•		
3200-3400				•••	••••	•		
3400-3600					•			
3600-3800				•	•			
3800-4000				•	••	•		
4000-4200					•	•		
4200-4400				•	•	••		
4400-4600								
4600-4800						••		
4800-5000						•		
5000-5200						•		
5200-5400					•	••	•	
5400-5600						•		
5600-5800								
5800-6000				•			•	
6000-6200								
6200-6400				••			•••	
6400-6600								
6600-6800								
6800-7000				•		•	••	•
7000-7200				•			•	
7200-7400								••
7400-7600						•		•
7600-7800								
7800-8000								•
8000-8200								•
8200-8400								
8400-8600								•
8600-8800								•
8800-9000								•••
9000-9200								••
9200-9400								
9400-9600								••
9600-9800								
9800-10,000								•••
> 10,000								•••

DSN= Desert Side-notched; CT= Cottonwood Triangular; RG= Rosegate; ELKO=Elko Corner-notched, Elko Eared; GSS= Gatecliff Split stem; HUM=Humboldt Concave-base; NSN= Northern Side-notched; GBS= Great Basin Stemmed.

Figure 2.10 Radiocarbon dates on projectile points from far western sites. Based on Wilde (1985: Figure 4 and Table 22). Each equals one ^{14}C date.

The importance of the cultural remains from the Catlow Valley caves is indicated in the following quotation:

> The rich haul of artifacts from the sheltered, dry sites of the Northern Great Basin, especially Catlow and Roaring Springs caves, provides one of the clearest reflections yet available of the ancient Desert Culture lifeway. Items of clothing included sagebrush bark sandals and rabbitskin robes. Footwear must have been very important to a people who were obliged to travel far and often, and it is the most abundantly attested form of personal clothing. For gathering, fetching, and carrying there were a variety of twined baskets, soft bags, and nets. Digging sticks of mountain mahogany for taking roots and shoots, and manos and metates for breaking and grinding seeds, were well represented. Atlatls and darts, bows and arrows, and stone projectile points to arm them, all occur in the collections, as do numerous cutting and scraping tools of chipped stone. The hunt provided not only food, but furs, sinews, and bones used in making clothing, in the hafting of stone tools, in the fashioning of bow strings, and in the making of awls and other manufacturing tools. Flaked stone drills and abrading tools of rough scoriatic basalt further attest the manufacture of wooden objects such as atlatls, bows and associated gear.
>
> Neither was the assemblage unrelievedly utilitarian. Many of the baskets from Roaring Springs Cave had been ornamented in geometric patterns by inlaying fibers of different colors; many of the dart shafts and arrow shafts had been painted with rings of red and blue; a pair of tiny baby's sandals had been given a soft inner lining of rabbit fur; a piece of cane had been cut and perforated as a musical flute; and a perforated Olivella shell from the Pacific coast had perhaps been strung as a bead. The collection illustrated, in short, not only the day-to-day tasks of the desert lifeway, but also some of its pleasures (Aikens 1982:147).

The series of photos in Figs. 2.12-2.22, from various Oregon sites, illustrate the richness of the desert culture inventory.

Locally available game food resources changed over the time Catlow Cave was occupied, as documented by the faunal assemblage. The bones of water birds, including pintail, teal, lesser scaup, goose, coot, and avocet were largely limited to the deepest level of the cave deposit. Conversely, the bones of land mammals, including mountain sheep, bison, and rodents, were predominantly from the higher levels. This pattern indicates the local availability of wetland habitat for aquatic animals earlier in the history of the site, and its diminution as time went on. Other game species

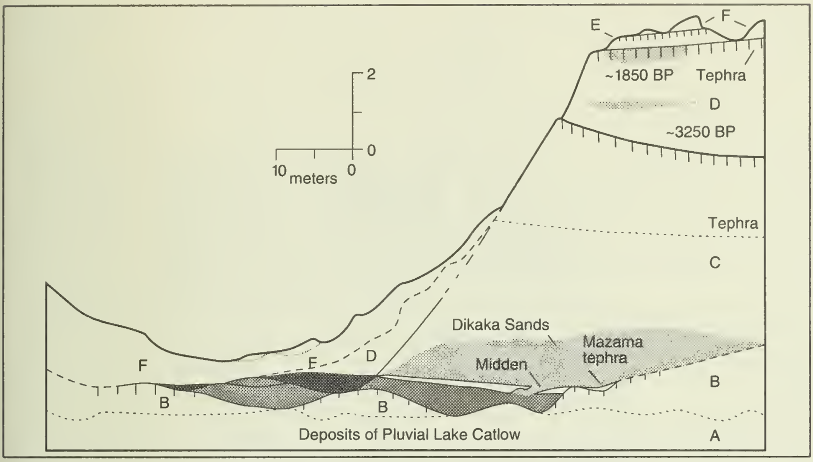


Figure 2.11 Generalized stratigraphic cross-section of the Skull Creek Dunes Site (Mehringer and Wigand 1986: Figure 5).

Figure 2.12 Woven sandals. Left, specimen of sagebrush bark from Fort Rock Cave; right, specimen of tule from Paisley Five Mile Point Cave.

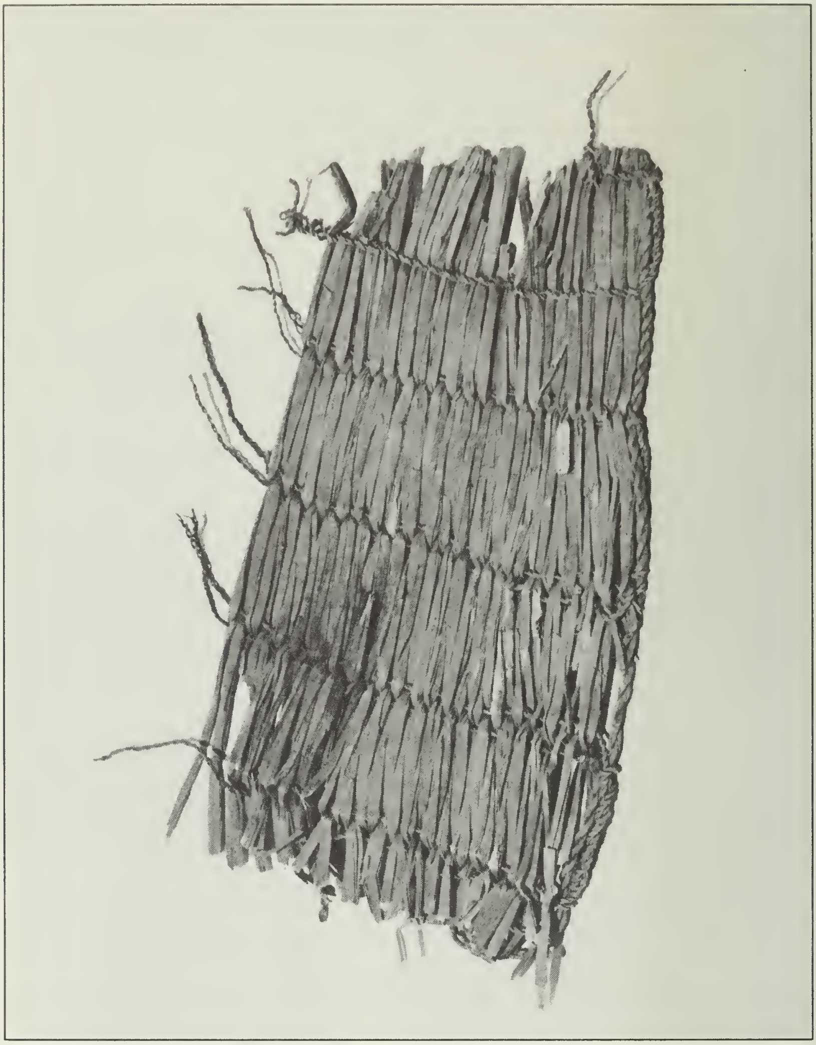


Figure 2.13 Fragment of tule matting bound together with fiber cordage, from Roaring Springs Cave.

attested in the faunal assemblage were mule deer, marmot, pika, jackrabbit, and sagehen. Predators, including coyote, fox, lynx, and owl were also represented. Except for the pika, a creature of cooler, moister habitats, all these animals are to be found in the Catlow Valley today. Surprising is the absence of pronghorn antelope from the faunal collections, in view of its present abundance in the region.

Figure 2.14 Large tule fiber bag from Chewaucan Cave.

Skull Creek Dunes

Roughly midway between Catlow Cave at the south end of the valley, and Roaring Springs Cave at the north, are the Skull Creek Dunes (Figure 2.11). Here a large sand sheet formed during middle Holocene times on the margin of then-dry pluvial Lake Catlow. Excavations showed that a soil formed after the drying of Lake Catlow, and that dune sand blown off the exposed lakebed to the west had just begun to accumulate over this soil when the first known human occupants arrived on the scene. Their

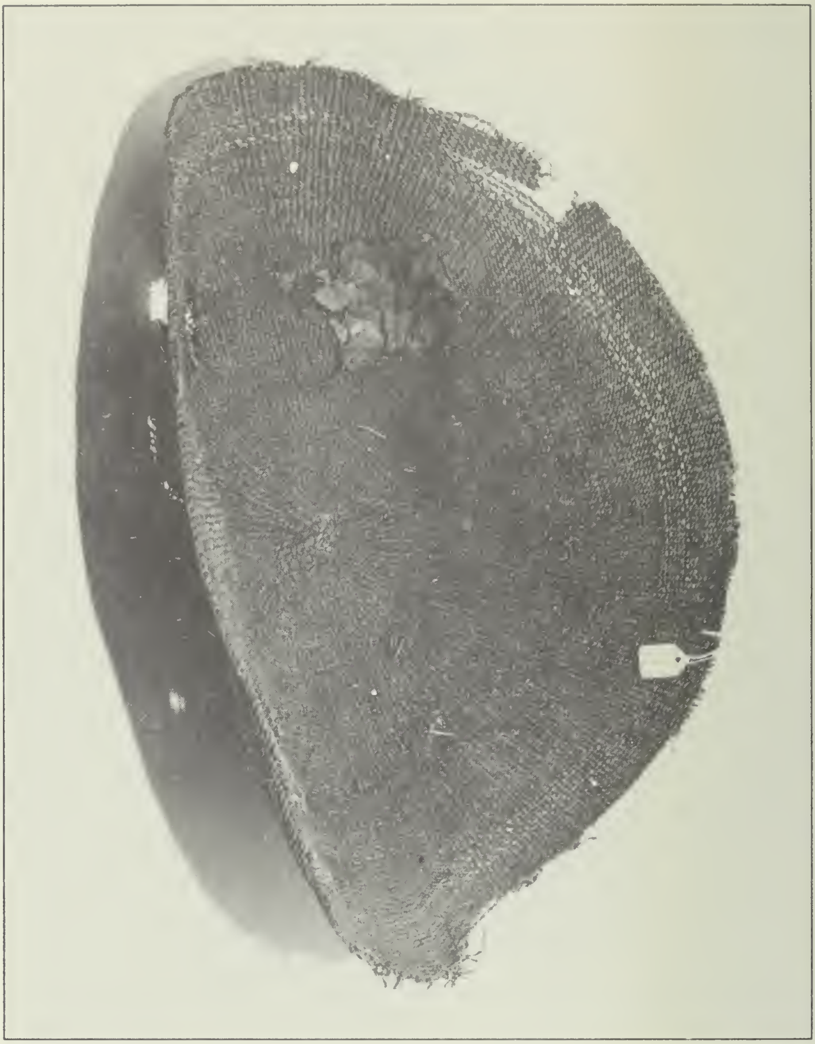


Figure 2.15 Large twined basketry tray from Chewaucan Cave.

encampment left an abundance of obsidian flakes, along with charcoal, bone fragments, and artifacts that included milling stone fragments, hammerstones, and cutting/scraping tools. Projectile points included Windust, Elko Eared, Elko Corner-notched, Elko Side-notched, and Humboldt Concave Base A types. Volcanic ash from the eruption of Mount Mazama fell during the time people were using the site, as shown by cultural material below, within, and slightly above the ash layer. The Mazama ash supplies a date for this occupation of about 7000 BP (Wilde 1985; Mehringer and Wigand 1985).

Figure 2.16 Skin bag from Chewaucan Cave.

Sand continued to accumulate, burying this early occupation to a depth of more than 10 feet before the dune was stabilized during a period of weathering that formed a distinct soil horizon. A few fragments of Northern Side-notched points and flaked bifaces were found on the weathered surface. A foot or so higher, in sands accumulated above this soil, was found a hard-packed living floor on which four firehearths lay scattered. Charcoal from one of these hearths gave closely congruent ^{14}C dates of 3315 and 3170 BP. Gatecliff Split stem points were found associated with the living floor, as were hammerstones and milling stone

Figure 2.17 Badger-head bag from Chewaucan Cave.

fragments. Sand continued to accumulate, burying this occupation as it had the two previous ones, until a weathering episode again stabilized the dune beneath a strongly developed red soil that caps the Skull Creek sand sheet today. Within this uppermost soil was found a firehearth that contained charcoal, obsidian flakes, bone fragments, and carbonized animal fat. Biotic remains from the hearth included inkweed or *wada* seeds, mountain sheep bone, and remains of small mammals, birds, and fish. Two ^{14}C dates on the hearth were 1900 and 1815 BP. A large surface site on a sand-covered flat a few hundred feet to the east probably represents the most recent occupation of the area.

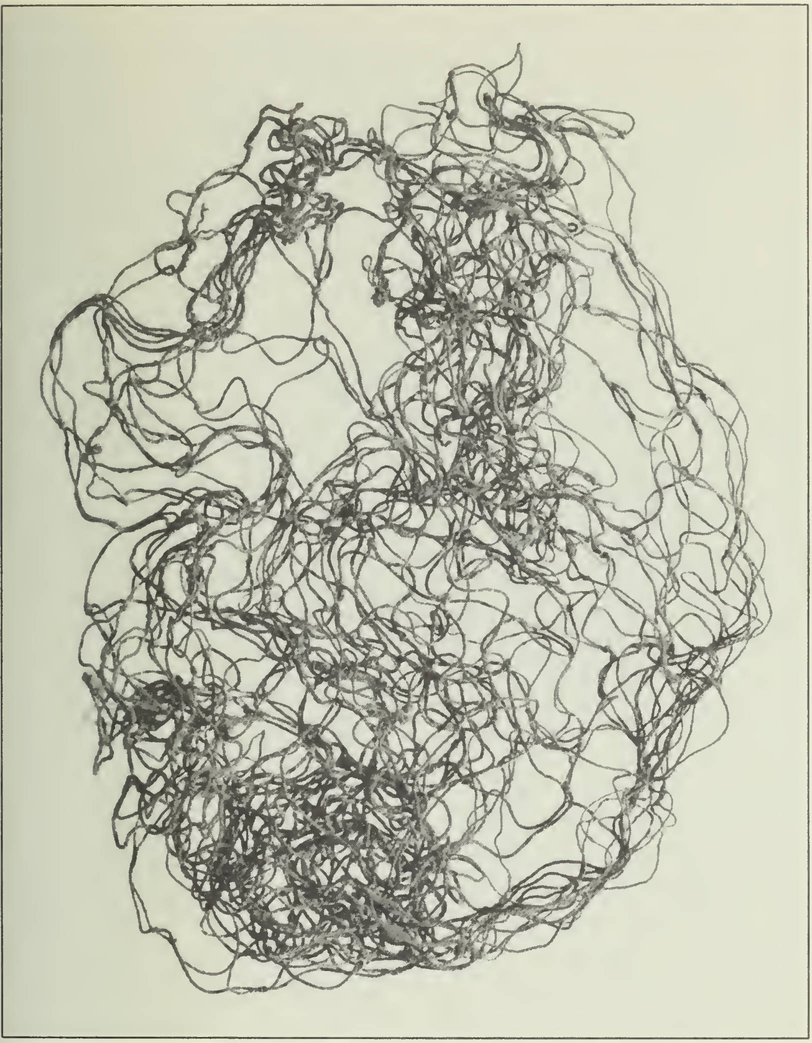


Figure 2.18 Small carrying net from Roaring Springs Cave.

The three sites just described—Catlow Cave, Roaring Springs Cave, and Skull Creek Dunes—are prominent representatives of a hunting-gathering lifeway practiced in the Catlow Valley over millennia. Catlow and Roaring Springs caves perhaps served as fall and winter bases for small groups which at other seasons ranged out to exploit the resources of the surrounding region. In ethnohistoric times some Northern Paiute groups wintered in the valley, and one of the remembered settlements was at Roaring Springs (Blyth 1938). The shelter and adjacency to wetlands resources afforded by Catlow and Roaring Springs caves might have long made them attractive for wintertime use, whether by Paiute or earlier

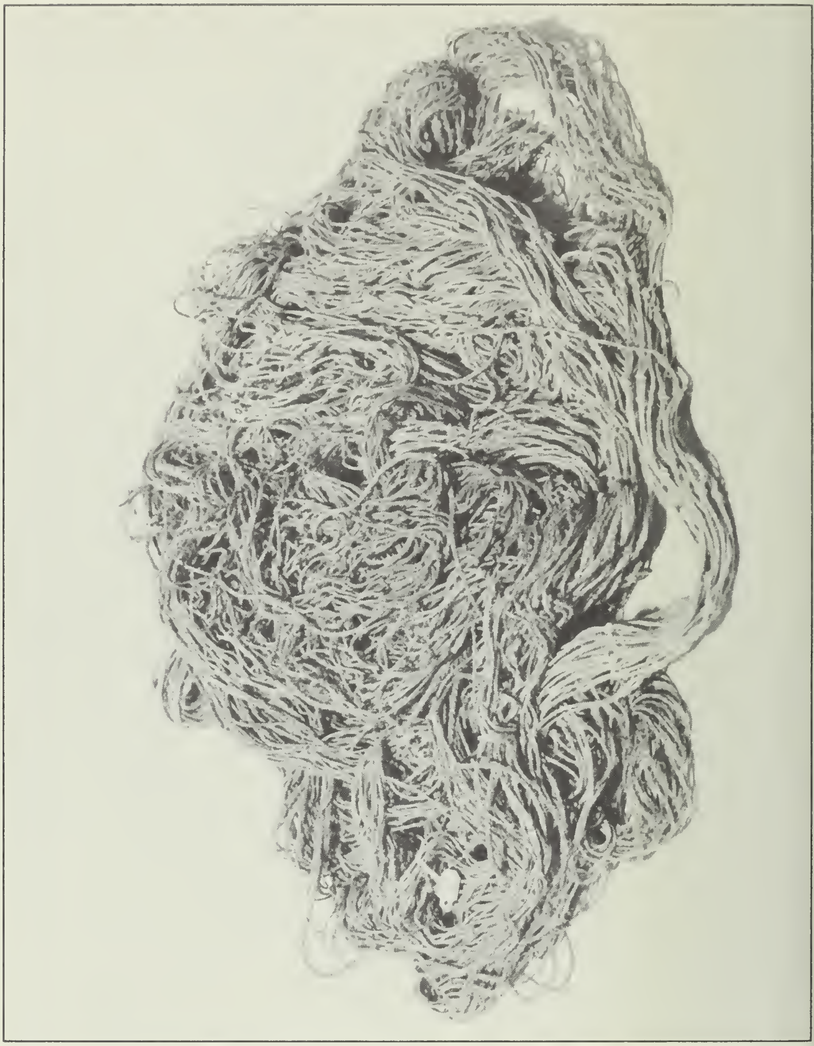


Figure 2.19 Large rabbit net made of plant fibers, from Chewaucan Cave.

peoples. The Skull Creek Dunes were more probably the scene of seasonal hunting and gathering forays, when people came to obtain fish from Skull Creek, *wada* seeds from the margin of the old lakebed, and perhaps the seeds of Indian ricegrass, which flourishes in sandy soils. All of the sites, being near water, would also have been favorable localities for stalking large game, and catching or trapping birds and small mammals.

Figure 2.20 Atlatl from Roaring Springs Cave.

Malheur Lake

The region around Malheur Lake, immediately north of Catlow Valley, has been another major focal point of human activity in the Northern Great Basin. Occupation there dates to the end of the glacial age, and ethnohistorically the Malheur region was the home range of the *Wadatika* Northern Paiute. These are the people whose seasonal round was presented at the beginning of this chapter to exemplify the general Great Basin hunting-gathering lifeway. Malheur, Mud, and Harney lakes form

Figure 2.21 Bow fragment and parts of arrows from Roaring Springs Cave. Note notched and sinew-wrapped end for attachment of bowstring.

an interconnected system of marsh and open water within a large structural depression surrounded by the Wagontire Mountains on the west, the Blue Mountains on the north, and Steens Mountain to the east and south. These upper elevations capture precipitation that is fed into the lakes via Silver Creek and the Silvies and Blitzen rivers. The resulting wetlands have for much of prehistory comprised the biotically richest locality—and most attractive human habitat—to be found in the region. The waters have, however, risen and fallen many times with climatic

Figure 2.22 Wooden snares from Chewaucan Cave. These snare parts were originally found in a skin bag.

vicissitudes, causing habitat changes that undoubtedly affected people's lifeways.

In fact, high lake levels during the mid-1980s, and the erosion that followed as lake waters receded, exposed many human burials and thousands of artifacts on the shorelines and islands of the Malheur Lake system. The archaeological significance of this event is still being assessed. The human skeletons were systematically reburied, but a great wealth of archaeological information was lost as artifact seekers swept into the area and illegally carried away the prehistoric evidence for personal collections or for sale. Reconnaissance surveys have disclosed a large number of sites, with projectile points, large biface blades, manos, metates, pestles, mortars, choppers, notched stone net weights, and other specimens lying exposed on the surface. Housepit depressions were also observed, as well as human skeletons that were documented and reburied in place. Projectile points collected for study ranged from Western Stemmed specimens of the earliest period to Desert Side-notched points of the latest period. The types found in greatest numbers indicate an intensification of occupation around the lake beginning about 4000 BP, and reaching a plateau after about 2000 BP (Oetting 1991). These revelations assure that future research will add much to the emerging picture sketched below.

The earliest human occupation so far known for the Malheur region is attested by large stemmed lanceolate points from several locations around Harney Lake. Specimens of the Windust type have been found both on modern playa surfaces and at higher elevation on a ridge quite distant from the lake (Fagan and Sage 1974). A lithic complex that included a point of Lind Coulee type, leaf-shaped points, a flaked stone crescent, and lithic flakes, has been identified from eroded contexts near an old beach line ^{14}C-dated to 8680 BP (Gehr 1980). Both the Windust and Lind Coulee types belong to the general Western Stemmed complex that is widespread in the intermontane west, and dated between 10,800 and 7,500 BP by some 75 ^{14}C dates from various localities (Willig and Aikens 1988: Table 3).

Archaeological survey has identified many later sites around Harney and Malheur lakes, along the Blitzen River, and elsewhere in the region. The artifacts found include arrowpoints and dart points for hunting, and milling stones for seed-grinding. Bones from excavated sites show that prehistoric people hunted land animals as small as rabbits and as large as bison. They also caught waterbirds and fishes. In all, the accumulating data suggest more and more that a winter-sedentary/ summer-mobile way of life like that of the historic *Wadatika* occupants has existed in the region for at least the last 4000 years. Brief accounts of several sites will show the state of our current knowledge, but first it is important to outline the excellent paleoenvironmental record for the region, which makes it possible to explore ecological relationships between human groups and their natural environment.

Wildhorse and Fish Lakes

Dramatic U-shaped canyons cut by glaciers on Steens Mountain, a few miles south and east of Malheur Lake, give evidence of ice-age cold in the region. By 13,000 BP the glaciers were melting back; a ^{14}C-dated sediment core from Wildhorse Lake, near the mountain crest, shows that the upper elevations were ice-free by 9500 BP. Pollen cores from Wildhorse and Fish lakes show cool, moist early Holocene conditions, followed by a long span of mid-Holocene time that was on average significantly more arid than the present. Relatively greater effective moisture returned during the late Holocene (Mehringer 1985). The period of decreased effective moisture is dated in the upper-elevation Wildhorse Lake core between about 7000 and 4000 BP, and in the middle-elevation Fish Lake core between roughly 8000 and 5500 BP (Figure 2.23). The two records strongly reinforce one another, their somewhat differing dates reflecting the complex relationships among precipitation, elevation, and temperature that jointly determine effective moisture.

Diamond Pond

A record of the last 6000 years at lower elevations is provided by an unusually detailed sequence from the deep sediments of Diamond Pond, at the base of Steens Mountain a few miles from Malheur Lake. The Diamond Pond core shows clearly how general climatic fluctuations caused local vegetation changes. Even more importantly, it documents the striking rapidity with which effective moisture levels fluctuated between wet and dry.

Sedimentary, pollen, and plant macrofossil evidence shows severe aridity from the beginning of the Diamond Pond record about 6000 years ago until about 5400 years ago. Then, for a long period between about 5500 and 2000 BP, marshland seems to have generally persisted in the area. A series of ^{14}C dates for juniper bark, twigs, and seeds from nearby fossil woodrat middens cluster between about 3400 and 2000 BP, documenting a downward expansion of juniper woodland during this interval. Pollen evidence dated about 2850 years ago shows that even during this generally moist period, however, the climate dried severely enough to replace marshlands with desert greasewood for some years. Quite possibly briefer droughts occurred as well, too short in duration to have left readable traces in the Diamond Pond sediments. This is suggested because a pollen record of unprecedented quality for the time after 2000 years ago at Diamond Pond shows that there occurred in quick succession a dry period, a moist period, a dry period, and a moist period (Table 2.2).

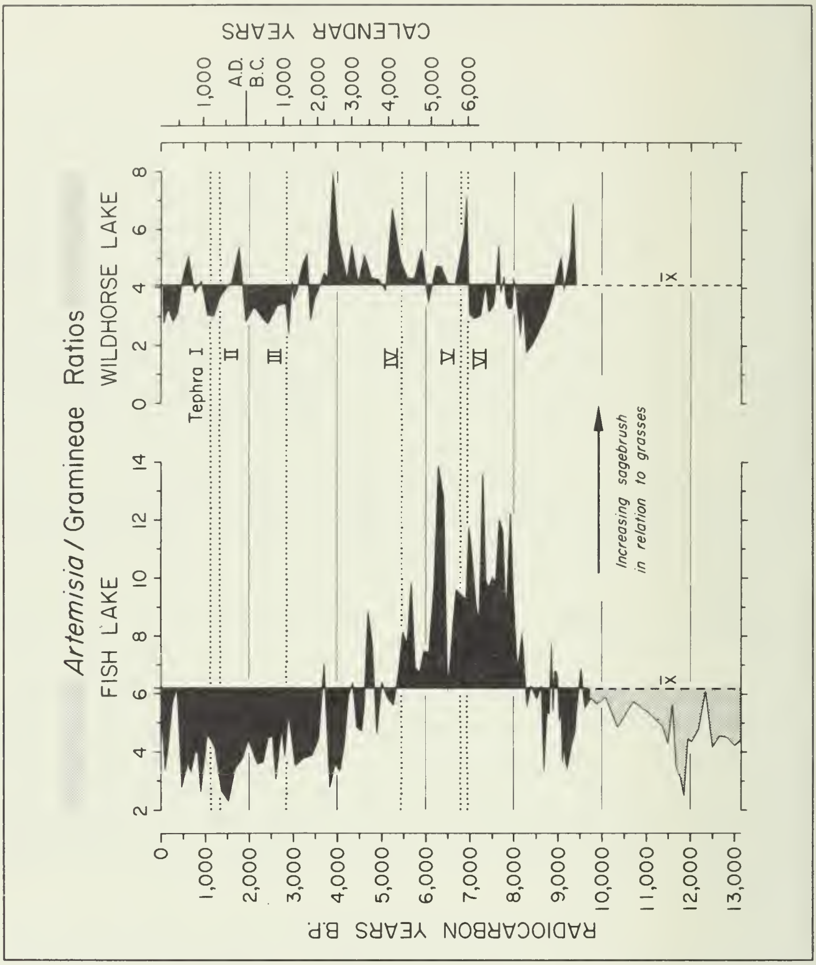


Figure 2.23 Sagebrush/grass pollen ratios for Fish and Wildhorse lakes, Steens Mountain (Mehringer 1985). The prevalence of sagebrush between about 8000 and 4000 BP indicates relative aridity; the prevalence of grasses before and after this interval indicates relatively greater effective moisture. The peaks and valleys in the diagram reflect short-term climatic fluctuations.

Each of these periods was very short in terms of geological time, but they certainly would have affected people, for they were of significant length as compared with an individual human life span. Within the 150 years or so since the end of the pollen record at Diamond Pond, Malheur Lake has fluctuated at least three times from high stands to conditions when the lakebed was almost entirely dry (Wigand 1987; Mehringer and Wigand 1990).

300-150 BP	GREATER EFFECTIVE MOISTURE	Abundant juniper and grass pollen reflects moister conditions. Numerous *Ceratophyllum* fruits indicate deeper, freshened water. Increased *Scirpus* macrofossils indicate shallower water.
500-300 BP	DROUGHT	Increased greasewood and saltbush pollen indicate drought; *Ruppia* seeds and pollen and the mollusk *Musculium* indicate shallow brackish water.
1400-900 BP	GREATER EFFECTIVE MOISTURE	More numerous grass pollen indicates greater moisture, abundant *Potamogeton* indicates deeper water.
2000-1400 BP	REDUCED EFFECTIVE MOISTURE	Increased sagebrush pollen indicates reduced moisture and re-expanding sagebrush steppe. More abundant *Scirpus* and *Rumex* macrofossils indicate shallow pond.
4000-2000 BP	GREATER EFFECTIVE MOISTURE	Abundant juniper and grass pollen, and juniper seeds reflect extensive juniper grasslands. Diamond Pond at deepest level 3700 BP.
5400-4000 BP	INCREASING EFFECTIVE MOISTURE	Increasing sagebrush pollen indicates sagebrush expansion into shadscale desert. *Scirpus, Rumex, Ceratophyllum, Polygonum* indicate perennial pond.
6000-5400 BP	DROUGHT	Greasewood and saltbush pollen dominant, indicating shadscale desert. Alternating silts and sands lacking aquatic plant macrofossils and pollen reflect periods of ephemeral ponds. Diamond Pond water level -17 meters.

Table 2.2 Pollen and macrobotanical record from Diamond Pond, showing environmental changes of the last 6000 years (Wigand 1987: 427).

The paleoenvironmental evidence shows clearly that prehistoric people of the Malheur Lake region had to cope time and again with major changes in their local surroundings. Under such circumstances, the inherent mobility of a hunting-gathering lifeway was a highly adaptive characteristic. When a given locality was hard-hit by drought, or perhaps by flooding, a group could simply shift its course of movement through the annual cycle, going to alternative places where food and water remained available. No new knowledge or technology would necessarily have been required to make such adjustments. Given the altitudinal and geographical variety of the Northern Great Basin environment, there would always have been productive locations somewhere that could be exploited according to established ways. Current understanding of the region's human ecology thus suggests that climatic vicissitudes primarily affected the settlement pattern rather than the material culture of the people. Cycles of occupation, abandonment, and re-occupation of various localities must have been commonplace, and indeed alternating periods of light and heavy use do seem to be reflected in the evidence from various archaeological sites.

Headquarters Site

The Headquarters Site, which lies on the southern edge of Malheur Lake beneath the modern administrative complex of the Malheur National Wildlife Refuge, has produced projectile points of types that span the last 7000 years. The most abundant specimens, however, are of types dated after about 4000 BP, and probably the site's most intensive occupation has been since that time. The unusually favorable circumstances of its location made the Headquarters Site attractive to human occupation over a long period. Being near the lakeshore yet on the edge of higher ground, and close to the mouth of the Blitzen River where it entered Malheur Lake, the site was not only safe from flooding, but placed people at the juncture between lake-marsh, riverine, and sagebrush-grassland zones and their characteristic resources. A high-volume spring also provided potable water in quantity (Aikens and Greenspan 1988).

Archaeological studies at the Headquarters Site have been limited to small-scale testing and the monitoring of excavations for recent construction. The locality is very incompletely known. Although stone artifacts and the bones of food animals suggest quite intensive occupation, house structures have not been identified at the site. The fact that a number of human burials were exposed by early construction activities suggests, however, that the site was probably a village center.

The bones of tui chubs, suckers, muskrats, and jackrabbits heavily dominate the faunal assemblages that have been studied. The fish and muskrats strongly indicate the dietary importance of the lacustrine zone, while the jackrabbits suggest drive hunting in the adjacent sagebrush-grassland. Surprisingly, given the site's location, birds were not common. Arrow points and other flaked stone tools give evidence of hunting, but no fish hooks or other identifiable fishing tools were found. Nets or baskets, such as used for fishing in ethnographic times, would not of course have survived in the unprotected site deposits. The processing of wild seeds, bulbs, and tubers from local plants is indicated by the occurrence of millingstones, handstones, mortars, and pestles.

Squaw Pit Site

On the north shore of Malheur Lake is the Squaw Pit Site, located on slightly elevated ground near the mouth of a large stream. This important site has been gravely damaged and looted by artifact collectors, whose careless digging has effectively destroyed it. Limited archaeological tests have, however, revealed a house floor in one of the circular depressions that gave the site its name. Apparently this was once a fairly substantial village settlement. Abundant flaked obsidian, milling stone fragments, and broken animal bones discarded by the looters show that the site was intensively occupied. Being in a very favorable location, it was probably occupied repeatedly over a long span of time. Small arrowpoints place its period of use roughly within the last 3000 years (Goddard 1974).

Blitzen Marsh and Hogwallow Spring

The Blitzen Marsh Site, on the Blitzen River a few miles south of Malheur Lake, also exhibited apparent housepit depressions on its surface, and test excavations gave evidence of floors there as well (Fagan 1974). Nine ^{14}C dates spread between 2350 and 170 BP clearly demonstrate repetitive occupation throughout the late prehistoric period, while the projectile point assemblage includes types that imply visitations possibly as early as 7000 BP.

Plant food processing at Blitzen Marsh is indicated by the finding of manos, metates, mortars, and pestles. Many bones of small and medium-sized animals such as muskrats, hares, and birds were recovered from the excavations. Large animals such as deer were less well-attested. Fish bones, shellfish remains, and eggshells were also recovered. Projectile points, knives, scrapers, and other flaked stone tools associated with hunting and processing were well represented. In all, the combined evidence of residential architecture and a diverse food supply suggests quite definitely that the Blitzen Marsh Site was a village during at least its late prehistoric occupation.

The Hogwallow Spring Site, very near by, may have been a non-residential satellite of the village at Blitzen Marsh. No house remains were found, but a heavy emphasis on fishing and the hunting of small to medium-sized mammals is attested by the faunal assemblage (Greenspan 1990a). Indeed the unusually high proportion of fish bones at Hogwallow Spring has fostered the suggestion that it may have been a specialized seasonal fish camp, like those common among the historic Klamath. Tui chubs and suckers, the two fishes most commonly found at Hogwallow

Spring and other sites, both spawn in the shallow waters of lake edges and streams. During spring and summer they school in great numbers, making them an important food resource easily taken. Ethnographic Northern Paiute peoples of Oregon used a variety of equipment in fishing, including nets, weirs, baskets, traps, harpoons, arrows, and hooks. Poison was also used to stupefy fish, which could then be scooped from the surface. Clear archaeological evidence of such a perishable fishing technology was not found at Hogwallow Spring, but even in the absence of fishing tackle the bones tell the essential story.

Dunn Site

Several miles east of Blitzen Marsh, on the northeastern edge of Diamond Swamp, is the remnant of another prehistoric village (Musil 1990, 1992). Excavations at the Dunn Site revealed a semisubterranean house roughly 13 feet in diameter that exhibited a central firehearth, a shallow storage pit dug into the floor, and indications of postholes around the edges. Charcoal from the floor gave a ^{14}C date of 3255 BP. Inconclusive traces nearby suggest the former presence of one more structure, and it is possible that others were destroyed by road construction which removed the western portion of the site. A much earlier occupation is suggested by one Western Stemmed projectile point found beneath the house floor. A later occupation is poorly attested above a layer of cinders, which fell on the site from an eruption at nearby Diamond Craters sometime after 3200 BP. These earlier and later finds, though not particularly informative, do indicate that the site was intermittently attractive to people over a long period of time.

Artifacts from the housepit included a series of Elko Eared projectile points; flaked stone bifaces, drills, and scrapers; and fragments of manos, metates, and pestles. Beads and polished fragments of bone were also found, as well as shell disk beads. The fill of the storage pit was subjected to flotation analysis, and found to contain charcoal of pine and sagebrush, grass stems, juniper seeds, and fish bone fragments, as well as lithic flakes. The hearth fill contained similar materials, and further included eight seeds of the goosefoot family and one mustard seed; both species were of dietary importance to ethnographic peoples (Stenholm 1990).

Over 5000 bone specimens, most highly fragmented and some charred, were recovered from the Dunn Site excavations. The remains of artiodactyls (possibly including deer, elk, antelope, sheep, bison) were most common, followed by bones of leporids (jackrabbits and cottontails), small rodents, fish (tui chubs, suckers), and muskrats. Overall, the assemblage suggests a generalized hunting pattern, exploiting species of both aquatic and terrestrial habitats in the site vicinity. Notably, however, the most numerous specimens also represent the largest kinds of animals, indicating a first-rank importance for big game hunting. In this respect the Dunn Site differs from other marshland sites of the area, where fish and smaller animals were relatively better-attested (Greenspan 1990b).

McCoy Creek Site

The nearby McCoy Creek Site affords a final and well-documented example of sedentary village occupation (Musil 1991, 1992). Located at the narrows between Diamond Swamp and Diamond Valley to the east, the site is quite near the base of Steens Mountain. Excavations in a deep, rich cultural deposit revealed a complex of two firehearths, two storage pits, clusters of flaked and ground stone tools, and thin patches of clay. These features represent two sequent and overlapping house floors, the edges of which were indistinct. A ^{14}C determination of 1900 BP comes from beneath this complex, and features associated with the house floors were dated at 1480, 1340, 1270, 1140, and 990 BP.

Another house was discovered close by at a slightly higher level within the site (Figure 2.24). Its floor was shallow and roughly circular, 12 feet in diameter, defined by dark-stained earth and some small-diameter burnt posts at places around its edges. Near the center of the floor was a large firehearth, and shallow pits had been dug toward the walls on either side. Charred poles and some fragments of grass thatch lay on the floor, along with scattered flaked and ground stone artifacts. These suggest that the structure burned while in use. This dwelling closely resembles in its details the typical winter house of the ethnographic *Wadatika* Northern Paiute. A ^{14}C date of 480 BP on charcoal from the floor places it in very late prehistoric times, congruent with such an identification.

Excavations turned up traces of an earlier floor beneath this structure, and trench profiles elsewhere in the site indicated two additional house structures. Thus it is evident that McCoy Creek was a site of some importance in the area, occupied on different occasions over a considerable period.

The artifact assemblage from McCoy Creek was large and diverse. The main classes included flaked stone projectile points, preforms, drills, scrapers, and cores, as well as ground stone manos, metates, hopper mortars, and pestles. A ground stone pipe bowl, bone beads, and a single bead of *dentalium* shell were also found. Projectile points were numerous,

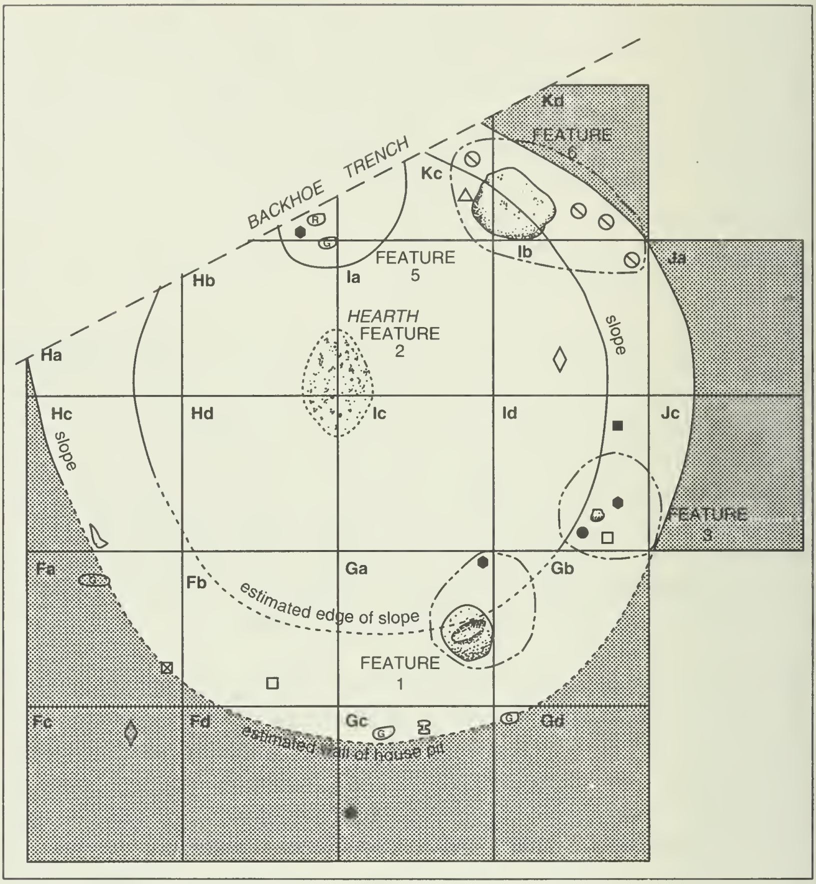


Figure 2.24 Late prehistoric wickiup floor from McCoy Creek (Musil 1992).

with 140 classifiable specimens. Most of those associated with the earlier house floors were of the Rosegate category, but a few Elko and Gatecliff points were also recovered. Associated with the later house were Desert Side-notched, Cottonwood Triangular, and small pin-stem corner-notched points that are reminiscent of types common along the Columbia River.

An unusually rich and varied vertebrate faunal assemblage from McCoy Creek included nearly 47,000 specimens, of which 18,000 were analyzed in detail (Greenspan 1991). Bones from the early pre-architectural occupation were relatively few, but those associated with the earlier and later house occupations were highly informative. Aquatic animals included mink, muskrat, ducks, grebes, coot, fishes, and spotted frog. Terrestrial animals included artiodactyls, canids, bobcat, rabbit, hare, marmot, a variety of small rodents, sage grouse, various perching birds, and some reptiles. The fauna shows that the people of McCoy Creek exploited all the major habitats in their vicinity—marsh, lake, stream, upland—in obtaining a wide range of animals that provided food as well as skins and bone for household manufactures. Numerous eggshell fragments indicate that people were at the site in late spring and early summer, but evidence for other seasons of occupation is not definitive.

It is notable that fish and fur-bearing mammals are most strongly represented in the occupation dated between about 1500 and 1000 BP, while large game animals were best-represented in the occupation dated around 500 BP. This corresponds strikingly with paleoclimatic evidence from nearby Diamond Pond, which shows that the earlier period was one of generally greater effective moisture in the area, while the later time was one of marked drought.

A diverse botanical assemblage was derived by flotation analysis of soil samples from hearths and storage pits in the McCoy Creek house structures (Stenholm 1991). Charred sagebrush, willow/poplar wood, and bunchgrass were common, with seeds of goosefoot and other species also well-represented. The firehearth dated to 1270 BP yielded 12 plant taxa; the bulk of the material was charcoal of sagebrush, with willow/poplar and grass also represented. Nearly 100 charred seeds were mostly of goosefoot and various grasses, but knotweed, dogbane, and possibly fleabane were present in trace amounts. A few sweet clover or alfalfa seeds are Old World species that must have been intruded by bioturbation. The chenopod seeds were popped open by parching, and the enclosing glumes of the grass seeds had been removed by threshing. All these seeds ripen in late summer, and could have been collected in the site vicinity. The botanist's interpretation of these data is direct and concise:

> In sum, the assemblage contains plants useful as fuel (big sage), construction material (willow, poplar, and mock orange), flooring and structural material (bluebunch wheatgrass and other bunchgrasses), cordage (dogbane), and edible material including the seeds and fruits of goosefoot, juniper, bunchgrass, and knotweed (Stenholm 1991:142).

Lost Dune Site

Perhaps one of the latest documented occupations in the Malheur Lake vicinity is that from the Lost Dune Site, not far north of Diamond Swamp (Thomas, Loring, and Goheen 1983). Nearly 200 fragments of Paiute/Shoshoni pottery were collected from a surface blowout in a sand dune field. This is a very large collection for the Northern Great Basin, where pottery is extremely rare. A number of Desert Side-notched arrowpoints, also comparatively rare in the area, were collected in the same place. These artifacts suggest a very recent date, probably within the last several hundred years. Desert Side-notched points and pottery are considerably more prevalent at sites farther south in the Great Basin, and their appearance in Oregon suggests the arrival of Northern Paiute peoples from that direction in late prehistoric times.

Stinkingwater Mountain

Sites in more distant upland settings are also pertinent to understanding human occupation patterns in the Malheur region. Archaeological surveys have documented many small lithic scatters, often with milling stone fragments, in the surrounding mountains. One special locality is Stinkingwater Mountain, northeast of Malheur Lake. Shallow rocky soils extend over many miles there, providing optimum habitat for a variety of plants with edible roots. In ethnographic times this was an important root ground for the *Wadatika* and other Northern Paiute groups, and modern Paiutes from Burns, Warm Springs, and other places still go there to dig sego lily, bitterroot, yampa, wild onion, and biscuitroot. A number of archaeological sites have been recorded, and projectile points and other artifacts observable on the surface suggest widespread occupation over the last 4500 years or more.

Excavations at Indian Grade Spring, on the western slope of Stinkingwater Mountain, recovered lithic assemblages that indicate generalized hunting-gathering and tool-making activities: projectile points, bifaces, scrapers, drills, knives, spokeshaves, cores, choppers, manos, and metates (Jenkins and Connolly 1990). Charcoal from several small firehearths and a large rock-filled roasting pit gave ^{14}C dates of 2840, 2000, 1670, 1440, 1410, 1150, and 530 BP, suggesting repeated visitations over a long period. No evidence specifically definitive of root harvesting was found, but stone tools that suggest woodworking could have been used in making the digging sticks of tough wood (such as mountain mahogany) that are essential to root collecting (Kiigemagi 1989). Beyond these indications, the best clue that Indian Grade Spring may have been a root camp comes simply from its location in a prime root-digging area. It and many other sites imply that the root ground on Stinkingwater Mountain has continued to be exploited over thousands of years.

Steens Mountain

East and south of Malheur Lake lies Steens Mountain, already mentioned in the preceding discussions. An extensive survey project assayed the archaeology of this dominating highland physiographic feature within a frame of reference that included the Catlow Valley on the west, Steens Mountain in the center, and the Alvord Basin on the east (Aikens, Grayson, and Mehringer 1982). Most previous studies in the Northern Great Basin had focused on major sites that were apparently long-term encampments, but archaeological information on lesser but more numerous short-term occupation sites had not been systematically developed. A central goal of the Steens Mountain prehistory project was to locate and study a large sample of human activity sites within the region as a whole. The hope was to assess how such sites might have functioned in the annual round of their ancient occupants, and how site use patterns might have changed over time in concert with environmental change. Steens project excavations at Skull Creek Dunes, and related data from Catlow and Roaring Springs caves, have already been described. Here the survey-based study of land use patterns is the focus of attention.

The paleoenvironmental data discussed earlier from Wildhorse Lake, Fish Lake, Diamond Pond, and Skull Creek Dunes were also gathered in the context of this Steens program (Figure 2.23, Table 2.2). At the outset of the Steens project it was speculated that drier conditions may have fostered a general shift of human populations toward higher, cooler elevations, and a clustering of settlements around a relatively limited number of stable and dependable water sources. Conversely, it may have been that during periods of cooler/moister climate, people might have occupied a greater variety of places, in a more dispersed pattern. More subtle changes might also have taken place.

Three summers of systematic survey mapped and documented surface materials in Catlow Valley, on Steens Mountain, and in the Alvord Desert. Occupied locales ranged from desert marshes on the valley floors at about 4000 feet elevation to upland stopping-places at almost 9,000 feet on Steens Mountain. From sample tracts covering approximately 5% of the total project area, 133 sites were recorded; 106 of these were mapped and collected, yielding some 146,000 artifacts. Sites consisted of dense artifact scatters. Many finds were, however, so diffusely scattered as to demand that they not be recorded as sites, but as individual or "off-site" items; nearly 13,000 "off-site" artifacts were individually mapped and collected. Of the 159,000 artifacts thus obtained, approximately 95% were unretouched lithic flakes. These flakes, classified into a number of technological and functional types, included both lithic manufacturing debris and use-worn expedient tools. Among the small percentage of retouched and formally shaped artifacts were nearly 1300 projectile points, which were used to seriate the observed occupations in terms of six periods from 10,000 BP to historic times (Beck 1984; Jones 1984).

Statistical analysis showed that no significant change over time could be documented in the technological and functional types making up the voluminous flake artifact collection. The important finding was, rather, that effectively all analyzed types persisted in the region throughout the period of record, essentially the last 10,000 years.

Further analysis, aimed at determining individual site function through study of the kinds of artifacts found at various locations, led instead to an initially unwelcome but in fact crucial and far-reaching methodological realization—that differences in the variety of artifact types seen in individual site collections were due merely to sample size variation. Detailed quantitative study showed overwhelmingly that small collections consistently yielded few artifact types (and those the most common ones), while progressively larger collections yielded progressively more types. This of course reflects nothing more than the simple statistical fact that rare types naturally tend to show up most often in large samples, and seldom in small ones. This realization prevented the drawing of what might otherwise have seemed an obvious conclusion, that small sites with few artifact types were temporary camps or special function sites, while larger sites with more types were general-purpose base camps. In fact, it became clear that both kinds of sites could have served the same functions; those with the larger and more diverse artifact assemblages may simply have been more favorably situated and therefore attracted more visitors (who discarded more artifacts) over the long run (Jones, Grayson, and Beck 1983).

A special study of one part of the Steens area — the Catlow Uplands, where the best data were available— resolved the question in part. It showed that the dense concentrations designated as sites were largely composed of lithic manufacturing debris. They also contained, however, significant numbers of use-worn flake artifacts of various types. These observations indicated that lithic flakes were made at the sites for use as tools, and that some were actually used and discarded there. The more sparsely scattered "off-site" specimens were, by contrast, predominantly use-worn tools rather than flaking debris; these areas were clearly zones of artifact use and discard rather than manufacture (Jones, Beck, and Grayson 1989).

Further analysis may yet suggest some additional differentiation of functions among the various site concentrations, but so far it seems clear that in general, sites in the Catlow Uplands were places where activities were both staged (that is, tools were prepared), and carried out (that is, tools were put to use), while off-site areas were places where activities were carried out only. Precisely how the Catlow Uplands may have been utilized in the annual round of its occupants over the years remains difficult to specify, because the simple, generalized tools that make up the archaeological record could have been used for a variety of hunting, gathering, and processing tasks. Whatever these tasks were, the uniformity of tool types across all periods suggests that activities did not vary greatly over time. Broadly speaking, the lack of evidence for substantial architecture at any period implies that occupation was always quite ephemeral, and probably limited to the warmer seasons of the year. One dimension along which occupation does seem to have varied, however, is intensity, as discussed further below.

Changes through time in site frequency and size of site area indicate clear temporal shifts in the aggregation of human populations in the Steens Mountain region generally (Table 2.3). These shifts may be related to environmental fluctuations in somewhat the way originally hypothesized. Site frequencies were low at 10,000-6000 BP, rose at 6000-4000 BP, peaked at 4000-3000 BP, declined at 3000-2500 BP, and rose again after 2500 BP. Site area showed contrasting trends. Sites were large at 10,000-6000 BP, smaller at 6000-4000 BP, larger at 4000-3000 BP, larger still at 3000-2500 BP, and smaller after 2500 BP. The meaning of these changes is not wholly clear, and there are some minor variations from area to area that are also difficult to understand, but some speculations may be advanced.

	10,000-6000 BP	6000-4000 BP	4000-3000 BP	3000-2500 BP	After 2500 BP
Site Frequencies	Low	Rose	Peaked	Declined	Rose
Site Sizes	Large	Smaller	Larger	Larger Still	Smaller

Table 2.3 Relationships between site frequency and site size over time in the Catlow Uplands (Beck 1984: Figure 125).

The site location data show quite definitely that between about 10,00 and 6000 BP, people occupied the uplands very little, but returned again and again to lowland settings associated with lakes, marshes, streams, and dunes. Thus, sites in such places gradually came to cover large areas. Within this interval, climatic data suggest a relatively moist regime between about 10,000 and 7500 years ago but a markedly drier regime thereafter. The reason people were attracted to moist lowlands in the early period is easy to fathom, but why would they persist in coming to the old sites once drought set in after 7500 BP? On reflection, this is no mystery either, because even under conditions of general drought, lowland streams and marshes—the ultimate collection points of runoff from cooler, moister upland catchments—would tend to remain the best-watered localities available within any given drainage system.

Site distributions show that between about 6000 and 3000 BP, people ranged out to a greater number of localities. With many more occupied locations during this period, any given site was used less frequently and therefore sites in general did not grow as large as they had during the preceding period. Notably, many of these smaller sites were in upland settings that had been little occupied earlier. This increasing dispersion of the human population may reflect an improving moisture regime, which became quite markedly better after about 5000 years ago. Some general growth in the regional population may be suggested as well, by the fact that both site numbers and site areas were relatively large around 3000 BP.

The interval 3000-2500 BP was characterized by fewer but larger sites. This is a pattern reminiscent of that seen between 10,000 and 6000 BP, when people were particularly attracted to moist lowland sites. It is important to observe that this is also the time when villages reflecting semi-sedentary occupation appeared around Malheur Lake, immediately to the north. Following 2500 BP, sites were again more numerous but smaller. This is a pattern like that of the 6000-3000 BP interval of generally improving effective moisture. After 2500 BP the climate was fluctuating at short intervals between increased and decreased effective moisture, but perhaps the average effect of these up-and-down fluctuations was not dissimilar to the average effect of gradual improvement from lower to higher effective moisture during the earlier period. Further analysis will be needed to render a fully satisfying account of these phenomena, but the Steens data do make it clear in the broadest sense that human patterns of aggregation and dispersal were affected by climatic fluctuations throughout Holocene times.

Alvord Desert and Trout Creek Mountains

Other land-use studies have been conducted east of Steens Mountain, in the Alvord Desert and the Trout Creek Mountains beyond (Pettigrew 1984; Pettigrew and Lebow 1989). An interpretation based on this work suggests an early Paleo-Indian/Pluvial Lakes period (12,000-7000 BP) during which people clustered largely around the margins of lowland lakes and marshes. A Transitional Archaic period (7000-5000 BP) followed, during which lakes and marshes dried, human population diminished, and settlements clustered around limited water sources; during this time intensive use of the uplands began, and the collecting of seeds and roots became essential to human subsistence. During the Full Archaic (5000 BP-historic times), populations expanded dramatically in both lowlands and uplands, with the period 4000-2000 BP being one of particularly favorable environment and successful human adaptation. This scenario, though presented within a slightly differing chronological framework, sketches broad trends quite congruent with those seen in the neighboring Steens Mountain region.

Dirty Shame Rockshelter

In the Owyhee uplands of extreme southeastern Oregon, Dirty Shame Rockshelter (Figure 2.25) provides a long record of human occupation that broadly parallels those from the Connley and Catlow Valley caves, but yields as well a variety of more detailed information (Aikens, Cole, and Stuckenrath 1977). There excavations penetrated to a depth of over 15 feet, recovering rich cultural remains from the uppermost six feet or so of dry deposit, and limited evidence below that level. Twenty-two ^{14}C dates span a period from 9500 to 365 BP, but a gap in the dates between 5850 and 2750 BP indicates that the site saw little or no human occupation during that 3000-year interval. An occupation reminiscent of the Windust phase in the Columbia Plateau was evidenced in the earliest levels, but by shortly after 8000 BP the culture of Dirty Shame was definitely of Great Basin character (Hanes 1988).

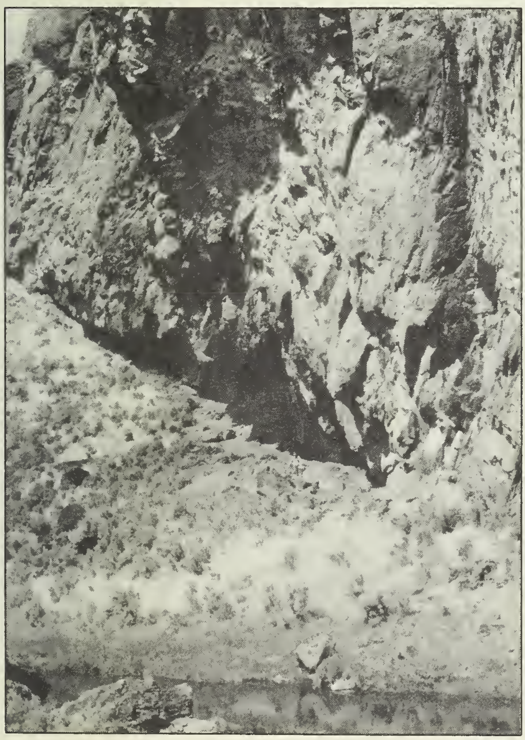


Fig. 2.25. Dirty Shame Rockshelter, Malheur County, Oregon.

Figure 2.26 Projectile points from Dirty Shame Rockshelter. The specimens are arranged with earliest types at the bottom, and the latest on top.

Perhaps the most arresting conclusion to come from the Dirty Shame study is that the general way of life of its occupants, and much of their technology, changed scarcely at all over the entire period of record (Figures 2.26-2.30). Milling stones for seed processing, and projectile points, knives and scrapers used in the hunt, were well represented in all occupation levels. Projectile point styles changed over time, and there were minor shifts in the frequency of certain other types, but the same functional classes of tools were present throughout (Hanes 1988). The animal bones left in the rockshelter indicate that the occupant's diet was

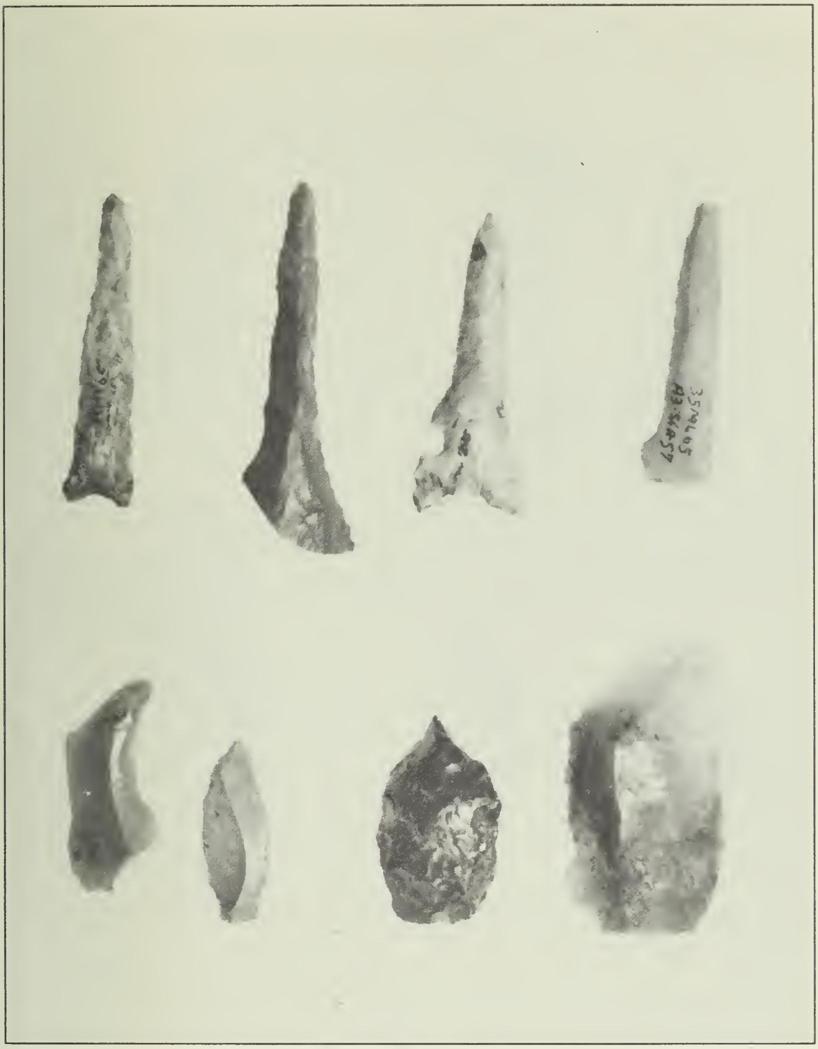


Figure 2.27 Stone drills and gravers from Dirty Shame Rockshelter.

also much the same throughout the site's history. Jackrabbits and cottontails, marmots, antelope, mule deer, and bighorn sheep were substantially represented in virtually every level. The plant and animal remains found in desiccated human feces, or coprolites, add to the picture of a diet composed of locally available species:

> The coprolites from Zones I, II, and IV at Dirty Shame Rockshelter reflect a well balanced vegetable and animal dietary composed largely of species preferring riverine and riparian habitats. The

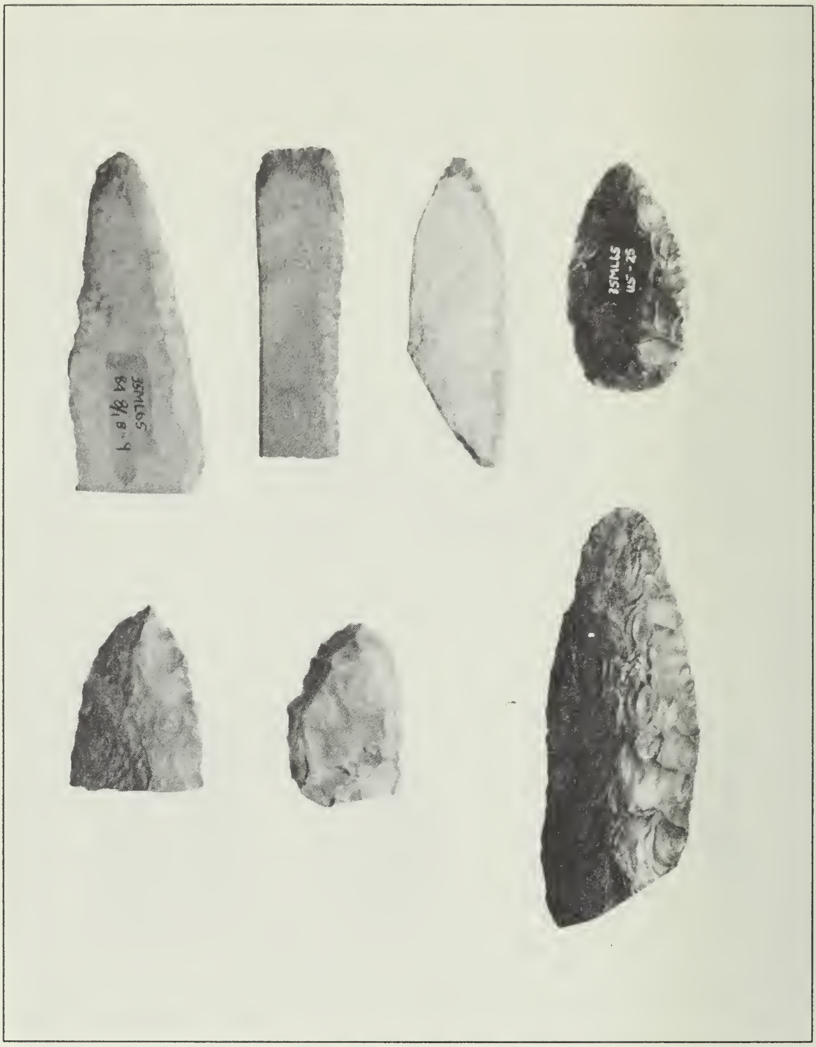


Figure 2.28 Flaked stone knives from Dirty Shame Rockshelter.

meat diet of small mammals, antelope, freshwater crayfish, shellfish, fish, and insects was complemented by plant foods which included sunflower and goosefoot seeds, pricklypear, sego lily, wild onion, and fruits of the wild rose and cherry. The greater portion was exploited in the locally restricted moist canyon bottoms while the more extensive dry upland probably contributed pricklypear, antelope, and lagomorphs (Hall 1977:10).

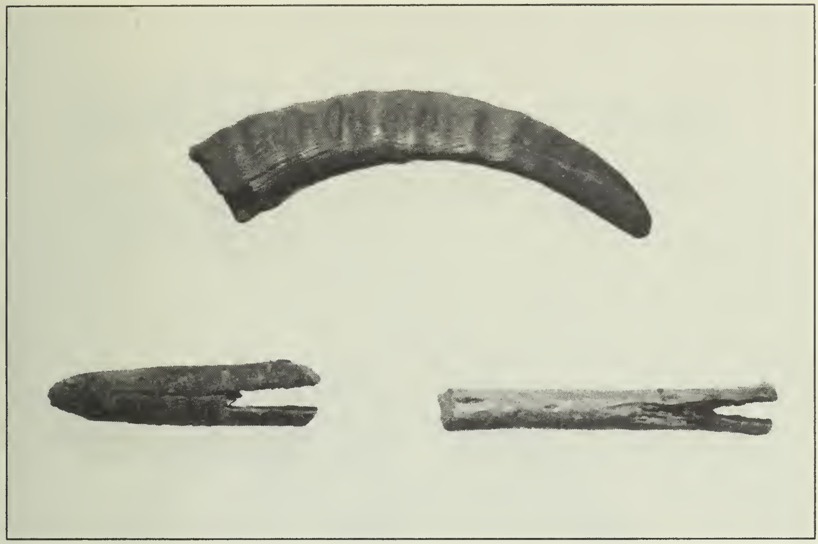


Figure 2.29 Hafts for stone knives from Catlow Cave. The mountain sheep horn (above) is hollowed at the broad end for insertion of a stone blade. The two wooden specimens (below) probably once had fiber or sinew lashings to hold stone blades in the notches.

A quantitative study of plant remains indicates that between roughly 9500 and 7500 years ago, vegetal food harvesting was concentrated on plants which ripen in the late spring and early summer. Thereafter, species which become available at various times from late spring through fall were collected, with some short term fluctuations in emphasis on one or another part of the gathering season (Sanford 1983: Figure 6). In general, the implication is that after about 7500 BP people spent the better part of a long summer season harvesting plant foods around Dirty Shame Rockshelter.

Change over time in the local biotic environment was apparently small, yet significant. Analysis of plant parts and pollen from the site indicates that there have been no vegetational changes of ecological significance near the rockshelter since the inception of the record. The plant remains also suggest that moisture patterns like those of the present—autumn\winter\spring precipitation with occasional summer thunderstorms—have prevailed throughout (Sanford 1983). On the other hand, analysis of the site's mammalian fauna indicates a small but significant shift in local conditions that roughly correlates in time with climatic trends documented from many other localities all over the west (Grayson 1977).

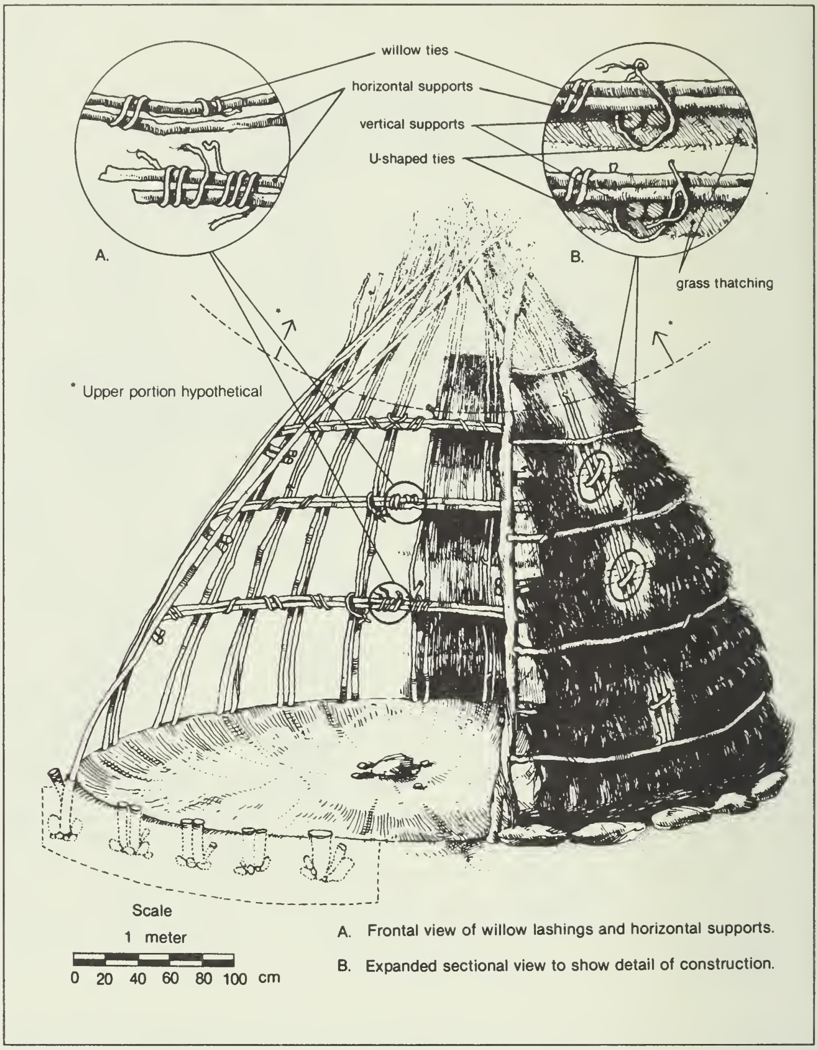


Figure 2.30 Reconstruction drawing of pole-and-thatch wickiup from Dirty Shame Rockshelter, based on data from excavation (Willig 1982).

In levels dated before about 8000 BP the bones of mammals which occupy relatively moist habitats, and those of mammals which occupy relatively dry habitats, were present in roughly equal abundance. After that time, there was an uneven but cumulatively significant decrease in the percentage of bones from creatures of moister habitats, and an increase in the bones of creatures of drier habitats. As noted above, the site provides no record for the period 5850-2750 BP. In levels occupied after 2750 BP an apparent reversal of the previous drying trend appeared, but the relative abundances of the two types of mammals never returned to pre-8000 BP levels; the record ends at about 400 BP with the animal indicators still suggesting a climatic regime drier than that in evidence prior to 8000 BP.

Human occupation at Dirty Shame Rockshelter was clearly affected by the climatic fluctuations noted. The break in occupation beginning about 5850 BP came at a time of decreasing effective moisture. Apparently, as the landscape dried, the abundance of natural food resources in the area shrank to a level that made travel there unprofitable. Regular use of the site resumed after 2750 BP, probably because better environmental conditions had raised the local food resources to a level of abundance that made the harvest worth coming for.

The activities that took place at Dirty Shame Rockshelter before and after the time of abandonment were closely similar, but not identical. Stone drills, gravers, uniface scrapers, and use-chipped flakes were more common in the later deposits, suggesting that more woodworking, bone-working, and hide-working chores were carried out at the site than had been the case earlier. Most importantly, a series of small conical or domed house structures framed with poles and thatched with native rye grass were attested in the later levels (Figure 2.30). These suggest that people lived at the site for extended periods during the later occupation. The plant and animal remains from both the earlier and later periods suggest that people were at the site for the late summer-early fall harvest. The houses and other evidence of increased domestic activity during the later period suggest that during this time the site might have served also as a winter encampment. The Owyhee uplands are cold and snowy in the winter, but the setting of Dirty Shame Rockshelter, in a deep canyon out of the wind, with a broad southern exposure to catch the winter sun and a high rhyolitic cliff to store warmth, makes this a plausible interpretation.

The other change of note at Dirty Shame was the appearance in the post-2750 BP levels of small projectile points for use with the bow and arrow. Points found in the earlier occupation were larger types, for use with the atlatl and dart, and perhaps with the thrusting spear. Dart points continued to occur after the break in occupation, suggesting that the atlatl and dart continued in use to some extent even after the introduction of the bow and arrow. In addition to the projectile points themselves, these hunting weapons were represented at Dirty Shame by wooden dart foreshafts notched for the insertion of a stone point, by arrow shafts and split feathers for fletching them, and by a fragment of a wooden bow.

Normally perishable artifacts preserved in the dryness of the rockshelter deposits included basketry, sandals, and much cordage made of plant fiber. The textile industry included both soft mats and bags, and more rigid containers. Sandals of the famous Fort Rock type, as well as other varieties, were represented by 116 more or less intact specimens and 60 fragments. The cordage was probably used in a variety of ways: in lashings and ties, carrying and hunting nets, and snares. The broad importance of textile artifacts to the way of life practiced over thousands of years at Dirty Shame Rockshelter is concisely summed up by those who made a detailed analysis of the assemblage:

> Indeed, perishables were probably the principal medium for the transportation of most foodstuffs and other items consumed or used at the site....If one considers the locally available resources, the general environmental setting, and the pattern of plant/animal exploitation reflected in the deposits, one must conclude that life at this site in a very real sense revolved around certain key elements in perishables technology, notably sandals, baskets, and cordage (Andrews, Adovasio, and Carlisle 1986: 212).

Continuity in textile manufacturing technique is traceable over thousands of years at Dirty Shame, from the earliest levels where perishables were found until the end of the prehistoric occupation. This continuity is particularly notable in the twined basketry assemblage, but attested in other elements as well. It clearly places the site within the long-lived Northern Great Basin textile tradition. During the latest period of occupation, however, some time after about 1500 BP, there appeared a few specimens made by a distinctive coiling technique of quite different origins. This late basketry was probably brought by Northern Paiute peoples, who (as noted above) are believed on linguistic and ethnohistoric grounds to have entered Oregon's Northern Great Basin region very near the end of prehistoric times.

Artistic and Symbolic Forms

Petroglyph figures, pecked or incised into the desert varnish on rock outcrops and boulders, occur by the many thousands in the Northern Great Basin. Pictograph figures drawn on stones with natural pigments are also widespread but far fewer, perhaps owing to their perishability. These rock art forms have been most intensively recorded in Warner Valley and on the great Hart Mountain upland to the east; the petroglyphs that are abundant there span thousands of years and illustrate all the major styles known for the Great Basin as a whole (Cressman 1937; Loring and Loring 1983; Cannon and Ricks 1986).

Long Lake is an especially important locality. A distinctive and powerful style comprised of deeply carved concentric circles, straight and curved parallel lines, and dots, all tightly integrated into large compositions, is unique to this site (Figure 2.31). An extensive panel of these elements barely showed above ground because they were located along the base of an outcrop against which earth had accumulated. Excavation revealed that some three feet down was an ash-rich layer several inches thick. The petroglyph panel extended from slightly above the modern ground surface to slightly below this ashy layer, continuing a few inches more into underlying clay. Electron microprobe analysis of the ash showed it to be volcanic ejecta from the 7000 BP eruption of Mount Mazama. Because the deepest ash was quite pure, only partially reworked and mixed with earth by erosion, it must have come to rest against the petroglyph panel soon after it fell, perhaps almost immediately upon falling.

That this rock art panel at Long Lake is at least as old as the eruption of Mount Mazama is quite evident. It is perhaps significantly older, since the lowest carvings were buried in clay that had already accumulated against the rock before the volcanic ash was laid down. The find is further remarkable in revealing at this early date a style hitherto unrecognized in the Great Basin. This style, termed Long Lake Carved Abstract, probably stands at the beginning of an already-established sequence of Great Basin rock art styles that continues into historic times (Cannon and Ricks 1986).

Other places at Long Lake display numerous petroglyphs of typical Great Basin styles, that were made over a long period by many generations of artists. Some elements were pecked out or incised so long ago that the lines defining them have weathered to completely match the surface varnish of the stones on which they were made. Others show much lesser degrees of patination, and some appear quite fresh. In a number of cases, petroglyphs are superimposed over one another.

Petroglyphs that are moderately to heavily weathered are mostly parallel lines, grids, meanders, circles, and dots. These belong to the Great Basin Curvilinear Abstract and Rectilinear Abstract styles that are widely known in Oregon, Nevada, California, and Utah. These styles are believed to date very roughly between 3000 and 500 BP, but the dates must be recognized as highly speculative (Heizer and Baumhoff 1962). Given the demonstrably great age of the Long Lake Carved Abstract style

Figure 2. 31. Long Lake Carved Abstract rock art panel at Long Lake, Oregon (Cannon and Ricks 1986).

in Oregon, it would seem that these possibly derivative forms could extend a good deal farther back in time than previously thought.

The least weathered elements at Long Lake correspond to the Great Basin Representational style, including figures of humans, sheep, deer, and lizards. Some figures certainly created in historic times show people riding horses. Although it has been said that rock art was not made by the late prehistoric and historic Paiute-Shoshoni and their relatives (Heizer and Baumhoff 1962), numerous horse-and-rider depictions from the Northern Great Basin show unequivocally that petroglyphs in the representational style were still being made in historical times, when Paiute peoples dominated the area (Figure 2.32).

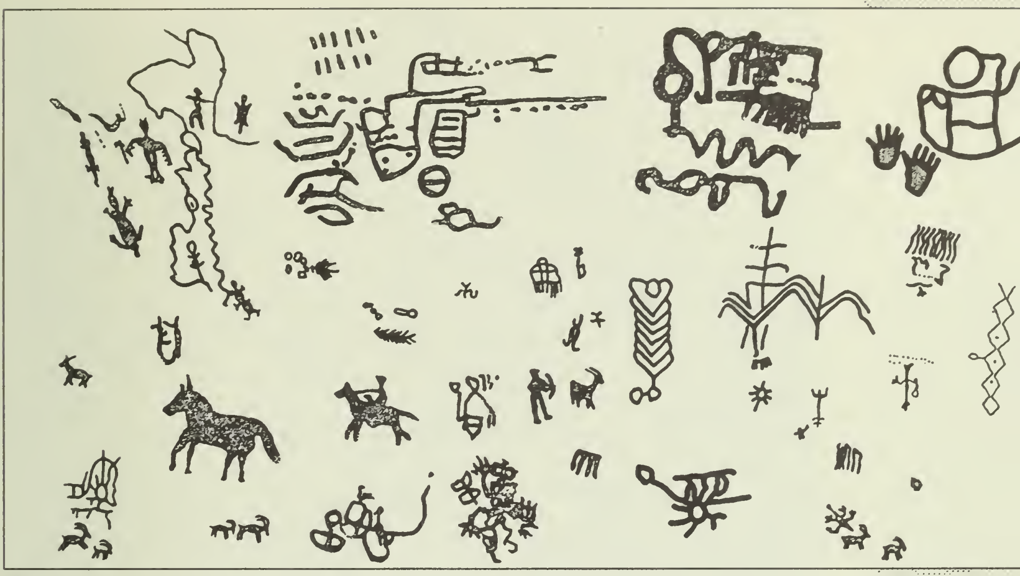


Fig. 2.32. Petroglyphs of Great Basin Curvilinear, Rectilinear, and Representational styles from Long Lake, Oregon (Cressman 1937: Figs. 26, 27).

Future Research

The above account reflects the current state of archaeological knowledge. The amount of information now available on the prehistoric cultures is far less than could be desired, and many questions remain. It is easier, on scant evidence, to describe the similarities between ancient and recent lifeways than to describe the differences. In the sphere of plant and animal resources, and in the sphere of tools and artifacts used to exploit those resources, the evidence now in hand is quite eloquent. It speaks of strong continuity over time in ancient traditions of hunting, gathering, and manufacturing. Basic tools and tasks did not change greatly in nearly 10,000 years, as concrete artifacts and biotic remains directly attest (Aikens 1978).

Less can be said with the same conviction about societal arrangements. But conclusions are beginning to emerge about social groups, the distribution of their settlements over the landscape, their relative degree of sedentism or mobility, and possible changes in these dimensions over time as environments changed. Current evidence offers important vignettes: long periods of abandonment at both the Connley Caves and Dirty Shame Rockshelter were correlated with intervals of aridity; evidence of fishing in the Fort Rock, Lake Abert, and Malheur Lake basins appeared with the Neopluvial freshening of lakes and streams; pithouse villages emerged at about the same time; and occupation patterns in the Steens Mountain and other areas fluctuated with time and environmental change. But much further research will be needed before anything approaching a full picture of prehistoric human ecology is developed.

The culture-historical question of when Northern Paiute peoples arrived in the Northern Great Basin will continue to excite archaeological interest. As alluded to above (see also Chapter 1), linguistic evidence has been taken to suggest that speakers of Northern Paiute (and the closely related Shoshoni and Ute languages) expanded their range in late prehistoric times from a homeland much farther south. There are competing theories about how and why this may have happened, but few doubt that major displacements did occur. The movement has variously been attributed to a more effective food-processing strategy on the part of the emigrants (Bettinger and Baumhoff 1982), to their aggressive, warlike character (Sutton 1986), and to environmental deterioration that helped these desert-adapted people to claim territory from afflicted wetlands-adapted neighbors (Aikens and Witherspoon 1986). In the Northern Great Basin, various archaeological clues point to a long prehistoric occupation of such wetlands as the Fort Rock, Lake Abert, Warner Valley, and Malheur Lake basins by people whose lifeway greatly resembled that of the Klamath. The Northern Paiute, who were in possession at the time of the first 19th-century historical accounts, seem to have replaced these people only within the last few hundred years. Future research will add to these indications or find another explanation of them, and perhaps allow a clear choice to be made among competing interpretations.

Rock art research is also progressing importantly in the Northern Great Basin, with an intense focus developing in the Warner Valley - Hart Mountain area. Although geochemical research has suggested ages in excess of 11,500 years for rock art of Great Basin type in the Mohave Desert (Whitley and Dorn 1987), large uncertainties in the analytical method undermine confidence in the dates. The findings at Long Lake, however, which place rock art there at least 7000 years ago, are much more secure. Additional work in this area is also likely to bring further insight into the functions and associations of Great Basin rock art.

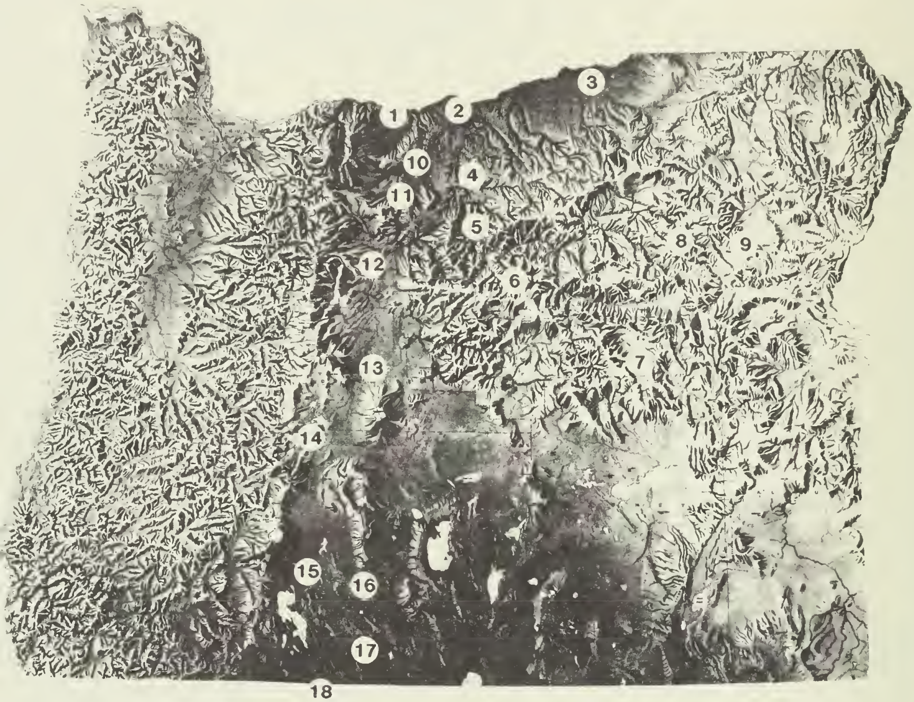
Finally, in the Northern Great Basin region as elsewhere, there will be simple, sheer discovery: further work will unquestionably bring to light new and provocative facts, that will pose questions not yet conceived.

Figure 2.33 Father of Oregon Archaeology. Professor Luther S. Cressman (University of Oregon), shown here at Fort Rock in 1970 leading a band of students and colleagues from the Great Basin Anthropological Conference, initiated the study of Oregon archaeology in the middle 1930s. Although his most famous work was in the Northern Great Basin, Professor Cressman carried out pioneering research all over Oregon, laying the foundations of our current understanding during a long and unusually fruitful archaeological career.

Chapter 3

Columbia Plateau

Aboriginal life in the Columbia Plateau was shaped by the great river system that gives the region its name (Figure 3.1). Excavations at The Dalles of the Columbia River have shown that salmon fishing was already flourishing there nearly 10,000 years ago; some elements, at least, of the historic way of life were even then in place. The Columbia River forms the northern boundary of Oregon, except in the farthest northeast. East of the Cascade Range, the Oregon side of the river was occupied by the Wasco, Tenino, Tygh Valley, Umatilla, Cayuse, and Nez Perce, whose salmon-fishing, root-gathering, and hunting way of life typified that of the Plateau as a whole. Plateau culture also extended deep into central and northeastern Oregon, up the drainages of the Deschutes and John Day rivers. The lower John Day drainage was used variously by Tenino, Tygh Valley, Umatilla, Cayuse, and Nez Perce. The lower Deschutes was used primarily by Tenino and Tygh Valley people. The Molala and Klamath, whose homelands lay south along the upper Deschutes drainage and beyond, spoke languages clearly though distantly related to those of the Columbia River people, and their river and lake-oriented cultures shared much with the Plateau. The Northern Paiute peoples who moved into the Deschutes and upper John Day river areas during late prehistoric



Key to Sites

1 – The Dalles, Roadcut Site
2 – Wildcat Canyon, John Day Narrows
3 – Umatilla Rapids
4 – Lower John Day Canyon
5 – Pine Creek
6 – Mitchell Cave
7 – Hall Creek
8 – Pilcher Creek
9 – Stockhoff, Marshmeadow
10 – Lower Deschutes River, Mack Canyon
11 – Sherar's Bridge
12 – Round Butte
13 – Lava Island Rockshelter, Lava Butte
14 – Wickiup Dam, Odell Lake
15 – Bezuksewas Village, Williamson River Bridge
16 – Kawumkan Springs
17 – Pininsula Site
18 – Nightfire Island

Figure 3.1 Map showing site locations in the Columbia Plateau region of Oregon.

and early historic times represent a distinct language and culture that grew out of the Great Basin to the south, and is treated in the previous chapter.

Ethnographic Life Way

The native occupants of the vast Columbia River system had access to incalculable numbers of salmon, which annually ran up the main stem to spawn in numerous tributary rivers and their feeder streams. The region around The Dalles, immediately east of the Cascades, was particularly favored as a fishing ground. There the salmon appeared earliest in the spring, and the runs included the greatest variety of species. The fish intercepted there, in the first 150 miles or so of spawning runs that carried some of them into headwaters a thousand river miles upstream from the Pacific, were at their plumpest and most delicious. The Chinook salmon run has three peaks, in April, July, and September. Sockeye salmon run in August, and Coho mostly in October. The early runs were welcomed for immediate consumption and short-term storage. The fall fish were leaner and less oily, making them the best to dry and preserve for winter stores (Schalk 1977).

Although the salmon harvest varied in abundance from time to time it never failed, and the wealth it supplied to the native peoples is lyrically described by the early anthropologist Lewis Henry Morgan:

> But the crowning advantage of this favored area was found in the inexhaustible salmon fisheries of the Columbia River, which, at stated seasons, filled the land with super-abundance of food. If the current representations with reference to these fisheries may be credited, they are unequaled in any part of the earth, in the quantity and quality of fish annually supplied. They enter this river in myriads, and penetrate its several branches, even into the mountain elevations (Morgan 1871: 241-242).

To participate in the salmon harvest, and to obtain the best fish, people came to The Dalles from all over the Plateau. It must have been a fine sight, and a scene of great excitement, when diverse people speaking many languages gathered there at the end of long journeys filled with anticipation of the event. When Alexander Ross passed The Dalles during the fall salmon run of 1811, he saw an estimated 3000 people congregated there.

The big river, at The Dalles or other fisheries, was the dominant focus of economic efforts during spring and summer. Besides salmon there were lamprey eels, sturgeon, trout, suckers, squawfish, chiselmouth, shiners, and daces to be had from the rivers. For people whose home territory lay along the river, the runs gave opportunity not only to accumulate winter stores, but also to develop wealth through catching and processing surpluses for trade. Individuals or small family groups from the hinterlands would come out seasonally to fish for themselves, relying on the hospitality of relatives married into river communities.

Dip nets and pronged spears were used along narrows and places where fish ran close to shore; bag nets were set in eddies; gill nets were used with wooden floats and notched stone sinkers to hold them vertically in open water; and willow fences or weirs were placed across smaller tributaries to channel fish into funnel-shaped basketry traps. Farther into the interior, where streams were smaller, people might use the hook and line, shoot fish with the bow and arrow, or wade into streams to catch fish by hand. Where a stream could be dammed, fish might be stupefied by throwing crushed leaves and roots of a certain toxic wild parsley into the water, then gathered by hand as they rose to the surface. A labor that went on continuously with the catching was splitting the fish open down the back and drying them on racks; in this way 25 pounds of fresh fish might be reduced to three or four pounds for transport and storage. For trade, as Lewis and Clark observed at The Dalles in 1805, the air-dried fish might be pounded into a powder using large wooden mortars and stone pestles, then packed into large baskets (Lebow et al. 1990: 24-27).

Another central focus in the Columbia Plateau was the gathering of vegetable foods (Hunn 1990). A comprehensive listing of native food plants from the Plateau portion of north-central Oregon includes nearly 100 varieties, which variously yielded roots, seeds, berries, and herbs (Lebow et al. 1990: Table 3.3). Plant harvesting was an activity primarily of women, although men often came along to hunt deer, elk, or other animals in the same settings. Native crops such as biscuitroot and bitterroot became available in early spring, and between April and June parties split off from the riverine fishing camps to dig these "Indian potatoes" in the often extensive patches of shallow, rocky soil where they thrive. Roots were obtained with crutch-handled digging sticks of hard wood, collected in woven bags or baskets, peeled with stone knives, and sun-dried for winter stores. Camas, yampa, and hyacinth bulbs were dug somewhat later in the season, from wet meadows at higher elevations. Camas was baked in earth ovens. These were large pits where quantities of the onion-like bulbs were spread over heated stones, then covered with earth to cook for two or three days. Baking not only prepared the bulbs for eating, but greatly reduced their weight and bulk for transport and storage. Large numbers of people gathered annually at some of the more favored camas grounds, where collecting parties might remain for several weeks. By September, gathering groups were in the highest mountain meadows for the huckleberry harvest. With the berries dried and packed, people descended to the riverine villages for the winter.

Hunting was done primarily in the fall, though to some extent it went on throughout the year. Along the Columbia, where the fall salmon runs kept people occupied during the most favorable season for taking large game, hunting was of lesser significance. Deeper in the hinterlands, farther from the best salmon streams, the fall hunting season was more important. Elk, deer, and bear were taken in the wooded Cascades and Blue Mountains, while antelope and desert sheep were sought in the lower-lying, more open country between. Small game included jackrabbits, cottontails, ground squirrels, grouse, and quail, taken at opportunity. Far to the south, waterfowl were of great importance in the upland lakes and marshes of the Klamath country. Carnivores such as fox, raccoon, and badger were valued for both meat and furs. A tabulation of mammals used for food in north-central Oregon includes 5 kinds of lagomorphs, 11 kinds of rodents, 7 kinds of carnivores, and 5 kinds of hoofed animals (Lebow et al. 1990:Table 3.4).

The bow and arrow was the principal hunting weapon, used to take game carefully stalked and shot at close range. Antelope were taken in some numbers by driving the animals into corrals or surrounds made of brush, then dispatching them with arrows. Jackrabbits were driven into funnel-shaped enclosures formed by long nets woven of plant fiber. With the rabbits inside, the mouth of the funnel was closed off and the trapped animals killed with wooden clubs. Nets were also strung low across the water to enmesh waterfowl skimming along the surface of a lake or stream. Squirrels and other rodents were caught with string snares or deadfalls.

Harvesting and hunting perforce slowed greatly during the winter season, but did not entirely cease. Winter was a time when people stayed close to their main settlements, occupied with domestic tasks and the repair and manufacture of clothing and equipment. It was also a season for ceremonies and dances, though some went on at other times of the year as well.

Residence patterns throughout the Plateau centered on villages of substantial houses. Here group members congregated in winter, and here they stayed between the comings and goings of a more mobile period from spring through fall. These winter villages were almost invariably sited along the rivers, both the main stem of the Columbia and larger tributaries such as the Deschutes and John Day (Ray 1939). In the Klamath country to the south, villages might be placed on marsh edges as well as river courses.

Large gabled cedar-plank longhouses of Northwest Coast type were seen up the Columbia as far as The Dalles during the 19th century. These buildings housed large communal families. Farther upstream, the Umatilla and Nez Perce made large communal pole-framed lodges covered with woven mats. Smaller pithouses sheltering usually two nuclear families were also made along the Columbia, and throughout the Plateau as a whole. They were the more ancient form in this region, traceable deep into prehistoric times. Among the Tenino of the lower Deschutes and John Day rivers, each family had both a pithouse and a mat lodge at its winter village. The pithouse was used for sleeping, and the mat lodge for cooking and everyday matters. In summer the Tenino dismantled the winter earth lodge and removed themselves to a summer village, where light mat structures doubled for both residence and the drying of salmon (Murdock 1980). Among the Klamath farther south, lightly built mat-covered lodges were made for summer use, while the more substantial pithouses were partially dismantled and left to dry out after the soggy winter season (Spier 1930). Klamath pithouses were very similar in architecture to those of the Columbia region (Southard 1970).

During the warm part of the year many families would remain at riverside villages to catch and dry salmon, while others ranged out to root grounds, berrying localities, hunting camps, toolstone quarries, and sources of tule to be collected for matting. These special-purpose camps, visited seasonally by small task groups, were returned to year after year, though often a group's destination was a general area rather than a certain spot. At such places simple lean-tos or small mat-covered tipis might be erected, or perhaps no structures at all if the stay were to be very brief. The Blue Mountains and other like regions drew occupation mostly of this kind. Such hinterlands served as joint-use areas for a number of different seasonally mobile groups (Zilverberg 1983).

The basic features of Plateau social organization were widely shared. Communities varied considerably in size, from several hundred people along the Columbia down to 50 or so in more remote areas. Local groups were everywhere autonomous. In the larger settlements around The Dalles, social distinctions between a chiefly class, commoners, and slaves were recognized; elsewhere status differences were not so sharply drawn. Throughout the area, kinship was reckoned equally from both mother's and father's sides. A prohibition on marriage between blood relatives led people to seek mates from often quite distant localities, and in this way kinship networks were extended over broad regions.

Trade was extremely important in the Plateau (Wood 1972). During the annual congregations of hundreds or even thousands of people at the great fisheries, people bartered local products and manufactures from all over the Plateau, and beyond (Figure 3.2). In pre-horse days, overland exchange of bulky items—such as the 90-pound "bricks" of pounded and dried salmon that Lewis and Clark saw stockpiled at The Dalles in 1805—must have been uncommon. The same is no doubt true of the traffic in bison hides, which in the 19th century were brought back from the Plains by mounted Plateau peoples. Nevertheless, the far-reaching exchange network seen historically can hardly have sprung into being during the few decades between the time that Columbia Plateau peoples acquired the horse, and the time of Lewis and Clark's observations. Prehistoric antecedents are clearly implied, as trade would have been a natural concomitant of people's regular trips to and from the salmon fisheries.

A compelling account of intergroup relations between southern Plateau peoples during the period 1805-1855 is provided by Anastasio (1972). Though the high degree of interaction that he documents was surely brought to its peak by the historic adoption of the horse, the discussion has important implications for prehistory as well. A partial listing of items exchanged during the 19th century is given in Table 3.1.

Table 3.1 Items traded among Plateau peoples of the 19th century. (Anastasio 1972: 120, 136).

Source area	Items
Upper Columbia and western Plateau	Camas roots, hazel nuts, huckleberries, beargrass fibers, basketry, tule mats, dried berries, hemp, stone artifacts, freshwater shell ornaments, hemp twine
Middle Columbia-Lower Snake	Salmon, camas, baskets, hats, freshwater shells
Northwest Coast	Marine shells, dried salmon, salmon oil, deerskins, wapato root
Great Basin	Edible roots, skin lodges, elk and buffalo meat
Klamath River	Wocas lily seeds, elk skins, beads, shells, bows
Great Plains	Catlinite and catlinite pipes, buffalo skin tents, painted buffalo hide bags, pemmican, buffalo horn and robes, parfleches, dressed moose skins, buffalo bone beads, feather headdresses

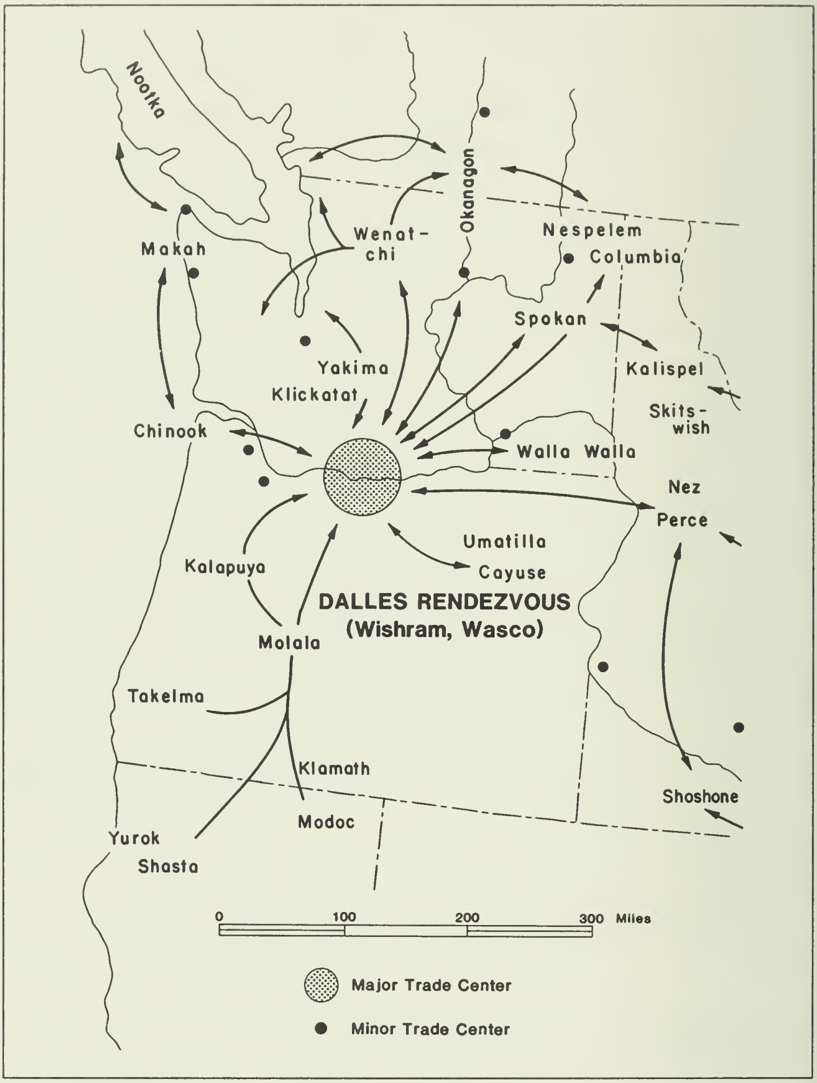


Figure 3.2 Selected aspects of the Plateau trading system centered on The Dalles. (Wood 1972: Figure 1).

Landscape and Natural Resources

The Plateau way of life was intimately linked to the natural environment. This provided the resource base for the human population, and thereby shaped people's daily and yearly cycles of activity. Climatic change, by affecting precipitation and runoff, also altered the shape of the landscape and the flora and fauna that could live in a given place.

The Columbia River generally flows in a deep canyon, incised several hundred feet into the vast lava flows that form the surrounding upland plains. The canyon is broad, over a mile wide in places. Human settlement is now, and was in the past, concentrated on alluvial terraces or benches along its sides. These are the remnants of an ancient floodplain, through which the river has cut to reach its modern level.

South of the big river is the Deschutes-Umatilla Plateau. This is a nearly flat landscape that slopes gradually upward from an elevation of about 300 feet along the Columbia to about 3000 feet along the southern plateau edge 50 miles or so inland. Much of this is natural grassland, now converted to domestic cultivation. The Blue Mountains lie behind the Deschutes-Umatilla Plateau to the south and east. Topographically, this is the most diverse region in Oregon; elevations range from 300 to over 9000 feet, and landforms include rugged mountains, alluvial basins, deep canyons, and dissected plateaus. Most of the area is wooded, but large upland meadows are also common. From east to west the area is drained by the Umatilla, John Day, and Deschutes rivers, all of which flow into the Columbia. On the west the Deschutes River drainage links the Columbia valley to the forested Cascades.

Local climates vary markedly over the Oregon portion of the Columbia Plateau. Along the Columbia River itself, where elevations do not exceed a few hundred feet, summers are hot, winters are cold, and precipitation is very limited the year around. The Deschutes-Umatilla Plateau is also subject to hot summers and cold winters, but the extremes are not as great as along the Columbia; precipitation is higher, though the region remains a dry one. The altitudinally varied Blue Mountains province has correspondingly varied temperature and moisture regimes. Lower elevations are more or less comparable to the Deschutes-Umatilla Plateau, but higher elevations are significantly cooler and moister the year around. During winter, extensive snow packs accumulate in the mountainous highlands. The Klamath country is generally an upland plateau, with warm but not hot summers, and cold, snowy winters.

Time and Environmental Change

The Columbia River and its upper tributaries drain the vast winter snowfields of the Northern Rocky Mountains. During the late glacial age, catastrophic floods of scarcely conceivable magnitude repeatedly boomed down the Columbia. As Lake Missoula in the Montana Rockies periodically rose high enough to breach the dam of glacial ice which contained it, it would suddenly release up to 500 cubic miles of water.

These incredible floods eroded the channelled scablands of northeastern Washington; they backed water up the Snake River for miles above its confluence with the Columbia; and they carried boulders of Rocky Mountain granite, rafted in chunks of glacial ice, almost to Eugene on a huge surge of water that was driven up the Willamette River from the Columbia's main channel at Portland (Baldwin 1976).

These events have been variously called the Spokane Flood, the Missoula Flood, and the Scabland Floods. It is now known that there was not just one event, as some of the popular terms imply, but several. The last such flood is now dated to some time after 13,000 BP (Hammatt 1977). Silt and sand deposits perched 500 feet above the historic level of the Snake River contain cobbles with fresh glacial striations, showing their origin in the glaciated Rockies. Two ^{14}C dates, one of 14,000 BP and one of 13,000 BP, were obtained from beneath the flood deposits.

These floods have important implications for our understanding of Plateau prehistory. First, if people lived along the Columbia before 13,000 years ago, their archaeological traces surely have been swept away. And catastrophic erosion of the river valley left a raw alluvial topography that would have taken centuries to recover as a productive human habitat.

A geological sequence for the Lower Snake River in Idaho shows that sands and silts began accumulating on the old flood surfaces after about 10,000 BP. A period of geological stability followed, between about 8000 BP and 5000 BP. During this interval, volcanic ash from the 7000 BP eruption of Mount Mazama fell and was preserved in places as part of the geological record. Between 5000 and 4000 BP came another erosional episode, minor in comparison with the late glacial floods, but certainly significant. This was followed by renewed deposition and then another period of relative geological stability that began about 2500 BP and has lasted until the present. Evidence from the Rocky Reach of the Upper Columbia River suggests a similar sequence of alluvial episodes there, during which the base level of the river rose and fell (Mierendorf 1983). Comparable research has not been done along the Oregon stretch of the Columbia, but geological events there surely paralleled those known upstream.

Climatic history in the Plateau during this same period generally paralleled the sequence previously outlined for the Northern Great Basin. Postglacial warming and drying reached a peak between about 7000 and 4000 BP, and a moderate reversal of this trend established a climate roughly like that of the present after about 4000 BP.

Cultural Chronology and Time Markers

Different projectile point types mark sequent periods in Plateau prehistory. The diagnostic types and their dates are closely similar to those reported in the previous chapter for the Northern Great Basin. In some cases the types are identical, and the same names are used. In other cases, regional specialists have given different names to highly similar if not completely identical types; where this has happened, both names are mentioned.

Clovis fluted spear points found near The Dalles (Strong 1969) indicate human presence about 11,500 BP. Subsequent cultural phases, though defined for the Lower Snake River region, are broadly applicable to the Columbia Plateau as a whole (Leonhardy and Rice 1970; Leonhardy 1975). The Windust Phase, 10,000-8,000 BP, is marked by the Windust point type, and by large lanceolate points. The Cascade Phase, 8,000-4,500 BP, is marked by Cascade and Northern Side-notched types. The Tucannon Phase, 4500-2500 BP, is marked by triangular points with contracting stems, and triangular points with side notches or corner notches; these correspond roughly to the Pinto and Elko types of the Great Basin sequence. The earlier part of the Harder Phase, 2500-700 BP, is characterized by Snake River Corner-notched points, large basal-notched points, and small basal-notched points. These correspond respectively to the Elko, Eastgate, and Rose Spring series of the Great Basin sequence. The end of the sequence is represented by the later part of the Harder Phase, 700-100 BP. This period is marked by Columbia Valley Corner-notched and Wallula Rectangular Stemmed types, which are reminiscent of the Rose Spring series of the Great Basin. Representative specimens are illustrated in Figures 3.3-3.6.

As elsewhere, the sequence of point types for the Columbia Plateau reflects the history of projectile weapons in the region. The large Clovis and Windust points were probably used to tip thrusting spears. The somewhat smaller Cascade, Northern Side-notched, and Snake River Corner-notched types were used on small, light javelins or darts that were hurled with the aid of a spear-thrower or atlatl. Very small projectile points, used with the bow and arrow, are latest in the sequence. They first appeared while dart points were still common, then became the dominant form when the atlatl and dart passed out of use.

Figure 3.3 Projectile points of the Early period from the Columbia Plateau region of Oregon. Top row: Windust points; Bottom row: Windust point (left), Cascade Willowleaf (center); lanceolate (right).

The Dalles Roadcut Site

The Roadcut Site records nearly 10,000 years of human occupation in a locality that was, by early historic times, the greatest fishery and trading center in the Northwest. The reach of the Middle Columbia River that

Figure 3.4 Projectile points of the Early Middle period from the Columbia Plateau region of Oregon. Top row: Northern Side-notched; Bottom row: Cascade Willowleaf.

was called The Dalles by early French-Canadian voyagers includes the low, horseshoe-shaped Celilo Falls; a chute of white water below it that Lewis and Clark named the Long Narrows; and the Big Eddy at the downstream end of the chute. The Roadcut Site is at the head of the Long Narrows, about five miles upstream from the modern town of The Dalles, Oregon. The narrows and falls concentrated salmon by the millions, and offered places from which they could be taken in quantity (Figure 3.7).

Figure 3.5 Projectile points of the Late Middle Period from the Columbia Plateau region of Oregon. Top row: basal-notched; Middle row: corner-notched; Bottom row: side-notched and stemmed.

Construction of The Dalles Dam during the 1950s fostered archaeological study in the reservoir area (Cressman et al. 1960). Excavations into the side of a cutbank along the edge of U.S. Highway 30 sampled a deep deposit rich in cultural remains. The Initial Early specimens from the base of the deposit included a few large lamellar blades of flaked stone, some flaked stone scrapers, and a few worked bone pieces.

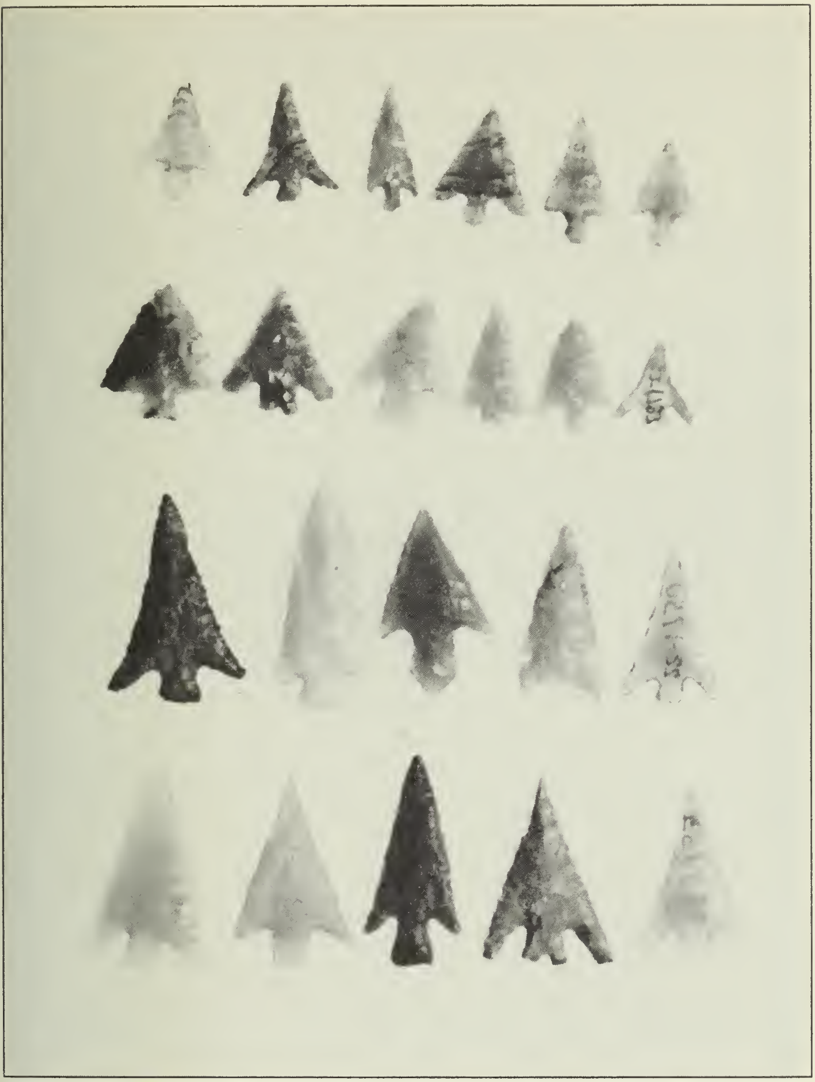


Figure 3.6 Projectile points of the Late period from the Columbia Plateau region of Oregon.

The Full Early period, ^{14}C dated between about 9800 and 7900 BP, is known from a much greater array of evidence. Most important is the great quantity of salmon vertebrae found (Figure 3.8). Some 125,000 individual bones were counted, which represented roughly half the amount observed during excavation. A study critically examining whether these bones actually indicate human fishing, or may have been only a natural accumulation, leaves little doubt that the collection resulted from human agency (Butler 1990). Bones of rabbit, beaver, otter, muskrat, marmot, and badger were also recovered, as well as remains of fox and raptorial birds. Projectile points included the Windust type and large leaf-shaped forms. Heavy choppers made on large flakes, ovate biface knives, stone graving tools or burins, pebble net sinkers girdled by incised grooves, edge-ground cobbles, and worked bone and antler pieces were also part of the cultural inventory (Figures 3.9, 3.10). The Full Early period at The Dalles corresponds to the Windust Phase, dated between 10,000 and 8,000 BP.

The record of occupation at the Roadcut Site between 7900 and 6100 BP is scanty, perhaps because this time was represented in the stratigraphic sequence by tough, cemented earth which made artifact recovery extremely difficult (D.L. Cole., personal communication). Some choppers and scrapers and a few projectile points were retrieved. In deposits ^{14}C dated after 6100 BP were projectile points of the Cascade phase, 8000-4500 BP; the Tucannon phase, 4500-2500 BP; and the Harder phase, 2500-100 BP. The specimens collected indicate that human use of the Roadcut Site was more or less continuous throughout the last ten millennia, though the intensity of occupation may have varied over time (Figures 3.11-3.14). The record for the last 2500 years was quite rich, with artistic and craft items added to the inventory of utilitarian specimens. Small stone sculptures, mortars and pestles with carved ornamental designs, carved bone, nicely shaped charm stones, and ornamental beads of bone and stone, together illustrate growing social and ceremonial concerns during the later occupation (Figures 3.15-3.17).

Copper and glass beads, iron knives, hatchets, fish hooks, firearms, and gunflints from the Roadcut Site signalize the Euro-American incursion. (Figures 3.18-3.20). The outside contacts were at first indirect. When Lewis and Clark landed in the October of 1805 at Wakemap Village—just across the river from the Roadcut Site—they saw in use Euro-American goods that had previously entered the region via native trade routes. These items had come from sources farther east and farther west; Euro-American traders had long been established east of the Rockies, while Spanish, English, and American sailing ships had been trading along the Northwest Coast for some time. Foreign objects from these sources traveled inland through native networks before Euro-Americans were ever seen in the interior.

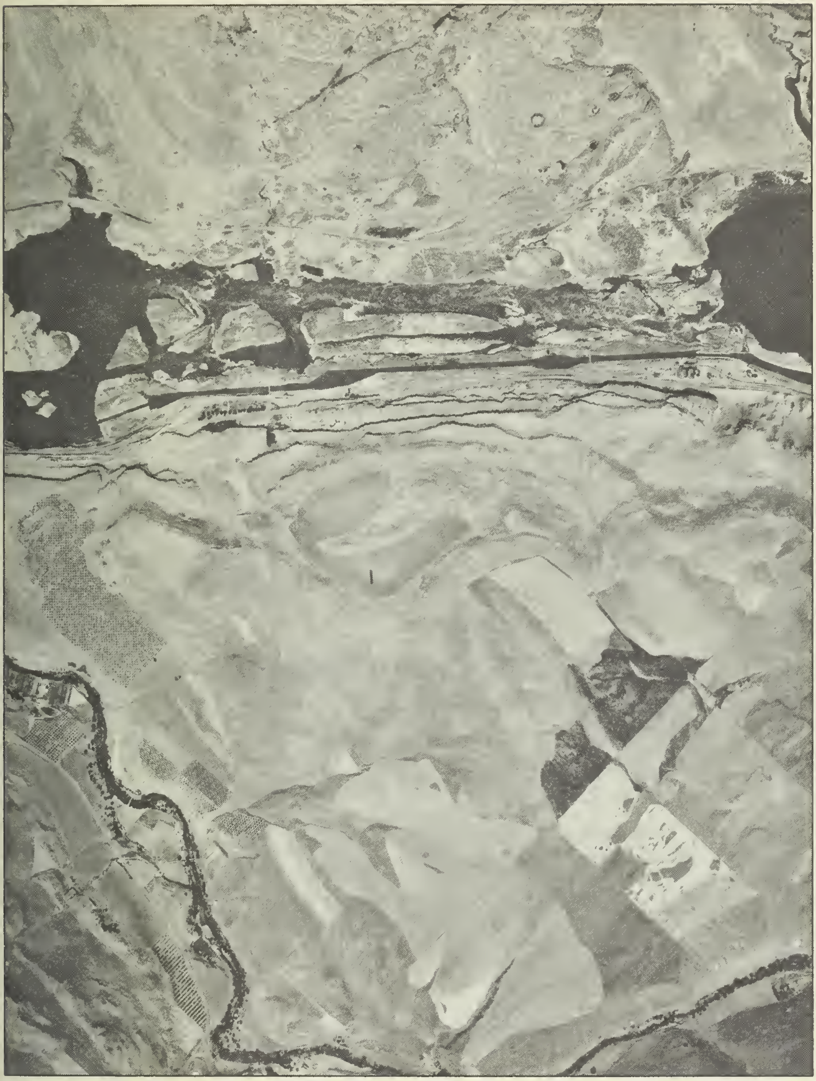


Figure 3.7 **The** Long Narrows at The Dalles of the Columbia River.

Wildcat Canyon

A cultural sequence of comparable length was discovered at Wildcat Canyon, about 30 miles upstream from the Roadcut Site. The site is on the south bank of the Columbia, several miles above the mouth of the John Day River. It lies on a terrace at the base of high basalt cliffs, overlooking the river. Traces of occupation were found over an area several hundred feet across, and excavations were initiated at several promising spots (Cole 1968; Dumond and Minor 1983).

Figure 3.8 Salmon vertebrae from the Roadcut Site at The Dalles.

The earliest cultural remains at Wildcat Canyon are of the Philippi Phase, 9000-7500 BP. This phase is cognate with the Full Early period at The Dalles, and the Windust Phase of the lower Snake. Large lanceolate, leaf-shaped and stemmed points, and large scrapers and knives, indicate hunting. Occasional milling stones and manos indicate the grinding of vegetal foods. A few living surfaces have been discovered, but no structures. The sparse remains suggest that, at this period, Wildcat Canyon saw only occasional brief visits.

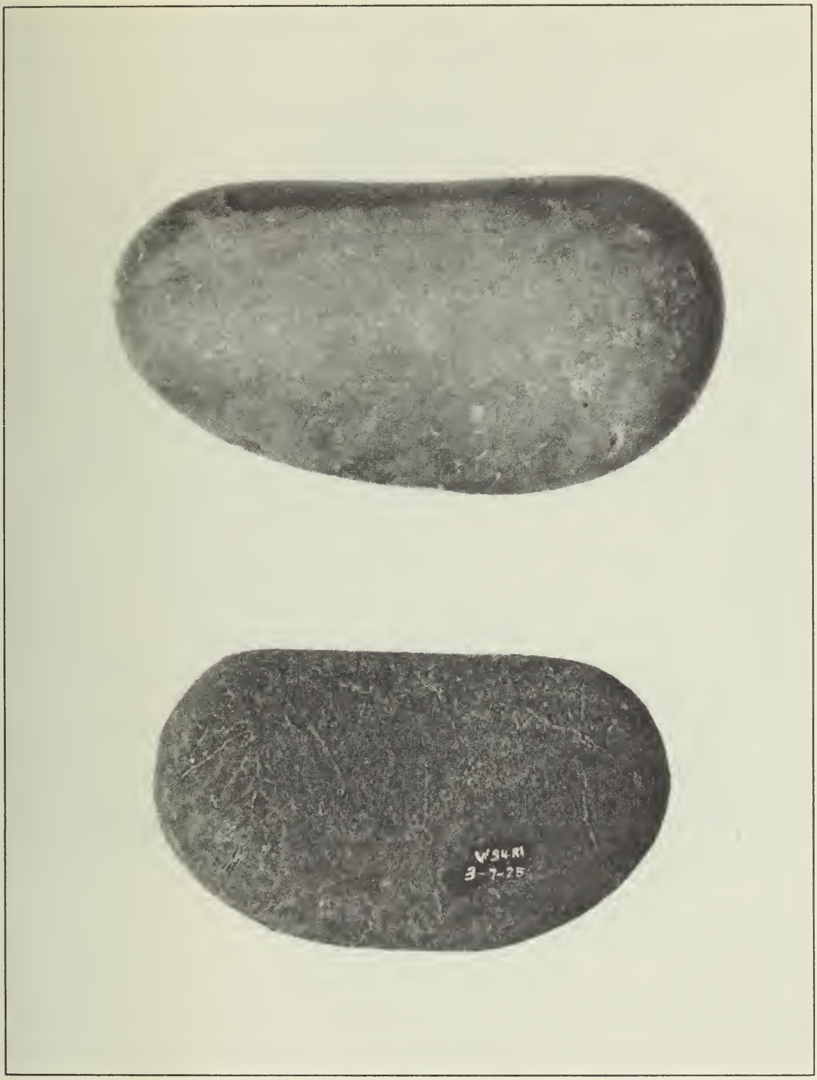


Figure 3.9 Edge-ground cobbles of the Full Early period from The Dalles. Note flattened upper edges.

After an apparent hiatus of about 1000 years, the site was again occupied during the Canyon Phase, 6500-5000 BP. The diagnostic artifacts—most notably Cascade and Northern Side-notched projectile points—demonstrate an equivalency with the Cascade Phase of the Lower Snake River sequence. Eight deep, narrow shafts dug into the site by its users were the most interesting features of this occupation. Upon re-excavation by archaeologists, the shafts filled with water. Perhaps they represent

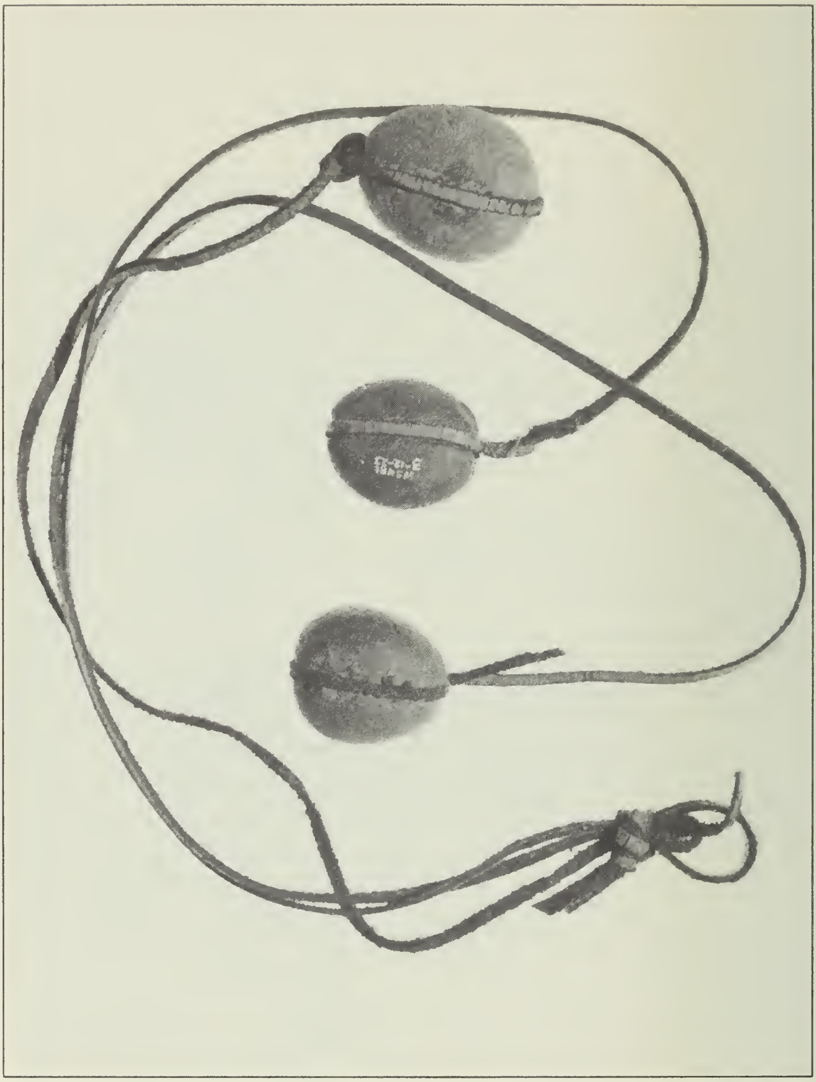


Figure 3.10 Grooved pebbles from The Dalles. Possibly used as bolas weights (as shown), but more probably as net sinkers.

ancient wells, originally dug as the flow of nearby Wildcat Creek diminished with the growing aridity of mid-Holocene times.

After a long period of non-occupation, the heaviest use of the site occurred during the Wildcat Phase. Dated 2500-1000 BP, this is generally cognate with the Harder Phase. Large corner-notched dart points dominated early, with smaller arrowpoints appearing later and ultimately becoming predominant. Clearly it was during this phase that the bow

Figure 3.11 Handled maul and grooved maul head from The Dalles.

and arrow replaced the more ancient atlatl and dart. Other artifacts include mortars and pestles, milling stones, mauls, flaked stone bifaces, knives, scrapers, choppers, drills, gravers, and net sinkers. Bone awls and toggling harpoon heads of both one-piece and composite types were also represented. In short, the specimens comprise a domestic inventory of household tools for a variety of tasks. Some relate to food-getting and preparation, others to the manufacture of leather, wood, and textile items which were not themselves preserved in the moist deposits of the site (Figures 3.21-3.25). Exotic and artistic items included beads of *Dentalium*

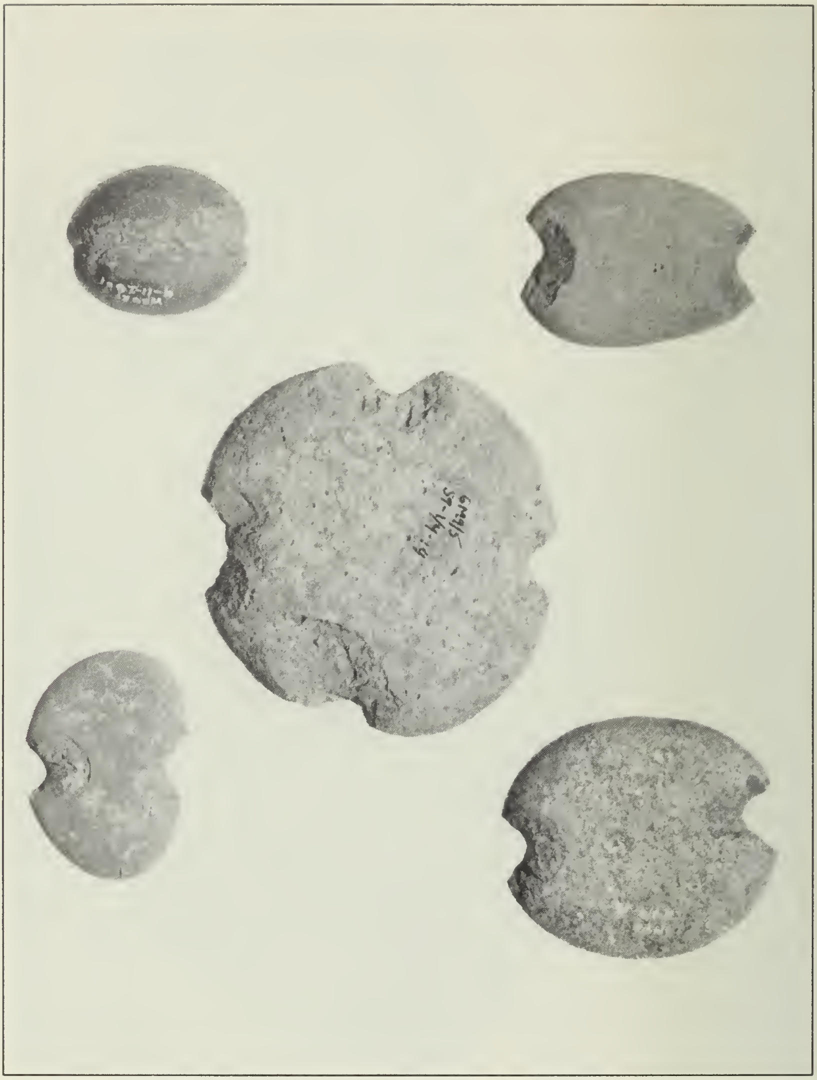


Figure 3.12 Notched and girdled stones from The Dalles and Wildcat Canyon.

shell brought in from the Pacific coast, bone and shell beads and pendants, and ochre or other pigment stones.

People of the Wildcat Phase enjoyed a diverse diet. Fish bones give evidence of chinook salmon, steelhead trout, bridgelip sucker, largescale sucker, mountain sucker, chiselmouth, northern squawfish, and peamouth. This variety suggests that people were exploiting all major habitats of the river by various angling methods. Freshwater mussel was

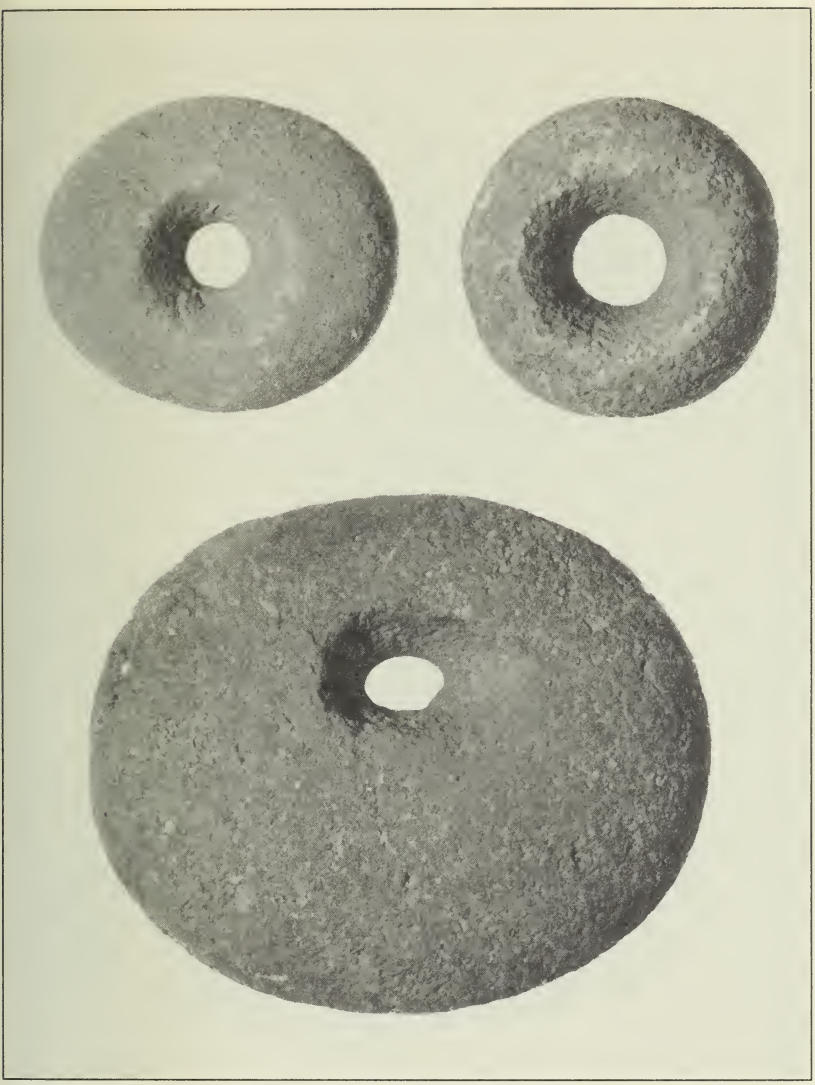


Figure 3.13 Biconically perforated stones from The Dalles.

collected as well. Deer and bighorn sheep were best represented among the larger animals, but elk, goat, and bison were also present. Jackrabbit was predominant among the smaller forms, which also included a miscellany of small rodents and birds. Vegetal remains were not recovered, but the artifact assemblage, as noted above, included a significant number of pestles and hopper mortars, of types which were used in historic times to pound the roots of camas and other plants into meal. The traditional

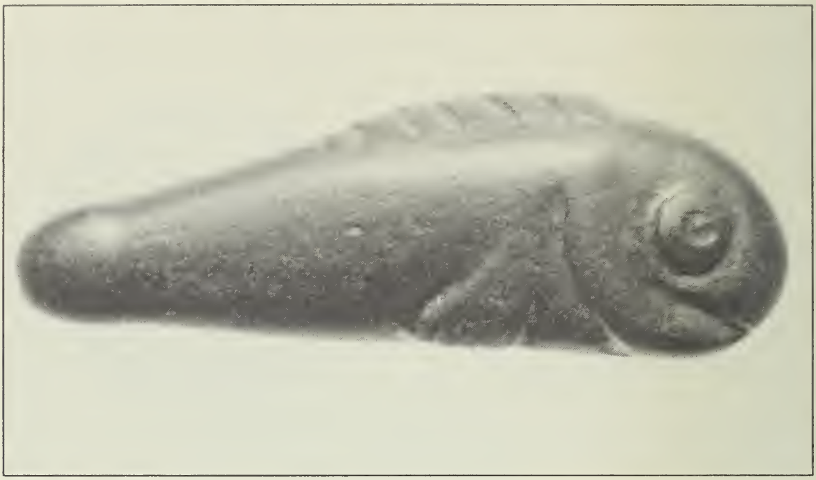


Figure 3.14 Fish effigy of ground stone from The Dalles.

Figure 3.15 Anthropomorphic stone pipe bowl from The Dalles.

Plateau diet of fish, roots, and game was well established by the time of the Wildcat Phase.

Living floors, charred timbers, and other indicators show that people of the Wildcat Phase lived in roughly circular houses. These had floors scooped out of the earth, and timbered superstructures that were probably covered with mats, or with brush and earth. Two housepits had pit walls lined with basalt slabs. Inside, hearths that were either encircled by stones

Figure 3.16 Stone club from The Dalles.

or simply laid on the floor provided heat and light. Pits dug into the floors apparently served as footings for posts supporting the house superstructure. A reasonably complete floor outline of one such building suggests that these dwellings were roughly 20 to 25 feet in diameter. The more substantial of these were no doubt semisubterranean earth lodges, or pithouses, of a type which historically served as winter dwellings. Indications of more lightly built lodges, perhaps of tipi-like construction, suggest that summer habitations were also made at the site.

Figure 3.17 Polished jadeite celt from The Dalles.

The remains suggest that year-round village occupation may have been established at the site during the Wildcat Phase, especially if the remains are taken to suggest that people moved out of winter earthlodges into lighter, more airy structures during summer, as was done historically. It is not clear how many households may have comprised the settlement at any one time. But it is evident, from the overlapping of structural remains in excavated portions of the site, that houses were built and rebuilt in

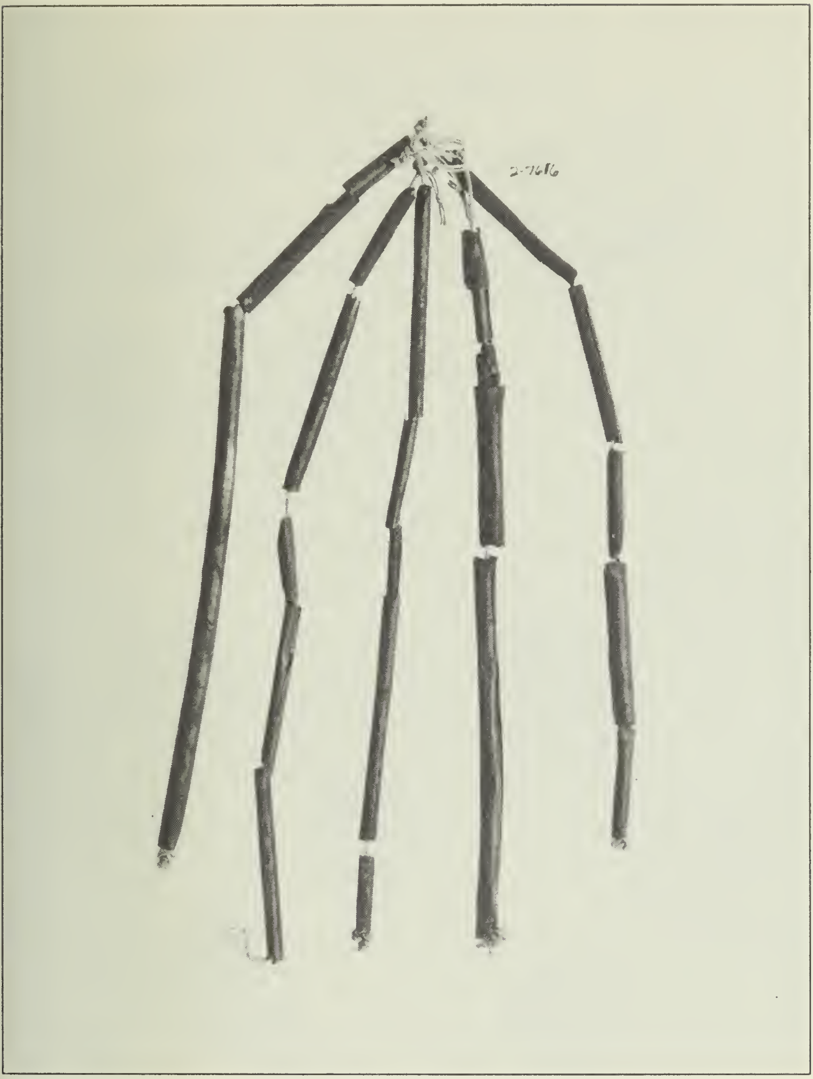


Figure 3.18 Tubular copper beads from the Middle Columbia (historic).

essentially the same places over a considerable period. From a separate cemetery nearby were recorded over 80 human burials, another indication of long-continued occupation.

The Quinton Phase, 1000 BP to historic times, is represented by a shallow, disturbed component which seems to lack semisubterranean winter houses; at this period, the site may have been a summer encampment only. Further, the predominance of a distinctive pin-stem projectile point

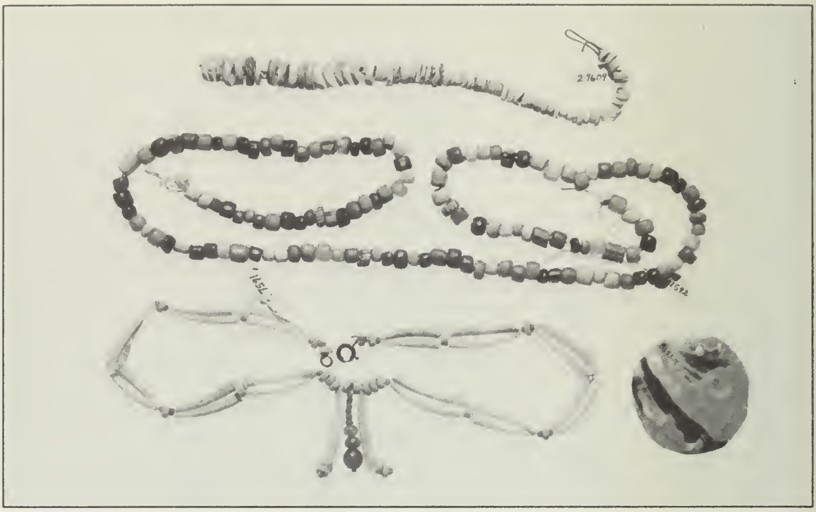


Figure 3.19 Upper, shell disc beads; middle, glass trade beads; lower, aboriginal *Dentalium* and glass trade beads; lower right, abalone pendant.

Figure 3.20 Historic metal artifacts from The Dalles. Left, phoenix buttons; center, Chinese coin; right, military uniform buttons.

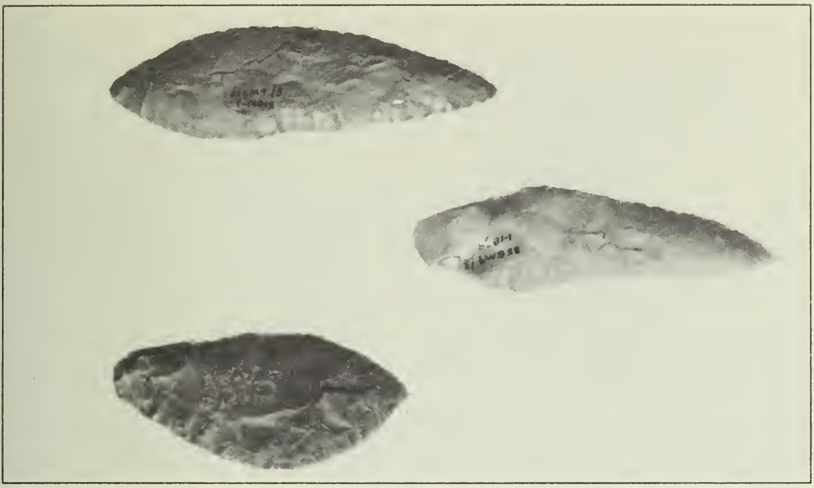


Figure 3.21 Large biface knives from Wildcat Canyon.

Figure 3.22 Historic fishing at Celilo Falls represents a culmination of the Plateau fishing pattern (courtesy of Oregon Historical Sociey, #ORH 165990).

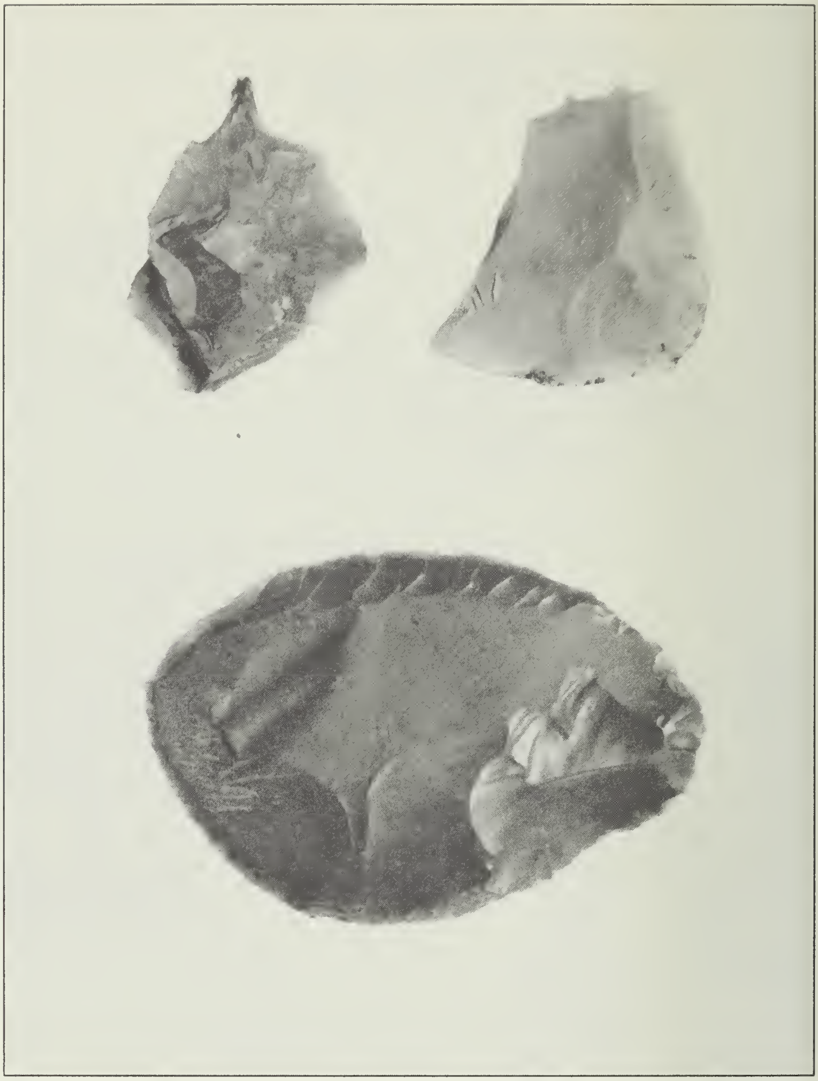


Figure 3.23 Single-bitted graver, double-bitted graver, and scraper of the Philippi Phase from Wildcat Canyon.

type suggests that during this interval the main contacts of the site's occupants seem to have shifted downriver, towards the west, whereas in all earlier periods they had been oriented upriver, to the east and north.

Umatilla Rapids

At Umatilla Rapids, about 60 miles up the Columbia from the mouth of the John Day, was another long-occupied site. A village with "a great

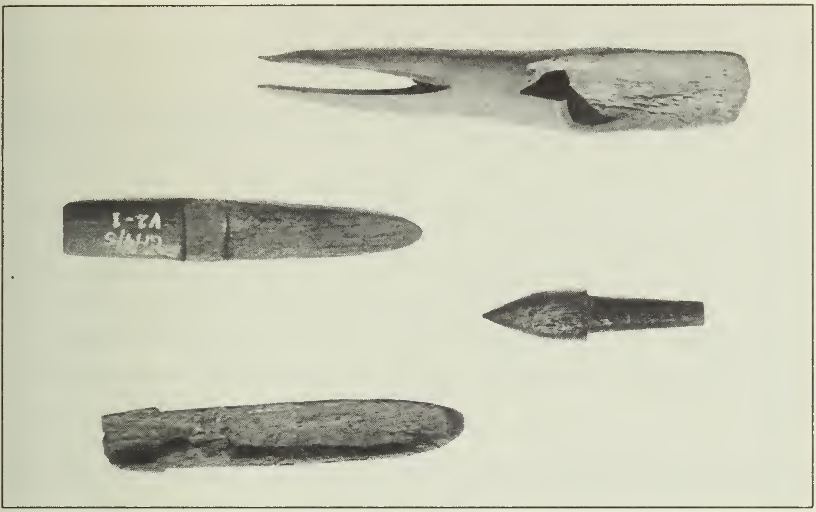


Figure 3.24 Bone harpoon heads of the Harder Phase from Wildcat Canyon. Top, composite harpoon with valves and armature. Bottom, toggling harpoon; in use it would be armed with a stone point.

Figure 3.25 Bone gaming pieces from the Middle Columbia Alderdale Site.

number of lodges" was noted on the Washington shore of the Columbia below the two mile-long rapids when Lewis and Clark passed downstream in the fall of 1805. When the expedition returned upriver in the spring of 1806, an even larger aggregation, comprising some 50 lodges and an estimated 700 people, was there awaiting the spring salmon run. A historic village on the Oregon side, where the Umatilla River enters the Columbia, preceded the modern town of Umatilla. The modern town is the latest in a series of occupations that are traceable deep into prehistoric times (Schalk 1980).

Archaeological remains occur on both sides of the Umatilla River mouth, extending along the shore of the Columbia for over a mile, and inland for about a quarter-mile. Deposits containing artifacts, bones, and other occupational remains, sometimes in dense concentrations, reach depths of 5 to 10 feet in places. The earliest of these remains were found beneath a layer of volcanic ash from Mount Mazama, establishing human presence there before 7000 BP. But ^{14}C dates place the major occupation between 3600 and 200 BP. Most of these dates come from a deposit in which many house floors were identified, showing that a stable village was established there.

The remains of over 30 houses—surely a fraction of the total contained in the site—have been identified. The earliest structures were predominantly circular, with deeply excavated floors and raised benches encircling the base of the housepit wall. Firehearths were present, and interior storage pits were common. Houses found stratigraphically above units of this type were also circular, but had floors only shallowly excavated into the earth, and lacked benches and storage pits. A small rectangular structure from nearby 35UM35, ^{14}C-dated at 2420 BP, shows that this historically-known Plateau style house was also quite early in the area. In addition to these house finds were numerous firehearths and storage pits. These could not be positively related to well-defined house structures, but nevertheless contribute to an impression of intensive occupation over a long period of time. More deeply buried deposits, which have not been dated, contain artifacts but apparently no dwelling structures. This suggests that perhaps the earliest use of the locality was ephemeral, less sedentary than later occupations became.

A cemetery area, from which over 230 burials were identified by the Mid-Columbia Archaeological Society and the University of Idaho, occurred not far from the mouth of the Umatilla River. Projectile point types associated with the burials suggest that this cemetery dates between about 2500 and 250 BP, making it essentially the same age as the dwelling remains, and giving additional evidence of the relatively permanent, sedentary character of the occupation.

The technology of the Umatilla Site inhabitants cannot yet be described in detail. Excavations by the Mid-Columbia Archaeological Society are said to have recovered some 36,000 prehistoric items, and other research has produced additional specimens. Detailed accounts of this wealth of material will be of great interest when they appear. At present it can only be said that the specimens generally resemble those from the later levels of the Roadcut and Wildcat Canyon sites, giving evidence of various hunting, gathering, food processing, and manufacturing tasks, and indicating a significant level of aesthetic and ceremonial activity.

Animal bones from the Umatilla Site show that people drew their food from both the river and its hinterlands. Salmon vertebrae attest the fishery at Umatilla Rapids. Jackrabbit and cottontail could have been taken in the near vicinity as well. The bones of deer, elk, bighorn sheep, and antelope indicate hunting in the uplands behind the site. This evidence is illuminated by ethnographic accounts telling that the Umatilla, as well as their Nez Perce and Cayuse neighbors, regularly hunted south into the Blue Mountains, where elk, antelope, and deer were abundant (Ray 1936:150).

Deschutes and John Day Rivers

In addition to the villages along the big river, many important sites are known from the Columbia's major tributaries. The Deschutes River enters the Columbia immediately above Celilo Falls, and the John Day comes in only 15 miles farther up. Ascension of the John Day River leads first south across the Deschutes-Umatilla Plateau, then far to the east into the rugged Blue Mountains. Ascension of the Deschutes River leads directly south along the flanks of the Cascade Range, into upper headwaters in Crescent and Odell lakes, less than 40 miles from Klamath Marsh. Prehistoric sites with housepit depressions and other evidence of stable occupation occur at a number of places along the lower reaches of both rivers, suggesting a pattern of life generally comparable to that on the Columbia. The upper reaches of both rivers were high-elevation hinterlands where small and scattered sites are the rule, probably the hunting and gathering camps of small groups ranging out from village centers.

John Day Narrows

The Narrows of the John Day River, only several miles up this main tributary from the Columbia confluence, was a prime fishing locality before water backed up by the John Day Dam drowned the rapids there. Archaeological studies have identified a series of sites along both sides of the river that are believed to have served as spring/summer residential bases, field camps, and activity locations. The Wildcat Canyon site, not far downstream, probably was one of the winter villages relating to this complex. Projectile points found are of types that span a long period, but the bulk of the occupation is assignable to the time of the Wildcat Phase and later, that is after 2500 BP (Wilde et al. 1983).

Excavations at the Morris Site, on a terrace just below the Narrows, yielded no firm evidence of house structures, but hearths and living floors were detected. The economic purposes of the site —probably typical of others in the vicinity as well—were revealed by much fish bone, many pestles and fragments of grinding stones, traces of edible roots, and a fragment of charred cake probably made of biscuitroot. A ^{14}C date of 4935 BP was obtained for the earlier occupation of the site, and a date of 3100 BP was obtained on the rootcake just mentioned. Other evidence suggests occupation until some time after 2000 BP (Schalk 1987).

Lower John Day Canyon

A cultural resource inventory survey of a 160 mile stretch of the lower John Day River canyon above the Narrows recorded 76 prehistoric sites (Polk 1976). Non-residential locations included rock art panels, rock alignments, and a number of small pits and cairns found in talus slopes. It was speculated that these talus pits and cairns represent burials, though it is not clear why the pits would be found open if they were burial spots. Habitation sites included 47 at which housepit depressions were noted, as well as some rockshelters and open sites. Among the major habitation sites were observed 230 depressions thought to represent pithouses. The number of probable dwellings identified varied from 1 to 17 per site, most locations having between three and six. These sites await further study, but the surface evidence clearly indicates a pattern like that along the Columbia, with stable pithouse villages and a variety of associated subsidiary activity sites.

Pine Creek

Sampling surveys along Pine Creek, which flows into the John Day some 80 miles above its confluence with the Columbia, have recorded 68 sites and a number of isolated finds. Housepit sites were again common. Also found were various activity loci of other kinds, including rockshelters, lithic flake scatters, isolated finds of projectile points and grinding stones, talus pits, cairns, pictographs, and toolstone quarries. Pithouse structures excavated but not yet fully reported have given evidence of living floors and firehearths, and ^{14}C dates between 2500 and 300 BP. A few projectile points of early type show human presence more than 7500 years ago, but the bulk of the evidence apparently dates to middle and late prehistoric times (Atherton and Houck 1976; Endzweig 1991).

Indian Canyon 2, on a small tributary to Pine Creek, was a special plant processing site. Excavations in a culture-bearing deposit about three feet deep collected specimens and fragments of some 110 flat stones with battered circular facets that were probably hopper mortar bases, and over 50 pestles and manos. In the deepest levels of the excavation, where a ^{14}C date of 1460 BP was obtained, clusters of such milling stones were the dominant feature. Higher up, in addition to more milling stones, were many clusters of blackened and fire-cracked rocks and charcoal. These are believed to represent earth ovens. They lay for the most part above the level from which a ^{14}C date of 1020 BP was obtained, and continued to the top of the deposit, where a ^{14}C date of 335 BP and the finding of a glass trade bead indicate late prehistoric and historic period occupation. Plant food remains were not recovered from the excavations, but the processing of root crops is indicated by the hopper mortar bases and earth ovens which dominate the site (Mazany 1980).

Pine Creek, with its pithouse sites and various associated activity loci, enters the John Day just at the southern edge of the Deschutes-Umatilla Plateau. As noted, few sites have been excavated and reported in detail along the lower John Day. Nevertheless, such data as are available show that a pattern of riverine life, centered on pithouse residential sites, extended upstream from the Columbia about as far as Pine Creek. Beyond this point, however, as the John Day crosses from the Deschutes-Umatilla Plateau into the Blue Mountains, pithouse settlements dwindle abruptly. It appears that in prehistoric times as now, the higher mountains were a hinterland, exploited in brief forays by people whose main settlements were elsewhere.

Mitchell Cave

One such hinterland site is Mitchell Cave, a small rockshelter on a minor tributary of the John Day a few miles above Pine Creek. It lies at about 4000 feet elevation on the northern flank of the Ochoco Mountains, in the transition zone between juniper woodland and ponderosa pine forest. The main intervals of human use are indicated by ^{14}C dates of 1430, 1020, 280, and 140 BP. The principal artifacts were small arrowpoints, point fragments, and point preforms, along with flakes and informal tools. Some larger, broad-necked points were also recovered. The dominant activity was clearly hunting and the processing of meat and hides, though a mano, a metate, and a pestle suggest some vegetable food processing as well. Faunal remains were varied. A number of small creatures including mice, voles, pocket gophers and squirrels were probably brought in by coyotes or other predators, but the bones of artiodactyls such as mule deer and elk surely represent the quarry of human hunters.

Of particular interest in suggesting the diverse areas from which people came to Mitchell Cave is a geochemical analysis of obsidian artifacts that identified raw materials from possibly 20 different geologic sources. The locations of most of these sources remain to be discovered through future research, but several artifacts were identified with known obsidian flows 50 to 80 or more miles away. Two pieces of obsidian came from Whitewater Spring to the northeast, in the headwaters of the Silvies River. Two came from Glass Mountain, and one from Glass Buttes, both sources to the south. Finally there was one specimen each from two different sources in the Cascades, to the west and south. Although the known obsidian flows all lie south of Mitchell Cave, it would be premature to conclude that the site's users came principally from that direction, given the many unknown sources and the relative lack of obsidian research in the region generally. Further, many small pin stem arrowpoints from the site suggest contacts to the north, where such points are common. Further research is clearly needed; for the present, the important and supportable conclusion is that Mitchell Cave attracted visitors from many different and quite distant places (Connolly, Jenkins, and Benjamin 1993).

Hall Creek

Farther up the John Day drainage, many small sites have been recorded in the higher elevations of the Silvies Plateau, which lies along the ragged divide between Plateau and Great Basin watersheds. These are sparse lithic scatters that attest only occasional, ephemeral occupation (Reid et al. 1989). The Hall Creek Site provides a good example. It is a thin, patchy scatter of flaked stone artifacts that extends broadly along the flanks of the stream for well over a half-mile. Test excavations showed the deposit to be generally shallow, but in one locality a cut well over a meter in depth exposed a stratum of volcanic ash deposited by the 7000 BP eruption of Mount Mazama, and flaked stone artifacts beneath it.

Stone tools found from bottom to top of the excavation at Hall Creek suggest recurring human occupation from the pre-Mazama period up to historic times. Dart points and arrowpoints from the site are of types that span the same time range. A detailed analysis of the obsidian cobbles, cores, flakes, bifacial blanks, and broken projectile points found at Hall

Creek showed that the site was primarily a quarry/workshop. Stone from the local stream gravels was used to refurbish hunting gear, the hunters replacing their broken or exhausted points with new ones made on the spot (Reid et al. 1989:146). There was little to indicate any other kind of activity at the site, except for the finding of a single mortar and pestle.

Other sites in the vicinity of Hall Creek that were test-excavated or studied from surface remains did not differ greatly in character. Owen's Spring yielded another quarry/workshop assemblage, and a Pinto point suggesting occupation as early as 5000 years ago. A locality near Craddock Meadow yielded a similar array of specimens, made from locally available obsidian cobbles and pebbles. Projectile points collected on the surface were of Great Basin Stemmed, Pinto/Gatecliff, and Rose Spring/Eastgate types, which taken together represent most of postglacial time.

Pilcher Creek

Beyond the easternmost reach of the John Day watershed, on the edge of the Grand Ronde valley, Pilcher Creek gives evidence of very early upland occupation. Excavations there revealed an ancient soil containing large stemmed and shouldered Windust points and large leaf-shaped points assignable to the Windust Phase. One of the shouldered points was found with volcanic ash identified as coming from the eruption of Glacier Peak (in the Washington Cascades) 11,200 years ago. A diverse assemblage of bifacial knives, scrapers, drills, cores, flakes, hammerstones, edge-ground cobbles, and soapstone pendants also belonged to this lower component. An upper component contained most of the same kinds of tools, but large stemmed points were rare; Cascade points were dominant, and a few corner-notched points were present. These artifacts, and bones of deer- and elk-sized animals, were found in earth that contained mixed volcanic ash from the Mount Mazama eruption of about 7000 BP (Brauner et al. 1985).

Stockhoff and Marshmeadow

Another important site is the Stockhoff Quarry, in the Grand Ronde valley near modern LaGrande. Here fine-grained basalt suitable for tool-making is abundant. In addition to great quantities of stone-flaking debris, the site has yielded specimens broken at various stages of manufacture, from cores and initial rough-outs to nearly finished artifacts. The quarry saw its greatest use between about 8000 and 4000 years ago, as shown by the finding of specimens there beneath volcanic ash from the Mount Mazama eruption, by ^{14}C dates of 7660 BP and 5750 BP, and by large lanceolate and side-notched projectile points. Other traces indicate continuing activity since then.

The adjacent Marshmeadow Site has ^{14}C dates of 10,700 BP, 6100 BP, 3410 BP, 2260 BP, 690 BP, and 480 BP, along with artifacts of types that together span all of Holocene time. The meadow near the site currently supports camas lilies in abundance. The artifacts from the site give evidence of tool manufacturing and the repair and discard of damaged hunting tools. Milling stones and pestles indicate vegetal food processing. Fire-cracked rock and charred bulbs dated after about 3400 BP indicate camas processing, and the bones of mountain sheep, pronghorn, and bison directly document hunting during this time (Womack 1977; McPherson et al. 1981).

Lower Deschutes River

Back on the lower reaches of the Deschutes River, the archaeological evidence is quite similar to that from the lower John Day. An inventory survey of the 100 miles or so of riverbank between Warm Springs Bridge and the Columbia located 135 prehistoric sites. Among them were rock art panels, rock piles, and excavated pits in talus slopes (Hibbs et al. 1976). The investigators suggest that the talus pits may have been hunting blinds, since they tended to be near the junctures of major game trails. Midden concentrations made up of freshwater mussel shell were found at a number of locations. Lithic quarry and workshop sites, rockshelters, open surface scatters of artifacts, and village sites with well-marked housepit depressions were also found. Two villages showed some 30 housepit depressions each; 25 other sites contained from one to six definite depressions, and 10 more sites were identified as probable pithouse villages. The best-known among all these sites is that at Mack Canyon.

Mack Canyon

About 20 miles above the Deschutes' confluence with the Columbia is the Mack Canyon Site, where 29 housepit depressions have been mapped along an alluvial terrace overlooking the stream (Cole 1967, 1969). Excavations in three of these depressions suggest the nature and age of occupation there. House pits 1 and 3, most extensively dug, represented shallow circular pithouses essentially identical to those known along the Columbia. The housepit floors measured roughly 20 feet and 15 feet in diameter respectively, and were made with a more deeply excavated central area, encircled by a less deeply excavated bench. In the depressed central area were found the remains of fires, and such domestic tools as hopper mortars, pestles, milling stones, pounding stones, flaked stone cutting and scraping tools, and projectile points. Some artifacts were also found scattered on the upper benches. No doubt these concentrations reflect use of the central portion of the floor as the main domestic activity area, while the raised bench around it probably served for sleeping and storage.

Over 1000 pieces of bone were excavated at Mack Canyon. Most were so broken up that the species represented could not be determined, but the identifiable specimens were of deer, elk, bighorn sheep, jackrabbit, cottontail, beaver, coyote, and bobcat. Rare fish bones and fragments of freshwater mussel shell also indicated the taking of aquatic fauna.

The artifact inventory from Mack Canyon was quite large and varied. Projectile points belonged to the Snake River Corner-notched, Columbia Valley Corner-notched, and Wallula Rectangular Stemmed types defined for the late Harder Phase of the southern Plateau region. Correspondingly, they closely resemble those of the Wildcat Phase from the mouth of the John Day. Other flaked stone specimens were scrapers, knives, drills, and gravers. Food-grinding implements included hopper mortars, pestles, and milling slabs. Bone awls, bone beads, and a fragment of a composite harpoon were also recovered. A ^{14}C determination of 1900 BP on charcoal from the floor of House Pit 1, and a date of 700 BP from the floor of House Pit 3, are congruent with the Harder Phase age indicated by the projectile point types.

Sherar's Bridge

Upstream from Mack Canyon is Sherar's Bridge, which crosses a stretch of the Deschutes River where the stream rapidly descends a long, rocky chute that evokes in miniature The Dalles of the Columbia. This is currently an important summer fishing area for native people, where platforms are erected along the edges of the channel just as they were at The Dalles before the dam was built there. Several archaeological sites are known in the vicinity of Sherar's Bridge, manifested by surface scatters of lithic flakes, cores, choppers, and the shell of river mussels. In the absence of detailed archaeological study, the antiquity and character of these sites is uncertain; they surely contain, however, valuable records that carry the contemporary use of this important fishing station back into prehistoric times.

Round Butte

Farther up the Deschutes, occupation beginning in quite early times is documented at rockshelter sites near Round Butte. A ^{14}C date of 7990 BP was obtained from beneath a layer of volcanic ash in Three Sheep Shelter, where leaf-shaped projectile points and other flaked stone artifacts were recovered. Another rockshelter (35JE1) produced a ^{14}C date of 2675 BP in association with flakes and projectile point fragments. A third (35JE2) yielded a ^{14}C date of 2650 BP in association with lithic cores and flakes, a hand grinding stone, and bone tools including a needle, some awls, and six fish hooks. From overlying levels came dart points, small arrow points, and an arrowshaft, among other specimens. Hopper mortar bases and pestles, fresh-water mussel shell, and fish bones are also reported from these and other sites in the vicinity. The finds are sufficient to establish long human use of the riverine setting, but much research is still needed to give a fuller picture of cultural patterns there (Ross 1963).

Lava Island Rockshelter

Near the modern city of Bend, Lava Island Rockshelter yielded a cache of projectile points made of obsidian that trace element analysis shows to have come from nearby Newberry Crater (Minor and Toepel 1984, 1989). Lanceolate points were most common, but small notched dart and arrow points were also recovered. Much flaking debris in the site indicates that tool-making was a major activity of its occupants. Deer bone, a fish bone, and river mussel shell also give evidence of hunting, fishing, and gathering. Charcoal from Lava Island Rockshelter gave ^{14}C dates of 2150 BP, 1420 BP, and 140 BP. The excavators suggest, however, based on the typology of the lanceolate points, that the site may have been occupied as early as 7000 to 10,500 BP. Others, however, contend that very thin obsidian hydration rinds on points from the cache indicate a relatively limited age. They suggest that the lanceolate specimens are not projectile points of early type, but rather generic tool blanks manufactured for trade in much more recent times. These same authors note the discovery in the general area of other, similar caches, which they interpret in the same way (Scott, Davis, and Flenniken 1986). However the dating question is resolved, Lava Island Rockshelter is significant as an example of a stone tool manufactury, based on the abundant Newberry Crater obsidian obtainable a few miles to the south.

Another rockshelter site on the Deschutes River near Bend is Peninsula 1, where a bone fish hook, a harpoon fragment, and mussel shell traces indicate use of riverine resources. The site was used over a long period, as indicated by ^{14}C dates of 4080 BP and 2980 BP, and by dart and arrow points of types made between about 4500 BP and late prehistoric times (Stuemke 1989).

Lava Butte

Also near Bend is Lava Butte, an open site that produced an abundance of flaked stone projectile points and other hunting tools, as well as many metates, hopper mortar bases, and pestles (Ice 1962). Occupation apparently began after the eruption of nearby Lava Butte about 6200 BP; dart points of generally Elko type, and arrowpoints of Rosegate and Desert Side-notched types, suggest that the site was visited thereafter down to late prehistoric times. A relative abundance of projectile points indicates hunting, and it is notable that contemporary deer herds moving between a summer range in the Paulina Mountains and a winter range in the Fort Rock Valley are drawn to the site area by a break nearby in the extensive lava flows that otherwise obstruct their passage between the two ranges. The large number of milling stones indicates that plant food processing was also important in the Lava Butte vicinity (Davis and Scott n.d.).

Wickiup Dam and Odell Lake

In the uppermost reaches of the Deschutes River drainage are the Wickiup Dam and Odell Lake sites, where large leaf-shaped and shouldered points, corner-notched points, and other flaked stone specimens were discovered under volcanic ash deposited by the 7000 BP eruption of Mount Mazama. The specimens from these sites are few, but they nevertheless document clearly the presence of people in the Cascades lake country in early Holocene times (Cressman 1948). In historic times this zone was the homeland of the Molala, whose range extended to the north, and the Klamath, who occupied the country to the south (Spier 1930; Stern 1966). In one influential interpretation, Klamath culture is traced back to pre-Mazama times, as an early adaptation to upland lakes, marshes, and rivers that has persisted for thousands of years (Cressman 1956).

Kawumkan Springs

Excavations at Kawumkan Springs Midden, on the Sprague River in the heart of Klamath territory, show that a hunting/ fishing/ gathering lifeway like that of the historic Klamath people is ancient there. Projectile points like those found beneath Mazama pumice at Odell Lake suggest that accumulation of the midden might have begun more than 7000 years ago. No Mazama pumice was detected, however, in the excavations at Kawumkan Springs (Cressman 1956). More conservatively, obsidian hydration measurements on projectile points from the site suggest an initial occupation about 5000 BP, and occupation thereafter down to late prehistoric times (Aikens and Minor 1978). Recent Klamath occupation at Kawumkan Springs is also documented. The Lalos, a native family, built a house of Euro-American type at the site in 1915, and people continue to live there today.

The site is named for a large spring, and numerous smaller ones, that well up in an open flat adjacent to the Sprague River. The springs feed a considerable pool that drains a very short distance into the river. The waters, said to maintain a constant 52^0 temperature year around, have never been known to freeze over. The warm spring discharge also keeps the river open at that point, even in hard winters. This suggests that Kawumkan Springs was a good wintering location, and the fact that 21 apparent housepits were visible as depressions in the midden's surface indicates that it was once a village of considerable importance.

Excavations in five of these housepits showed them all to be roughly circular, one to two feet in depth. The largest measured nearly 30 feet across, the smallest about 8 feet across, and intermediate examples were about 20 feet across. Two had well-defined benches around part or all of the interior circumference. All contained small notched and stemmed arrowpoints that probably date to the last 1000 to 1500 years, while four contained a few metal artifacts that were apparently intrusive refuse from modern occupation of the site. The ages of the unexcavated structures are not known.

Fish bones were present throughout the 4 to 5 feet of midden deposit at Kawumkan Springs, and more abundant in upper levels. The bones of birds and large mammals, and shells of river mussels, also occurred consistently. No plant remains were preserved, but many milling stones, mortars, and pestles give evidence for the processing of seeds and roots. Technology remained essentially stable throughout the life of the site. Of 15 kinds of artifacts used in hunting, hide working, fishing, and root or seed grinding, 12 were represented from the bottom to the top of the archaeological deposit. Manifestly, the way of life practiced at Kawumkan Springs changed little over millennia, in terms of either dietary economy or basic technology. Effectively the same patterns have been described for the ethnographic period of traditional Klamath culture (Cressman 1956).

Bezuksewas Village and Williamson River Bridge

Bezuksewas Village is an ethnographically described Klamath settlement situated just below the confluence of the Sprague and Williamson rivers, a few miles west of Kawumkan Springs. It is shown by archaeological excavations to have been occupied throughout much of the last 2000 years. The Williamson River Bridge Site, about three miles downstream from Bezuksewas, was a major fishing station occupied during the same period. From mid-March through mid-June, several species of suckers from Klamath Lake migrate one after another to spawning grounds up the Williamson and Sprague rivers, passing these sites in the thousands. In ethnohistoric times, a dam was made in the river opposite Bezuksewas to catch the fish of the spring migration. In the vicinity of Williamson River Bridge, a shallow rapids about a quarter-mile long affords excellent fishing opportunities (Cheatham 1991).

Excavations at Bezuksewas Village recovered a rich and diverse archaeological assemblage. It included projectile points and various tools of flaked stone; mortars, pestles, grinding slabs, and net weights of ground stone; and fish hooks, awls, and beads of bone. Concentrations of stone, bones, and tools indicate domestic activities, and fish, shellfish, bird, and mammal remains demonstrate a diversified subsistence base. A dozen ^{14}C dates span a range from 1960 BP to 200 BP. Many historic Euro-American items of the late 19th century were also found—including a U.S. ten-cent piece dated 1892—bringing the occupation up to very recent times. No housepits were excavated, but probable housepit depressions were observed in the vicinity.

At the Williamson River Bridge Site, digging exposed a considerable midden deposit of freshwater mussel shell, a fire hearth, and several concentrations of fire-cracked rock. One of these latter was ^{14}C dated to 1810 BP, the shell midden to 1600 BP, and another fire-cracked rock feature to 70 BP. Other dates, as well as historic artifacts, suggest two major periods of occupation—one between about 1800 and 1000 BP, the other about 100 years ago. Three wooden posts or stakes found near a large hearth may represent racks for drying fish. Artifacts included small arrow points, larger dart points, bifaces, scrapers, ground stone net weights, large bone points probably used to tip fish spears, and small bone points like those used by ethnographic Klamath to make composite fish hooks.

Of nearly 14,000 excavated bones identified to taxonomic class from the Williamson River Bridge Site, 84% are of fish, 15% of mammals, and 1% of birds. Of the fish bones identified to the genus level, 96% were of suckers. A number of tui chub bones and a few of salmon or trout were also identified. Excluding some 900 bones of pocket gophers that probably lived and died in the site independent of human agency, the most common mammals were ground squirrels and domestic dog. Only five deer bones were found, indicating that large game were no significant part of the human diet at this site. Shells of freshwater mussel were recovered in some quantity, an estimated 4500 individuals being represented by the excavated remains. Analysis of shell growth increments shows that the season of death for all specimens studied was between mid-April and mid-June. This period corresponds closely to the time of the annual sucker spawning runs.

Lost River and the Peninsula Site

Archaeological investigations in the uplands overlooking Lost River, southeast of the Klamath heartland near the California border, carry the account into Modoc territory. The Klamath and Modoc languages are closely related, and the traditional lifeway of the two peoples was very similar. Like the Klamath, the Modoc relied heavily on river and marsh for their subsistence. But they tended to hunt and gather plant foods rather more, and to fish rather less, occupying as they did a more diversified habitat that reached into montane woodlands but encompassed much lower-elevation sagebrush steppe as well. Historically, Modoc winter villages were placed on lowland streams and marshes, and upland exploitation was mainly a summer activity. In terms of comparative ethnography, the Klamath / Modoc way of life is intermediate between Plateau culture to the north and Californian culture to the south, with Klamath diverging more toward the Plateau, and Modoc more toward California (Ray 1963; Stern 1966). In the present book, this cultural bridging is reflected by the fact that Klamath culture also comes into the discussion of Californian relationships in Chapter 6, where the focus is on southwest Oregon.

The Peninsula Site, on an upland plateau that drains southwest into the Lost River, displays some 28 boulder- outlined house circles. These are scattered along a ridge that once bordered a marshy meadow, now beneath the waters of Gerber Reservoir (Silvermoon 1989). The boulder circles, mostly about 14 feet in diameter, apparently served as bases against which to foot pole frameworks for perishable superstructures. They are founded on a shelving rocky surface with very shallow soil, that would not have allowed excavation for the construction of more typical pithouses. Outside the house circles, pecked or ground into the boulders and bedrock of the site surface, were 26 hopper mortar depressions, 9 deep mortar pits, and 6 grinding slicks. A number of natural rock depressions also showed some signs of grinding. A few stone pestles and manos, and numerous fist-sized pounding and abrading stones, lay scattered on the site surface among these features. In the same area, several petroglyph motifs were pecked into a boulder and a low rocky ledge.

The artifact assemblage, recovered from the surface and excavations in areas of shallow soil, included an abundance of flakes that had been used for cutting and scraping. A striking characteristic of this assemblage was the predominance of small flake tools with multiple use-faceting, suggesting that stone tool material was "used and reused, worked and reworked, until individual pieces became so small that they were discarded (Silvermoon 1989: 111)." A few obsidian cores represent the sources of these flakes. The projectile point collection included predominantly small Desert Side-notched and Rosegate arrowpoints, with some larger specimens that may have been dart points. Three ^{14}C dates, one of 1080 BP, one of 540 BP, and one modern, are quite congruent with the established ages of the arrowpoint types. Some dart points could indicate earlier occupation as well, but they were so few as to leave the issue in doubt.

The Peninsula Site was probably occupied during the biotically productive warm half of the year, when the wet meadow and rocky soils nearby would have provided a variety of grasses and sedges, and root crops such as camas and ipos. Plant food processing is clearly indicated by the site's bedrock grinding features, and hunting by the projectile point assemblage. Local residents say that waterfowl in some numbers once frequented the marshy area where the reservoir now lies. Larger game such as deer and antelope are regularly seen around Gerber Reservoir today, and the Oregon-California interstate deer herd moves through the area each spring and fall. During the season of cold and snow, better locations for residence were available in nearby lowland settings, and it is known that the Modoc of historic times preferred to winter in such places (Burnside 1987).

Nightfire Island

On the western edge of Lower Klamath Lake just below the Oregon-California state line is Nightfire Island, a lowland site in the heart of traditional Modoc territory. An extensive series of ^{14}C dates, 27 in all, demonstrates occupation there between about 6000 and 1000 BP. The dates show that people returned to the spot consistently over millennia, although occasional gaps of a few hundred years suggest intervals of abandonment when lake waters may have been too high, or too low (Sampson 1985).

The history of occupation at Nightfire Island reflects changing uses of the locality by its human visitors. Lower Klamath Lake, shown by high shorelines and diatomaceous clays to have once been considerably larger and deeper, had shrunk to approximately its historic size by shortly after 7000 years ago. This is seen in the fact that the basal clay layer at the site, which was deposited in a swampy shoreline setting, contained a lens of volcanic ash from the Mount Mazama eruption. Artifacts and stone rubble began to accumulate above this layer, along with food refuse that included the bones of many species. During its initial period of occupation the site was apparently a seasonal hunting, gathering, and fishing station.

As the Nightfire Island deposits continued to thicken, there grew a little platform of rubble-rich earth that helped stabilize and elevate the marshy ground. This platform was greatly enlarged and solidified about 4400 BP by quantities of stone that were brought into the site from nearby sources. Between about 4000 and 2000 BP substantial pithouses were built at the site, as indicated by clay-lined floors and post holes. Charcoal from a hearth in one of these floors yielded a ^{14}C date of 4030 BP, and a charred timber from the floor of a house destroyed by fire gave a date of 2220 BP. During the period of house construction, the platform continued to be augmented with stone rubble. The site at this time probably functioned as a sedentary winter village and year-around base of operations. Two cemetery areas, with the remains of 45 individuals cremated according to historic Modoc custom, apparently came into use toward the end of this period. Arrowpoints found among some remains suggest that deaths due to violent raids occurred late in the site's history. Only lightly-built structures seem to have been made during the final period of occupation, and apparently the site served once again as primarily a warm season fishing/hunting/gathering camp until it passed out of use about 1000 years ago.

The bones of coots, grebes, scaups, mallards, mergansers, and geese were varyingly common throughout the accumulated deposits. Marked fluctuations in the ratio between ducks that feed by diving in deep water, and those that dabble in shallow marshy settings, suggest a complex history of changes in the local environment. Common mammals included elk, deer, antelope, mountain sheep, jackrabbit, cottontail, mink, otter, coyote, and dog. Bison occurred during the middle period of occupation. Fish bones were found in some abundance, virtually all of the identified sample being of the cyprinid or minnow family. Fish bones were best represented in the later part of the occupation, though some traces go back to early times. A broad range of additional bird and mammalian species was represented by limited numbers of recovered specimens. In general the faunal remains are of animals that can be found even today in the immediate or near vicinity of Nightfire Island.

The artifact assemblage from Nightfire Island was extensive. Plant food processing is attested by numerous ground stone mortars and pestles, flat milling slabs and handstones, and hopper mortar bases. Hunting technology included an older complex of atlatl dart points identified to Northern Side-notched, Humboldt, Pinto, Elko, and Gold Hill types; and a younger complex of small arrow points belonging to the Rose Spring, Gunther, and Siskiyou or Desert Side-notched types. Fishing technology included grooved stones that were probably sinkers or net weights, and bone prongs for fish spears. Numerous cores and abundant flakes of obsidian, along with pebble hammerstones, gave evidence of a well-developed stone working industry. Stone mauls, antler wedges, stone drills, and serrated cutting tools, along with such products as handles and bevelled bone points, attest the making of wood, bone, and antler artifacts. Eyed needles and bone awls, along with stone flake scrapers and knives, tell of hides being worked and sewn.

An X-ray fluorescence analysis of some 300 projectile points showed that the Nightfire Island people used obsidian from sources 20 to 35 miles south in the Medicine Lake Highland, 35 to 85 miles northeast in the region of Sycan Marsh and Tucker Hill, and 110 to 120 miles east-northeast in the Warner Mountains and at Quartz Mountain (Hughes 1985). Some 80% of the Northern Side-notched points, generally the earliest type in the sample, were of southern obsidian from the nearby Medicine Lake Highland. The somewhat younger Elko points also included many specimens of Medicine Lake Highland obsidian, but 37% were made of stone from more distant sources to the north and east. The youngest specimens, arrowpoints of the Gunther series, showed a return to the pattern of the Northern Side-notched specimens, with 81% made of nearby southern obsidian from the Medicine Lake Highland. This evidence of shifting obsidian procurement clearly indicates greater contact by Nightfire Islanders with areas to the north and east during the middle period, prior to the time the bow and arrow were introduced. Among possible reasons for this shift, it has been suggested that competitive relationships among local groups may at times have facilitated Nightfire Islanders' access to the Medicine Lake Highland sources, but at other times limited it, forcing them to seek elsewhere for toolstone.

During the final centuries of occupation, when the Nightfire Islanders were once again depending heavily on Medicine Lake Highland obsidian, they also became notably involved in the exchange of seashells and finely crafted stone pipes from the west and south. This development presages the extensive trading network maintained by the Modoc and Klamath in early historic times, when it reached as far west as the Pacific coast, and as far north as the great summer rendezvous at The Dalles of the Columbia River.

Artistic and Symbolic Forms

Tsagaglalal, "she who watches" in the Wishram language, is a large, dramatic image pecked into a basalt ledge overlooking the Long Narrows of the Columbia (Figure 3.26). A Wishram tale describes her as an ancient chief who was turned to stone by Coyote, that she might stay and watch over the people of that place. The image, representing a face or mask with large round eyes and small ears high on the head, closely resembles the bear figures of carved wooden masks made historically along the British Columbia coast. More generally, the Tsagaglalal petroglyph shares artistic details with petroglyphic and other representations that extend from The Dalles of the Columbia down to the Pacific coast, and north along the coast as far as Alaska. Some elements are traceable even farther, into coastal Siberia. In many representations human and animal merge, often to a degree that anthropomorph and zoomorph cannot be distinguished (Hann 1989).

Archaeological excavations near The Dalles have yielded anthropomorphic bone and antler carvings that share motifs with this striking image, and the age of these sites suggests that the petroglyph probably dates from late prehistoric times, after about 1000 years ago. Other motifs, ^{14}C dated at sites on the British Columbia coast, indicate that the basic style is probably 3000 to 4000 years old (Lundy 1976).

In addition to anthropomorphic / zoomorphic beings with stylized faces, the Columbia River region displays an abundance of naturalistic animal figures, including sheep, deer, birds, and lizards. Simple anthropomorphic figures without facial features also occur. Abstract elements such as simple, concentric, and rayed circles, zigzags, rakes, and reticulated patterns are also common. A few examples consist only of pits pecked into a stone, or of pits connected by grooves. These various petroglyphs are allied in motif and style with a tradition that is widespread in the intermontane region, from the Plateau in the north to the Great Basin in the south (Steward 1927, 1929; Cressman 1937). In the Great Basin, where

Figure 3.26 Tsagaglalal, "she who watches," on an outcrop overlooking the Long Narrows of the Columbia (courtesy of Jerry Magee).

efforts to date these elements have been most extensive, pit and groove petroglyphs are thought to date as early as 7000 BP. The abstract style probably dates from about 4000 BP, and the animal figures from about 2000 BP (Heizer and Baumhoff 1962).

Portable art in stone, bone, antler, and even wood is also a notable characteristic of Plateau culture sites around The Dalles. Besides the above-mentioned bone and antler anthropomorphic carvings, there are such items as stone fish effigies, full-figure human effigies, human faces and heads, stone mauls ornamented with carvings of anthropomorphic heads, bird figures, and lizards. So distinctive are many of the human representations that it has been suggested they represent a special ritual pattern for the area (Butler 1957; Strong 1943).

Southward up the Deschutes River, petroglyphs near Sherar's Bridge include simple anthropomorphs, deer, sheep, rayed concentric circles, and other motifs. Rock art along Jones Creek included simple anthropomorphs, birds, sheep, and rayed circles, as well as non-representational curvilinear designs. A number of sites farther south, around the modern city of Bend, display simple anthropomorphic figures, rayed circles, sheep, and various curvilinear and rectilinear abstract designs. Sites along the lower John Day display abstract designs, circles, zoomorphs, and anthropomorphs. Picture Gorge, on the upper reaches of the John Day River, includes simple anthropomorphs, lizards, rayed circles, and various curvilinear and rectilinear designs. Farther south still, rock art around Klamath Marsh includes pitted boulders, simple anthropomorphs, circles, and abstract curvilinear and rectilinear designs. At sites on the Sprague River, concentric circles with dots at the center are quite common (Loring and Loring 1982).

It is notable that the rock art seen along the Columbia, especially near The Dalles, includes elements shared over a vast area of the Northwest Coast and intermontane west. In general the stylized faces and elaborate zoomorphs seen along the Columbia do not occur much to the south or east of the big river, but the other forms noted for the region of The Dalles are found farther afield (Figure 3.27). The rock art thus shows that The Dalles region had ties over millennia of prehistory both to the Northwest Coast and the interior Plateau hinterlands.

Future Research

This chapter has shown that the Plateau way of life common to much of northern and central Oregon east of the Cascades has a clear culture-

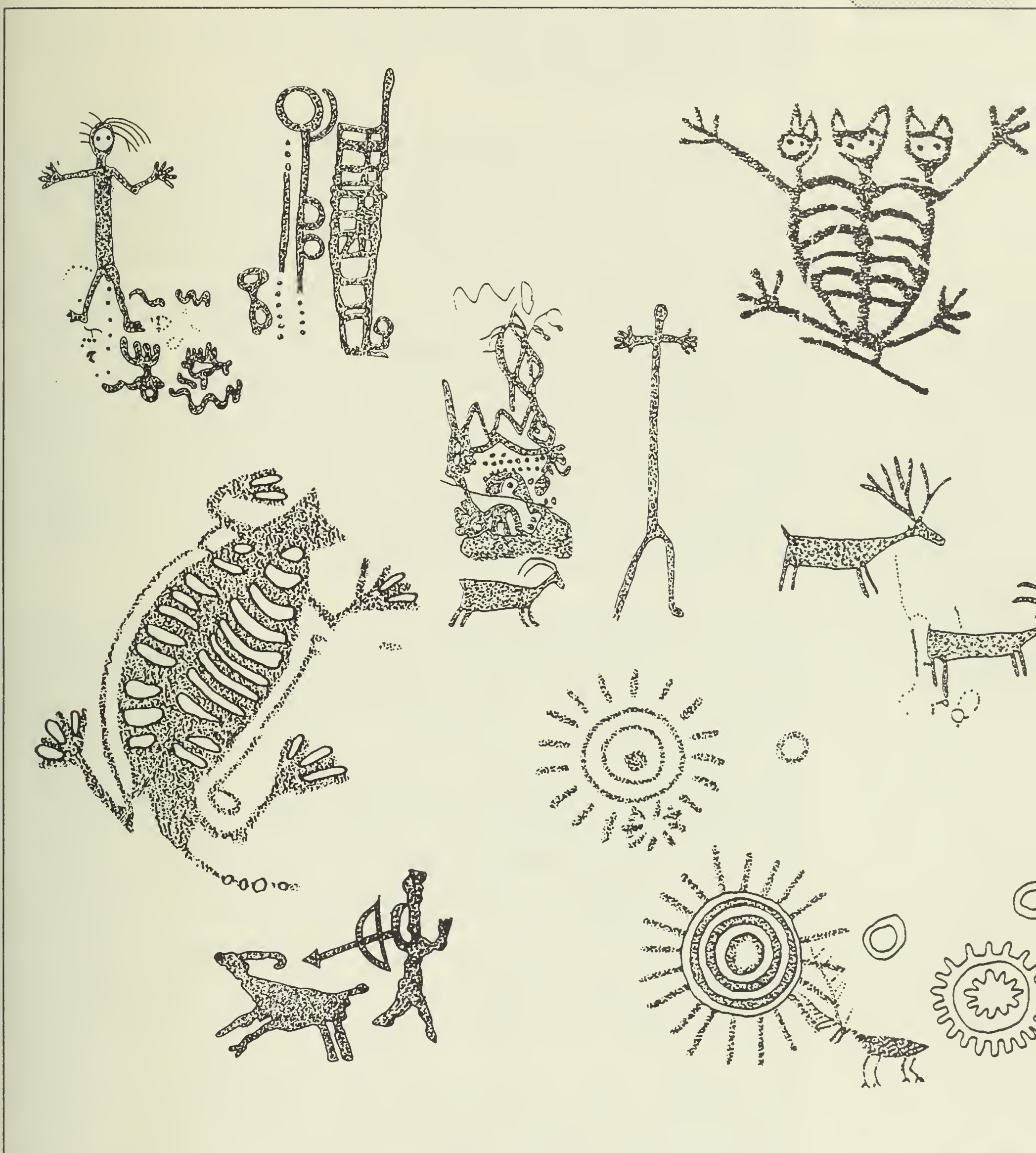


Figure 3.27 Rock art motifs from various sites near The Dalles of the Columbia. Redrawn from McClure (1984) and Loring and Loring (1982). Variable scale.

historical unity. The Columbia River and its tributaries were sources of sustenance, and passages for human movement that linked together an ecologically diverse region ranging from riverside habitat through open steppe and grassland into wooded montane foothills and uplands. The area around The Dalles was especially rich in natural resources, and was correspondingly a focus of human activity. It drew together people from all over the Plateau, and in later prehistory people from the Northwest Coast culture sphere as well.

The origins of this cultural phenomenon are under continuing investigation. One influential interpretation, which hews closely to evidence currently available, suggests that the earliest people of the Plateau must have been primarily terrestrial hunters and gatherers who foraged widely, moved frequently, and used riverine resources comparatively little—and then only in exceptionally favored places like The Dalles. According to this theory it was probably during the relative warmth and dryness of mid-postglacial time, around 5000 BP, that Plateau groups came to establish relatively sedentary lifeways in optimal locations where hunting, root collecting, and fishing could all be profitably accomplished within a small radius of travel. Once this more settled way of life was established, based on intensive harvest collecting and food storage, it led to population growth and eventually to the widespread establishment of settled villages with permanent houses after about 4000 BP (Ames and Marshall 1981; Schalk 1987).

A competing interpretation argues that early people, entering a region with some of the richest salmon runs in the world, would have come quickly to rely upon fishing rather than going into it gradually over thousands of years. Evidence from The Dalles does indeed show an association of salmon bones and human artifacts that indicate fishing soon after 10,000 BP. In this view, the extremely limited evidence of occupation along the Columbia between about 8000 and 4000 BP may be due simply to flood destruction of the river terraces that existed during this period. As briefly noted at the beginning of this chapter, an erosional episode is known to have occurred along the Lower Snake River between 5000 and 4000 BP, with renewed deposition thereafter and relative geological stability after about 2500 BP. Perhaps these same conditions would have pertained downstream on the Columbia as well. Pithouse settlements occupied by salmon fishers along the rivers may have been present in much earlier times, but remained unknown to us because flooding destroyed the river terraces they were built on. The sudden "appearance" of houses and villages between 4,000 and 2500 BP might thus be understood as more apparent than real, simply reflecting an end to major flooding episodes that destroyed earlier archaeological traces.

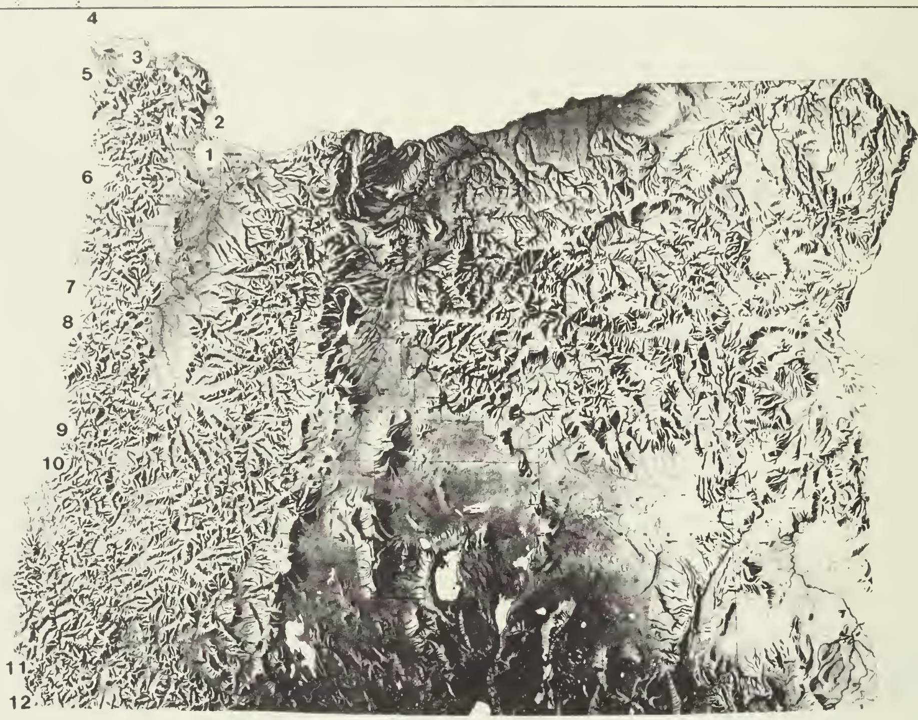
Future archaeological work in the region will ultimately resolve this question, and surely introduce new questions as well. As knowledge increases it should also prove possible to address questions of group organization and interaction that have not been archaeologically treated in the present account at all, except by reference to the far-flung trading and exchange system of the 19th century, which implies a prehistoric evolutionary sequence leading up to it.

Chapter 4

Pacific Coast and Lower Columbia River

Native cultures of the Oregon Coast and Lower Columbia River belonged to the greater Northwest Coast area, which extends from Yakutat Bay, Alaska, on the north to Cape Mendocino, California, on the south (Figure 4.1). The Pacific Coast and Lower Columbia River, though at first glance quite different environmental settings, share many plant and animal species that were important to human subsistence and industry. Correspondingly, the traditional cultures which grew in these two settings exhibit many common characteristics and a shared history.

The Lower Columbia was occupied by Chinookan people. All speaking closely related languages, the Chinook, Clatsop, Cathlamet, Skiloot, Multnomah, Clackamas, Cascades, and Wasco extended from the river's mouth upstream as far as The Dalles, where the Northwest Coast and Columbia Plateau culture areas touched. The Clatsop range also extended for some miles south along the coast, from the river mouth as far as Tillamook Head. Beyond them lived the Nehalem, Tillamook, Nestucca, Salmon River, and Siletz people, all speaking languages of the Salishan phylum. Farther south were the Yaquina and Alsea, and beyond them the Siuslaw and Lower Umpqua. Adjacent to the Lower Umpqua people were the Hanis and Miluk. All of these people spoke languages belonging



Key to Sites

1 – Meier
2 – Sauvie Island, Cholick, Merrybell
3 – Eddy Point, Ivy Station
4 – Fishing Rocks
5 – Palmrose, Avenue Q, Par-Tee
6 – Tillamook
7 – Yaquina Head
8 – Seal Rock, Whale Cove
9 – Tahkenitch Landing
10 – Umpqua-Eden
11 – Lone Ranch Creek
12 – Pistol River

Figure 4.1 Map showing site locations in the Pacific Coast and Lower Columbia River region.

to the great Penutian phylum. Beyond them the Upper Coquille, Kwatami, Tututni, Chetco, and Tolowa, all speaking closely related Athabaskan languages, extended into northern California. The high degree of linguistic diversity in this cultural area is striking.

Northwest Coast culture was most elaborated in the north, where the deeply fjorded coasts and numerous offshore islands of British Columbia and southern Alaska created a sheltered natural setting of extraordinary biotic richness. The natural abundance, readily harvested in the protected waters of the region, supported a considerable human population that gathered in large settlements. Along the straight, open Oregon Coast, directly exposed to the energy of the north Pacific, protected bays and estuaries were far fewer; correspondingly, both the relative richness of the natural harvest, and human population density, were much less. The Lower Columbia River Valley was, however, an important exception to the general Oregon pattern. Its protected and highly productive inland waters supported a dense population in numerous villages. These extended from the river mouth upstream through the Portland Basin and Columbia Gorge as far as The Dalles, just east of the Cascades.

All groups shared a broadly similar way of life, though local variations definitely existed. The roots of this marine/riverine culture can currently be traced about 8000 years into the past, but the earliest evidence is very thin, and much remains to be learned through further investigation.

Ethnographic Life Way

Ethnohistoric accounts of the coastal and river people show that their annual round was much the same throughout the region. South of the Coquille River mouth, a broad coastal plain and warmer climate contrast with the drowned coastline and cooler climate of the north. But people depended on the same range of plants and animals, and the seasons for exploiting individual species were about the same everywhere, governed by the rhythms of nature. The Alsea, dwellers of the north-central coast, obtained their subsistence in ways common throughout the region:

> Chinook salmon entered the coastal rivers in midsummer, followed by coho and dog salmon in the early fall. The steelhead trout, which is often grouped with salmon, was an additional sea-run fish prized for its flesh that was taken in the late fall through winter months. Smelt, herring, flounder, perch, and lamprey eels were also harvested as available throughout the year. Clams, mussels, crabs, and sea anemones were collected by the women from estuaries, tide pools, and bays.

Sea mammal hunting was apparently confined to offshore rocks where seals and sea lions congregated; there they were clubbed or harpooned. Whale hunting was considered too dangerous, according to informants interviewed by Drucker (1943), although the occasional beached whale was highly prized for the oil rendered from its blubber.

Although their land was rich in game, the Alsea did not extensively exploit this source of food. Hunting was considered "an adventuresome way of augmenting the fish diet (Drucker 1943: 83)", and was not pursued with the same vigor as fishing. Deer and elk were stalked along trails or at small forest clearings, especially during the summer when the animals were in fine flesh. Dogs were occasionally used in the hunt to hold an animal at bay until the hunter was within bowshot. Pitfalls were sometimes excavated to capture elk, a prized game animal, but the time required for preparation of the pits limited their use considerably. Less attention was given to other game, although it is reported that beaver were dug out of dens and clubbed, and that small fur-bearing mammals were shot with the bow. Quail and grouse were caught in basket traps, and waterfowl were shot. Children used a slip noose to catch seagulls, and seagull and cormorant ("shag") eggs were collected as a food resource.

A wide range of plant foods including roots, greens, berries, fruits, seeds, and nuts gave additional variety to the diet. Camas was dug in great quantities from summer through fall, with the surplus being prepared for winter storage. Roots of plants such as skunk cabbage and ferns were harvested in the spring. Salmonberries, blackberries, huckleberries, and strawberries, which grew in profusion along the coast, were important food supplements. Each was collected in its proper season, along with various greens. Acorns were also harvested in small quantities back from the coast. Tobacco was grown at sheltered plots away from the village; it was mixed with dried kinnikkinnik leaves for smoking. (Minor et al. 1980: 86).

Broadly speaking, a bi-seasonal subsistence cycle was practiced by all Northwest Coast cultures. From early spring through fall, village members would disperse into small temporary camps near resource areas, living on what they obtained and processing stores for winter. There were of course comings and goings between the village and its satellite camps; the main village was probably never wholly abandoned, but its population must have been much depleted at busy times. In late fall through winter, the whole populace reassembled in the main village. This was predominantly a time of repairing and manufacturing equipment, with some fishing, hunting, and collecting of shellfish to supplement dwindling winter stores.

Dwellings, very similar in type throughout the region, were large houses of wooden planks built over excavated pits. Size varied according to the number of people in a group, with multiple-family occupation the rule. An early description of Chinook long houses by Franchere provides a graphic account of this regional house type, though it must be remembered that the unusual population density and wealth of the Chinooks fostered the construction of larger buildings than were common elsewhere in the coastal zone of Oregon:

> Their houses, constructed of cedar, are remarkable for their form and size: some of them are one hundred feet in length by thirty or forty feet in width. They are constructed as follows: an oblong square of the intended size of the building is dug out to the depth of two or three feet; a double row of cedar posts is driven into the earth about ten feet apart; between these the planks are laid, overlapping each other to the requisite height. The roof is formed by a ridgepole laid on taller posts, notched to receive it, and is constructed with rafters and planks laid clapboard-wise, and secured by cords for want of nails. When the house is designed for several families, there is a door for each, and a separate fireplace; the smoke escapes through an aperture formed by removing one of the boards of the roof. The door is low, of an oval shape, and is provided with a ladder, cut out of a log, to descend into the lodge. The entrance is generally effected stern foremost (Franchere 1967:247-248).

Historic accounts all agree that the native settlements practiced a high degree of local autonomy. Each major village, with its satellites, was politically independent of all others; while there was naturally intercourse between settlements, there was no overarching organization of authority. Relations between villages essentially were maintained as relations between separate nations. Common interests were served, and alliances formed, through trade relationships and marriage.

Far-reaching similarities in material artifacts link historic and prehistoric cultures. A large inventory of tools and equipment was in use, including many items of perishable material not often found archaeologically. Hunting tools, fishing tools, woodworking tools, and objects of ornamentation and ceremony all attest strong continuity between past and present.

Natural Landscape

The Oregon Coast and Lower Columbia Valley form a natural unit in many respects. They share the same cool, mild climate, with abundant rain and a narrow temperature range, and much the same spectrum of plant and animal species. Wooded hills are dominated by the Douglas-fir, which occurs both in vast unmixed stands, and in mature forest mixed with western hemlock, western red cedar, and other coniferous species. Sitka spruce is common in the coastal fog belt. Along streams the deciduous red alder, bigleaf maple, and Oregon ash are common. Various ferns, salal, huckleberry, salmonberry, and other low-growing plants constitute the dense understory vegetation of the region. Terrestrial fauna includes elk, deer, bear, jackrabbit, brush rabbit, beaver, various squirrels and other rodents, raccoon, otter, and various members of the weasel family. Many kinds of waterbirds and inland species are to be found there as well, the region being in the heart of the Pacific Migratory Flyway.

Fishes were of course abundant throughout the area, and present in great variety. Salmon were of primary importance to both coastal and riverine peoples, but many other anadromous species, including steelhead trout, eel, and sturgeon were also prized. Strictly marine fishes, such as ling cod, halibut, flounder, and various small rockfish were taken as well. Sea mammals, especially seals, were available both along the coast and in the interior rivers during the salmon season, when they followed migrating fish upstream. Finally, shellfish of both fresh and marine waters were abundant and could be gathered in quantity at many places.

These similarities in the natural resource base no doubt account for the general sharing of a common fishing, hunting, and gathering technology among the native peoples of both river and seashore. Broadly speaking, Northwest Coast culture in general is an adaptation to this biota, available in varying abundance from Cape Mendocino in California to Yakutat Bay in Alaska. Local geography has great effect, however, on the relative abundance and accessibility of key resources in different areas. A major contrast is evident in the general richness of the Lower Columbia Valley as compared to the Oregon Coast.

The 170 miles or so of the Lower Columbia River, from The Dalles to Clatsop Spit on the Pacific, is particularly rich in fish. Five species of anadromous salmon funnel into the river from early spring to early fall, headed for spawning grounds throughout thousands of miles of streams in the vast Columbia drainage. Smelt and eels similarly run upriver.

Being newly derived from the sea, the fish of the lower river are in the finest condition. Additionally, various freshwater fishes are available on the Lower Columbia the year around. The open coast, by contrast, is swept by strong seas and has few large estuaries and protected bays that concentrate aquatic species in the way the Lower Columbia does. The coastal rivers flowing into the Pacific are short, with tributary systems and spawning grounds of comparatively limited extent. Their salmon harvest—though potentially rich—simply does not compare with that available along the Lower Columbia. These factors had their effect on the relative wealth and numbers of the human population, which was at least several times as densely concentrated along the Lower Columbia as along the Pacific shore. It has been estimated that some 22,000 people lived along the Lower Columbia in early historic times, as compared with only half that number along the entire Oregon Coast (Kroeber 1939:133, 136).

Time and Environmental Change

The present relationship between land and sea, with its corresponding local patterns of plant and animal distribution, seems to have been established about 3000 years ago. River valleys drowned by the sea to form long, deep estuaries are a dominant feature of the modern environment. The native cultures strongly reflected this setting, dependent as they were on its particular food and industrial resources. To trace the development of these cultures it is therefore necessary to explore not only the archaeology, but also the dynamic history of the natural environment.

During the glacial period, when much of the earth's water was locked up in great ice sheets on the land, worldwide sea levels were lower than they are now. The Oregon coastline then lay farther westward than it does at present. With postglacial warming, which was well underway by 11,000 BP and reached a peak between 8000 and 4000 BP, water stored as ice on the continents melted back into the oceans. This resulted in a worldwide rise in sea level of 300 to 400 feet.

The date at which Oregon's Pacific coastline became stabilized near its modern level is becoming more closely known through paleoenvironmental research. Logically, sea-level stabilization should date from the time when a climatic regime comparable to today's was finally established. According to pollen studies over a broad area of the Northwest, this transition took place some time around 4000 BP (Hansen 1947; Heusser 1960; Flint 1971). Geological evidence adds to this picture. For example, sediment cores and other evidence from Alsea Bay show that before about 7500 years ago the present Alsea River estuary was occupied by a high gradient stream. By 5000 years ago, rising sea level had drowned the channel, forming a deep-water estuary. Since that time the present shallow-water environment has formed as sediment borne down the rivers was dropped in the slow waters of the estuary (Peterson et al. 1984).

The history of sea-level rise goes far to explain the scarcity of evidence for very early human occupation along the Oregon Coast. Sites that might have existed along the shoreline in early postglacial times would have been surf-beaten and destroyed by the sea as it rose to its present level. A similar fate would have befallen any early sites too near the mouth of the Columbia River, as its waters rose in concert with the level of the sea. Even since the time of sea-level stabilization, archaeological sites have surely been destroyed or hidden by ongoing erosion of headlands and shorelines, shifting of sandspits, and local subsidences. But environmental dynamics did not affect only the archaeological record, they also affected the lives of prehistoric human residents directly, as evidence to be recounted below will demonstrate.

Cultural Chronology and Time Markers

Earliest human occupation in the region probably dates back to the Clovis Paleo-Indian period, or fluted point horizon, of about 11,500 BP. The base of a Clovis fluted point found on the surface at Siltcoos Lake on the central Oregon Coast, and several other fluted points found in far western Oregon and Washington, show that these early people occupied the coastal zone. Human presence after this period is demonstrated by the Youngs River Complex, known by surface finds made near the mouth of the Columbia. Characterized by large lanceolate, leaf-shaped, and stemmed projectile points, this complex is estimated to date between about 10,000 and 5500 BP. The time range is suggested on the basis of dates from the Plateau for similar specimens, which there span the early Windust, Cascade, and Tucannon phases. On the southern Oregon Coast a "Bluff Site" complex, including comparable types as well as other specimens, probably spans a similar period, and may have persisted longer (Minor 1989a: 4-6).

A more finely divided cultural sequence spanning the last 2500 years has been developed for the Lower Columbia Valley, based on ^{14}C-dated excavations at sites near Portland (Pettigrew 1981). Diagnostic point types from the Portland Basin are very similar to specimens from the Oregon Coast, allowing the same chronology to be used in both areas.

The Merrybell Phase, 2500-1750 BP, is marked by side-notched, corner-notched, and lanceolate points of medium size, with broad stems. These were probably used as atlatl dart points. The Multnomah I sub-phase, 1750-700 BP, is marked by small, triangular corner-notched points having narrow stems; these are clearly arrowpoints. The Multnomah II sub-phase, 700-200 BP, is marked by small, side-notched projectile points of a distinctive type recognized throughout the west as Desert Side-notched. Small, unnotched, triangular points also accompany this type. The Multnomah III sub-phase, 200-100 BP, is recognized by the appearance of Euro-American trade goods in aboriginal assemblages.

These projectile point types are illustrated in Figure 4.2. The fact that they were shared so widely along the Columbia River and Pacific Coast of Oregon reflects the continued interaction and sharing of mutually usable information and ideas that would be expected among people relying on the same kinds of natural resources and practicing the same kinds of economic activities. For example, in ethnographic times the Tillamook of the north coast arranged marriages with their Clatsop and Alsea neighbors, so that kinship networks spanned considerable distances, even crossing language barriers. Historically, too, Tillamook parties raided southward down the coast to capture slaves, who were traded to Clatsop, Chinook, and Chehalis peoples along the Lower Columbia (Beckham 1977).

Tahkenitch Landing

About midway between the towns of Florence and Reedsport is Tahkenitch Landing, which gives evidence of human occupation on the central Oregon Coast going back some 8000 years (Minor and Toepel 1986). Its discovery was a major breakthrough, for prior to that the earliest datable evidence for the coastal zone was only about 3000 years old. The locality is now a canoe landing within the U.S. Forest Service campground at Tahkenitch Lake, in the Oregon Dunes National Recreation Area. Government Land Office surveyor's notes from 1858 record a native canoe landing in the same place, and a village on the opposite shore of the lake. This section of the coast is the traditional territory of the Lower Umpqua, a Penutian-speaking group.

Tahkenitch Lake now fills the old estuary of a small river flowing out of the steep, rugged Coast Range. The Tahkenitch Landing site occurs along the base of a small sandstone knob slightly elevated with respect to the adjacent flats. A shell midden containing artifacts is about 150 feet wide

Figure 4.2 Projectile points from the Lower Columbia region (Portland Basin). Upper rows, Multnomah phase; bottom rows, Merrybell phase.

and 500 feet long. The abundant marine shells show unequivocally that the current fresh-water lake did not exist at the time the archaeological deposit was formed; the estuary was then directly open to the sea. The coastline now lies about a mile west of the site, and in early postglacial times, when meltwater from the world's icecaps had not yet brought the global ocean to its present level, the Pacific shore would have been more distant yet.

The archaeological deposits at Tahkenitch Landing reached to a depth of six feet in the main trench. The lowermost artifact-bearing layer contained no shellfish remains, but was followed by layers containing much shell and many artifacts. These in turn were capped by a thick bed of dune sand that was devoid of both artifacts and shell. The earliest occupation, called Component I, is dated by ^{14}C determinations of 7960 BP and 6880 BP. The bones of sculpin, tomcod, hake, and flatfish indicate fishing in an estuarine environment. A ^{14}C determination of 5100 BP for Component II dates a continuation of fishing, and the inception of intensive collecting of bay clams and bay mussels in what was still an estuarine setting. Six ^{14}C dates ranging between 3160 and 3040 BP place in time the Component III deposits, which contained the greatest bulk of shell, bone, and artifacts. All ^{14}C dates were obtained on charcoal.

Tahkenitch Lake subsequently formed as the estuary was dammed by windborne sand. The immense Oregon Dunes stretch for miles along the coast between the Umpqua River mouth and Heceta Head. They grew as the rising postglacial sea cut into ancient stabilized sediments and released vast quantities of sand to be moved and piled up by the prevailing wind. The disappearance of marine shells from Tahkenitch Landing about 3000 years ago indicates that this process had by then created Tahkenitch Lake, turning the locality into a freshwater environment (McDowell 1986). This change led to abandonment of the Tahkenitch Landing site, the uppermost layer of which is clean dune sand, devoid of any but trace indications of human visitation.

The artifacts from the major Component III occupation at Tahkenitch Landing, dating around 3100 BP indicate a range of activities. Several projectile points and a number of quite large knives, scrapers, and other items of flaked stone were probably hunting and butchering tools. More numerous were cobble hammerstones and sandstone abrading tools, probably used in fashioning associated wedges, awls, tube beads, disc beads, and a whistle made from a section of bird bone. A number of unshaped or spheroidal clay objects, and several fragments of steatite smoking pipes, were also found. A few cutting, pounding, and abrading tools associated with the earliest dates from the site did not differ notably from those found associated with the later dates. The less utilitarian bone, antler, and shell artifacts were not, however, found in early context. Cultural features were found only in Component II; they included a concentration of whale bones, a cluster of bones and rocks associated with a piece of a wooden post, and a cluster of rocks associated with large sea mammal bones.

No evidence of dwellings was found at Tahkenitch Landing, but very substantial human activity there is implied by the various artifacts, and by abundant marine shells and animal bones from the midden (see below). Structural remains could well exist in some other part of this extensive site, much of which remains unexplored. At CU62, on the southern Oregon Coast near the mouth of Pistol River, limited excavations in an area nearly destroyed by highway construction uncovered part of a packed clay floor in an apparent pithouse depression. A ^{14}C date of 3000 BP from an associated charred beam shows that substantial architecture did in fact exist along the coast within the time range of the later Tahkenitch Landing occupation (Cressman 1977:194-195).

Quantitative analysis of bulk midden samples from Tahkenitch Landing showed that clams (horse clam, bent-nose clam, littleneck clam) were by far the most abundant species represented there, followed by bay mussels. Other species represented in small amounts included acorn barnacles, horse barnacles, razor clams, limpets, and crabs. The bulk of the remains identified are of marine bay species, and their enormous volume at the site is a measure of the shellfish harvest's great importance to its occupants (Barner 1986).

The huge quantity of vertebrate faunal remains excavated at Tahkenitch Landing was studied using a sampling procedure to reduce the bulk to manageable proportions. Even with this measure taken, some 28,000 specimens of fish, birds, and mammals were identified (Greenspan 1986). Fish remains dominated the assemblage overwhelmingly, comprising over 95% of the total identified specimens. Birds were next in abundance, nearly 3%; and mammals included slightly less than 2%. The lowest levels of the excavation yielded relatively more birds and mammals than did the later levels, but fish were still heavily preponderant. In order of abundance the dominant fishes in the midden as a whole were sculpins, tomcod, herring, surfperches, flounders, and hake. But while these species account for the great bulk of the identified specimens, salmon, greenlings, lingcod, and sturgeon were also represented. The most numerous birds, in order of abundance, were ducks, cormorants, loons, shearwaters, grebes, murres, and gulls. A few other forms were also represented. The best-represented mammals were cetaceans (whales, dolphins, and porpoises), seals, and deer. The whale bones represented either sperm whale or a kind of baleen whale.

The vertebrate fauna reinforces shell midden evidence that the Tahkenitch Landing people concentrated their fishing and hunting in the immediate vicinity. All the species found could be obtained in an estuarine environment, except that the few bones of large whales most probably represent scavenging of animals beached along the Pacific shoreline. The considerable representation of hake in the assemblage could be taken to suggest, however, that people may have fished to some extent in the open ocean as well; hake rarely enter estuarine environments, more commonly schooling near the ocean bottom.

Manifestly, fish are the most important animals in the Tahkenitch Landing assemblage, and beyond a doubt the major harvest of the site's occupants. It is particularly interesting therefore that the artifact assemblage yielded no fish hooks, gorges, or spears. Commenting on this situation, Greenspan (1986: 71) observes that:

> The quantities of fish remains, as well as the range of sizes and heavy emphasis on small fish, suggest an indiscriminate fishing technique, such as small-gauge nets or stone tidal traps. Stone traps were a widespread and highly effective fishing technique all along the Northwest Coast. Stone-walled structures were built in the intertidal zone in bays or inlets or at the mouths of rivers. As the tide rose, fish would be carried towards the shore and swim over the top of the traps. The fish would become trapped behind the stone walls as the tide receded (Stewart 1977: 118-123).

This suggestion has the further appeal of rendering explicable the sheer quantity of fish remains found at Tahkenitch Landing, by identifying a plausible means through which fish could be taken in mass quantities.

This important site provides an essential key to the culture history of the Oregon Coast. The ancient shoreline is long gone. But Tahkenitch Landing carries evidence of a coastal lifeway far back in time, and identifies one kind of natural setting in which further evidence of early human activity can be found.

Umpqua-Eden Site

Evidence of coastal occupation is comparatively abundant from 3000 BP onward. With relative stabilization of the coastal environment after this time, loci of human activity are better preserved and more readily found. The finds from these sites overlap with the Tahkenitch evidence, and display the basic cultural pattern out of which grew the ethnohistorically known cultures of the coast. The Umpqua-Eden Site, south of Tahkenitch, and other sites both south and north along the coast, illustrate the nature and further growth of this basic pattern.

The Umpqua-Eden Site, near the mouth of the Umpqua River, has given evidence of an occupation that began quite early and continued down to the historic period (Ross and Snyder 1979, 1986; Lyman 1991: 102-174). A ^{14}C date of 2960 BP from the base of the shell midden establishes contemporaneity with the major period of activity at Tahkenitch Landing around 3000 years ago. Additional ^{14}C determinations of 1970 BP, 870 BP, 620 BP, 440 BP 350 BP, and 240 BP date later occupations (Lyman 1991: 107, 111). Euro-American use of the site, perhaps related to historic Fort Umpqua across the river, is represented by nails, hinges, window glass and other household goods. Most of the artifacts and faunal remains date between about 2000 years ago and historic times, but both earlier and later occupations seem to be of generally similar character. The stratigraphic complexity of the site, and the probability of some degree of mixing within the deposit, precludes any detailed exploration for subtle changes over time in the character of the occupation (Lyman 1991: 171-174).

Umpqua-Eden is situated on a high river terrace that overlooks, at low tide, extensive mud flats offering a variety of shellfish. The site midden was made up of mollusk shells, most commonly bay mussel, horse mussel, bent-nose clam, butter clam, and cockle. Present in lesser quantities were little neck clam, gaper clam, and horse clam. The midden also yielded a very large collection of fish bones; species recognized include flounder, greenling, surf perch, herring, sculpin, salmon, and sturgeon. Birds were also heavily represented. Ducks of various kinds were most common, with herons, cranes, swans, gulls, and murres also indicated. All are birds of watery habitats. Numerous sea mammal bones from the collection were predominantly those of harbor seal, with sea lion and fur seal also represented. Many fragments of the distinctive cancellous bone common to seals, sea lions, and whales were identified as whale bone because of the robustness of the pieces. The bones of deer and elk heavily dominated the collection of terrestrial mammal remains, both animals being about equally represented. Other terrestrial species identified were grizzly and black bear, cougar, lynx, dog, raccoon, sea otter, mink, fisher, muskrat, beaver, and several kinds of small rodents (Ross and Snyder 1986; Lyman 1991: 126-171).

The varied and abundant fauna from Umpqua-Eden reflects the environmental diversity and rich productivity of the immediate vicinity. It implies that a broad range of hunting, fishing, gathering, and food-processing activities were mounted from the site, which served as a focal point of residence and industry. Lyman (1991: 135-170) analyzes in detail the extensive butchering and processing of large terrestrial and sea mammals that was carried out at the site. A small river island nearby, where seals still haul out in numbers, was no doubt a continuing source of these animals. Salmon may also have been obtainable in the very near vicinity. In a quite similar estuarine situation on the Lower Coquille River to the south of Umpqua-Eden, a long pole-and-willow fence was built across the river as a fish weir. This weir obstructed the passage of salmon and guided them through narrow openings where they could be netted or speared, or taken in large openwork basketry traps (Draper 1988). Such weirs were commonly used on the west coast (Stewart 1977), and it would not be surprising if future research turned one up near the Umpqua-Eden Site.

The artifact assemblage from Umpqua-Eden is varied and interesting (Figures 4.3, 4.5). Hunting and fishing pursuits are attested by flaked stone projectile points, bone fishhooks, harpoon points, barbs from fishing spears, and notched or grooved stone net weights. Flaked stone knives and scrapers suggest butchering and hide working, while bone awls and pins, and stone scrapers, suggest hide tailoring. Bone and antler wedges and chisels indicate woodworking. Cobble hammerstones would have served in various tasks, from butchering to lithic tool manufacture and the driving of antler wood-splitting wedges. A siltstone pipe and fired clay pipes are suggestive of tobacco smoking. Incised and ornamented seal and elk teeth give evidence of personal artistry and ornamentation.

The hard-packed earthen floors of two quite small houses were uncovered at the site. Both of the smaller structures were rectangular, one measuring about 10 by 12 feet across, the other slightly less. The first-mentioned house had postholes and grooves around the periphery of its clay floor, suggesting that planks were set on edge against vertical supports to form walls. A firehearth outlined by vertically-set stones occurred near the center of the floor. The date of this structure is not known. The smaller structure exhibited a large pit in the center, and numerous smaller postholes placed irregularly around it, some distance from the walls. The posthole patterns do not readily suggest the nature of this unit's superstructure. A ^{14}C date from the floor was 620 BP. The small size of both these units indicates they were single-family dwellings. Also present at Umpqua-Eden, but only partially excavated and very briefly reported, were traces of a much larger semisubterranean long house of plank-walled construction. Its creation marked the very end of the site's prehistoric occupation, as shown by stratigraphic evidence. This structure, roughly 25 feet wide and 90 feet long, probably resembled quite closely the large communal house of the Lower Umpqua Indians shown in a 1858 edition of Frank Leslie's Illustrated Newspaper (Figure 4.4) (Ross and Snyder 1986; Beckham 1977: 65).

The evidence from Umpqua-Eden helps to establish continuity in the coastal lifeway over some 3000 years of time. It picks up from earlier evidence at Tahkenitch Landing that shows intensive reliance on the estuarine zone as far back as 8000 years ago. The faunal, artifactual, and dwelling remains from Umpqua-Eden clearly indicate that it was an important sedentary village community. But interpretation is limited by the extensive later damage done to the site, as well as by incomplete reporting of the archaeology done there. Later sites along the southern

Figure 4.3 Late projectile points from the Umpqua-Eden Site.

Figure 4.4 Historic Lower Umpqua house shown in Frank Leslie's Illustrated Newspaper, 1858 (courtesy of Oregon Historical Society, #ORH 176450).

coast show in considerably more detail the mature pattern of large village settlements that is only hinted at by the little-investigated late remains at Umpqua-Eden.

Lone Ranch Creek

On the far south coast is the Lone Ranch Creek site, a shell midden that was up to 10 feet deep in places (Berreman 1944). Excavated long ago, the site was never ^{14}C dated, but projectile points offer clues to its age. Points from the lowest levels were all of leaf-shaped types that may date to 3000 BP or earlier. Higher in the midden were small stemmed arrowpoints like some known from the later Multnomah subphases of the Portland Basin, which suggest an age range for the major occupation of perhaps 1000 to 500 BP. Since no objects of Euro-American manufacture were found at Lone Ranch Creek, it is evident that the site was abandoned some time before contact around 200 years ago.

Figure 4.5 Bone fish hooks from the Umpqua-Eden Site. Approximately 2 times actual size.

Four houses were identified in the excavations. They had packed clay floors and well defined firepits, the floors having been excavated to a depth of about two feet below ground surface. The charred remains of vertical plank walls indicated substantial wooden houses of basically the historically-known type. These houses indicate the permanence of the settlement, as do the 32 human burials encountered at various places during the excavations.

Hunting technology included flaked stone projectile points and scrapers. Fishing and sea mammal hunting is suggested by fishhooks, harpoon points, and spear points of bone, and by net sinkers of ground stone. Grinding slabs attested the milling of seeds or nuts.

Manufacturing at Lone Ranch Creek was indicated by several kinds of specimens. Bone awls and needles suggest hide tailoring. Stone mauls, adzes, drills, and arrowshaft straighteners, along with bone gouges, suggest woodworking activities. A few fragments of baked clay, which appear to represent pieces of ceramic pipes, indicate either limited pottery manufacture or trade from a ceramic-producing region. Ornamental objects of shell were fairly numerous. Beads and pendants of *olivella* shell, and other ornaments made of abalone and *dentalium*, were recovered in the excavations. Since the natural habitat of *dentalium* is restricted to the coast of British Columbia, these specimens apparently indicate long-distance trade.

Faunal remains from Lone Ranch Creek included the bones of deer, elk, seal, sea lion, and whale, as well as unidentified fishes. There were also huge quantities of mollusk shells, which largely composed the midden itself. Over 50 species of marine shellfish were identified. It is not known that the historic people of the south coast actively hunted whales, but creatures occasionally beached or washed up on shore were exploited for the wealth of meat, oil, and whalebone they provided. Possibly the archaeological specimens had a similar origin.

Pistol River

The historic Tututni Athabaskan village of Chetlessentan, not far from Lone Ranch Creek, sat on a bluff high above the ocean at the mouth of the Pistol River. Excavated on a large scale, the site gives a quite full picture of its inhabitants' lifeway, overlapping the transition between prehistoric and historic times. The historic village was burned and destroyed in 1856 during the Rogue River War. Its remains are underlain by shell deposits that contain artifacts to a depth of over seven feet in some places. Small triangular arrowpoints found throughout the midden suggest that its occupation probably corresponds to some or all of the Multnomah subphases of the Lower Columbia sequence, a time range of about 1750-100 BP.

Over 30 house depressions were observable at the Pistol River Site, as the archaeological manifestation of Chetlessentan is called (Heflin 1966). Archaeological work in some of them is concisely summarized in a recent synthesis:

> As described by Heflin, the aboriginal houses at the Pistol River Site were built around rectangular depressions ranging from 2 to 4 feet in depth, and averaging about 12.5 feet by 15 feet in size. The corner posts and vertical wall planking of these structures were made of cedar. Most of the houses probably had gabled roofs of cedar, bark, or thatch. Floors within these houses consisted of hard-packed clay, gravel, or beach sand. Stone encircled fire pits were located near the center of the rear of these houses (Beckham and Minor 1980: 30-31).

The character of this village as a stable and long established settlement is also indicated by the fact that over 20 human burials were found in the excavations. Some were encountered beneath the floors of houses, others within the midden itself. Artifacts found with the human remains included such traditional items as pine nut beads, stone beads, and *dentalium* shells, and such Euro-American trade specimens as glass beads and brass buttons.

A wide range of artifacts from the site attests diverse activities by its occupants (Figures 4.6-4.10). Flaked stone arrow points and knives, bone spearpoints, and harpoon foreshafts indicate hunting of terrestrial and marine species. Bone fishhooks, bipointed fish gorges, and an abundance of notched net sinkers made from river cobbles and pebbles give evidence of fishing. Plant food processing is indicated by ground stone pestles, hopper mortar bases, and bowls. Manufacturing activities are reflected by mauls, cobble chopping tools, adze handles, elk antler splitting wedges, flaked stone drills, scrapers, gravers, and actual craft products themselves: bone head-scratchers, hairpins, nose and ear pins (these identified from historical analogues), whalebone clubs, a stool and a bowl made from whale vertebrae, and a bear figurine and numerous tubular pipes of fired clay.

Contact with Euro-American traders and settlers is shown by a series of items. Glass trade beads and brass uniform buttons were found with burials. From the house depressions and midden deposits came such items as the lock from a muzzle-loading rifle, an iron knife, iron and copper bars, square nails, copper pendants, a ceramic trade pipe, and a single Chinese coin.

The vegetal component of the villagers' diet, which surely must have been extensive, is now attested only by the processing tools mentioned above. But bones and shells show more directly the animal species involved. Land mammals included deer, elk, and the predatory bobcat; sea mammals included sea lion and whale; fish vertebrae and bird bones were present, but not identified to species. In addition, some 20 kinds of mollusks were represented among the myriads of shells that made up the site midden; most prominent were marine mussels, which could be easily obtained nearby.

On the central and northern coast, native cultures developed in parallel with those farther south, similarly growing out of the basic early substratum represented at Tahkenitch Landing. Considerable research activity in the north has produced rich and informative records from several sites.

Yaquina Head

Roughly 100 miles up the central Oregon Coast from Tahkenitch is Yaquina Head, a major promontory located a short distance north of

Figure 4.6 Projectile points from the southern Oregon Coast. Top and middle rows, Late period; Bottom row, Early and Middle periods.

Yaquina Bay and the city of Newport. An archaeological site near the tip of the high, mile-long headland is bounded on three sides by a sea cliff that drops 70 or 80 feet to the beach below. At present, access from the site to the seashore is made very difficult and dangerous by the steepness of the cliff. But geological evidence suggests that at the time of the archaeological occupation, a climbing sand dune built up from the beach against the headland probably afforded more ready access. A small dune atop the headland appears to be a remnant of this earlier feature. Excavations that

Figure 4.7 Bifacially flaked stone knives from the southern Oregon Coast.

sampled a broad area revealed buried artifacts, sea shell, and animal bones to a depth of five feet or more. Over a dozen ^{14}C dates associated with cultural remains show that human occupation began at the tip of Yaquina Head by 4000 years ago, was relatively intense between about 3700 and 2600 years ago, and ceased by about 2000 years ago. This occupation overlaps significantly in time with that of Tahkenitch Landing (Minor, Toepel, and Greenspan 1987; Minor 1989b, 1991).

Figure 4.8 Scrapers from the southern Oregon Coast.

The artifact assemblage represents a wide range of activities, including food procurement, food processing, and tool maintenance and manufacturing. Flaked stone projectile points, fragments of bone harpoon heads, and a possible fish gorge suggest land hunting, sea-mammal hunting, and fishing. Probable food processing tools included flaked stone knives, cobble choppers, and a grinding stone. Tool manufacture and maintenance is particularly well-attested. The making and refurbishing of stone tools is indicated by numerous lithic cores and

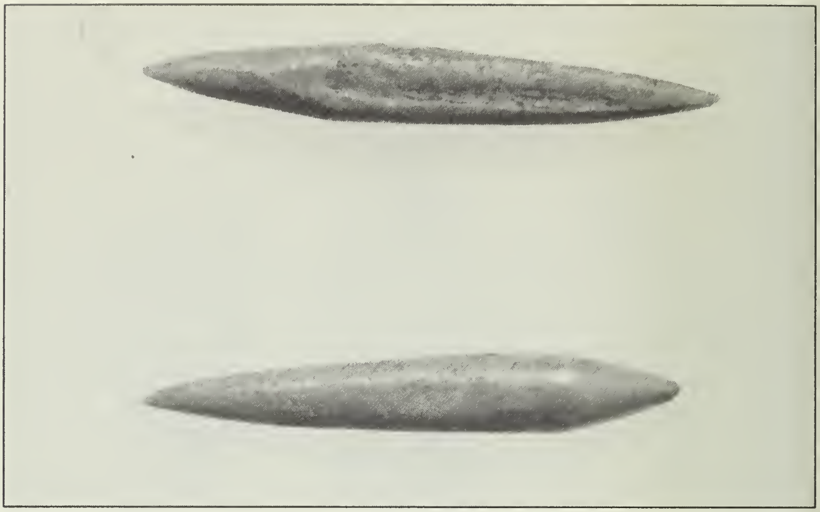


Figure 4.9 Bone points, probably of composite harpoon heads, from the southern Oregon Coast.

Figure 4.10 Elk antler and whalebone splitting wedges from the southern Oregon Coast.

abundant flaking debris. Stone knives and scrapers suggest hideworking. Woodworking is implied by wedges and chisels of bone and antler, as well as hammerstones perhaps used to drive the wedges. The making of basketry, and sewing of hides, is indicated by bone awls and needles. A small tool made of antler may be a shuttle used in net-making. The manufacture of such bone and antler tools is suggested by gravers, many sandstone abraders, and hammerstones, which could have served in breaking up the bones used as raw material. Personal items and adornments were also found, including a figurine made of antler, a bone pendant, a piece of carved whale bone, numerous bone and shell beads, and two whistles made of bird bone.

The abundance and variety of specimens found, several human burials, and the large extent and considerable depth of the deposits, all suggest that the site was a quite stable settlement. It was perhaps a village, occupied as a base of operations the year around. One housepit outline was seen in the profile of an eroding bank at the edge of the sea cliff, but the structure could not be documented in detail. In another place an extensive layer of dark, compact earth—littered with numerous artifacts, bones, charcoal, and fire-cracked rocks—was initially thought to be a house floor. But continued excavations failed to find any distinct boundaries that might indicate walls. Lacking more definite evidence, the feature was finally labelled as an activity area rather than a house floor.

Large areas of shell midden at Yaquina Head show that shellfish were exploited throughout the life of the site. The rocky intertidal zone at the base of the sea cliff is ideal habitat for sea mussels, the shells of which largely made up the midden. Because the byssal threads by which mussels attach themselves to rocks also tie the mussels themselves together, these shellfish are readily collectable in quantity. Barnacles were also common in the midden, while cockles, piddocks, clams, and other kinds of shellfish were identified in small quantities.

Vertebrate faunal remains were also abundant in the Yaquina Head site. Over 22,000 specimens were recovered from the excavations. Fish bones were by far the most abundant, followed by those of birds, marine mammals, and terrestrial mammals. Among 18 species of fish, the most common were hake, greenlings, sculpins, herring, and tomcod. Among 24 species of birds, most common were shearwaters, various kinds of ducks, and fulmars. Among 10 kinds of marine mammals, seals and sea lions were heavily dominant, with dolphins and larger whales also represented. Within the terrestrial mammal assemblage, deer and elk greatly predominated; also present were rabbits, beavers and other small creatures. The impressive diversity of the shellfish and vertebrate faunas shows that the Yaquina Head people had a very broadly based food economy, and thus one that should have been generally stable despite vicissitudes that might affect various individual species from time to time. As summed up by Greenspan and Wigen (1987: 65-66):

> Fish were obtained from the nearshore rocky intertidal zone, from the nearshore rocky reefs, and probably from habitats farther from

> shore. Birds were obtained from terrestrial, shoreline, and marine habitats, including, evidently, the outer coastal zone. Marine mammals were obtained both on shore and from offshore rocks, and possibly from open, outer coastal waters as well. The presence in the cultural deposits of the remains of sea mammals, offshore birds, and fish commonly found on offshore reefs, suggests that seagoing watercraft were most likely employed in the subsistence activities carried out from this site. The vertebrate faunal remains from Yaquina Head contain many indicators of the season of occupation; these data strongly suggest that the site was inhabited throughout the year.

About 2000 years ago the people of Yaquina Head left this highly favorable site, and it was never occupied again in any significant way. Most probably the abandonment was due to erosional destruction of the route or routes that gave access from the high headland to the productive shore. Without access to a suitable living area, the richness of the locality would have availed people little. It has been hypothesized that access between beach and headland was originally afforded by a climbing sand dune, and that erosion of the base of this dune by the sea ultimately led to its destruction. Although this hypothesis remains to be fully demonstrated, the plausibility of the suggested process is shown by the fact that elsewhere on the Oregon Coast today, climbing dunes in analogous situations exhibit marine erosion of their bases, and in general unconsolidated sediments along the shoreline are being eroded back at a significant rate. At Cape Perpetua a current erosion rate of four to five inches per year is documented, and at the Houser site in the Oregon Dunes National Recreation Area, dune movement between 2500 and 3000 years ago caused the rerouting of a creek.

Whale Cove

Several miles north along the coast from Yaquina Head, Whale Cove was occupied in part at the same time as the Yaquina site, with later occupation near the end of historic times. The earliest deposits at Whale Cove were layers of burned and unburned marine shell, which yielded ^{14}C dates of 3010 and 2830 BP. A following layer of dark earth devoid of shells was dated at 610 BP, and an upper shell layer was dated to 330 BP (Lyman 1991: 244). Clues observed in a trench profile after excavation suggest that a semisubterranean house floor may have been present in the later deposits, but this was not further investigated. A small assemblage of flaked stone artifacts included projectile points, cutting/scraping tools, and the cores and flakes related to their manufacture and maintenance.

Cobble choppers, hammerstones, abrading stones, manos, and grinding slabs also occurred. Pointed bone specimens, eyed needles, and awls were relatively numerous, suggesting that sewing and perhaps basket-weaving were important at the site. Bone and antler wedges and chisels, also comparatively numerous, imply a certain prevalence of wood-working activity as well. Whistles and beads of bone, some incised with ornamental markings, also occurred.

Some 20 species of shellfish made up the bulk of the midden deposits. All the common kinds mentioned in preceding accounts were identified from Whale Cove, but their relative proportions were not analyzed quantitatively. Fish remains were also recovered, but not identified or quantified. Terrestrial and marine mammals were, however, studied in detail. The fauna included several species of rodents in addition to bear, raccoon, deer, elk, whale, sea otter, seals, and sea lions. Among these, deer, elk, and harbor seal were predominant. In the earliest levels of the site, deer and elk predominated heavily over sea mammals; in later levels this pattern was reversed, with harbor seals being much more common. Other terrestrial and marine mammals participated in the same pattern. Lyman (1991: 277) suggested possible social and environmental factors that might have been responsible for this change, but no definite conclusion could be reached.

Seal Rock

Very near Whale Cove, Seal Rock adds to the documentation of long-term cultural continuity on the Oregon Coast. This site, a large shell midden on a dune near present-day Seal Rock State Park, was described by Dorsey (1890: 229) as the northernmost historically-occupied settlement of the Alsea tribe. The archaeological deposits have yielded ^{14}C dates of 375 and 160 BP, and the remains of a small plank house built there in the 1850s show the site to overlap the transition from prehistoric to historic times. These facts support Dorsey's identification (Snyder 1978; Clark 1991: 178). From the abundance of pinniped bones in the archaeological deposits, and a substantial assemblage of bone harpoon points, Snyder (1978) identified the site as a major center for exploiting the sea lion rookery at nearby Seal Rock, a prominent feature of the central Oregon Coast. Further analysis of the collection by Lyman (1991: 214-237) strongly supports this interpretation. His study of the sea lion skeletons indicates intensive butchering of the carcasses, and even the breaking of holes in the skull for extraction of the brain.

In addition to their special focus on the sea lion rookery, the occupants of Seal Rock exploited a wide variety of other resources, as shown by marine shells, bird bones, fish bones, and the bones of mammals ranging from hares and rabbits to deer and elk. Projectile points, knives, and scrapers, as well as grinding stones, give evidence of food processing. Hammerstones, adzes, bone and antler wedges, drills, gravers, and abrading stones suggest various kinds of tool making. In short, the evidence indicates the by-now familiar range of hunting, gathering, fishing, food processing, and manufacturing attested over some thousands of years at various sites along the coast, here continuing well into the historic period.

Palmrose, Avenue Q, and Par-Tee

On the far northern coast, the Palmrose, Avenue Q, and Par-Tee sites have given evidence of occupation spanning a long period between about 3850 and 850 years ago. These sites are at the southern edge of the sandy Clatsop Plains, which extend from the mouth of the Columbia southward to Tillamook Head. Geomorphic studies show that these plains, made up of sediment carried down by the Columbia River, have been actively growing and extending the edge of the land seaward since the Pacific began to stabilize near its current level about 4000 years ago (Rankin 1983; Peterson et al. 1984).

Palmrose is a large, deep shell midden roughly a half-mile inland from the present shore near the town of Seaside. Excavations there revealed part of a large rectangular semi-subterranean structure much like the wooden long houses seen by Lewis and Clark on the Lower Columbia in 1805-1806. Evidence of at least three floors within this structure indicated repeated rebuilding, and a series of 21 ^{14}C dates clustered in three periods—roughly 2600-2400 BP, 2200-2100 BP, and 1850-1650 BP. These dates show that the historic house type, or something very close to it, has long been used on the Oregon Coast. An isolated date of 3840 BP, not associated with the structure, may date the first human use of the location (Phebus and Drucker 1973, 1977; Connolly 1992).

The Avenue Q Site, close by in modern Seaside, is another large, deep shell midden. Excavations there have been extremely limited, but nevertheless demonstrate a long period of human occupation. A ^{14}C date of 3280 BP was obtained at the bottom of the midden, and 10 other dates suggest occupational episodes at roughly 2550-2350 BP, 1700-1500 BP, and 1350-850 BP. The Par-Tee Site, another midden not far from Palmrose, has been ^{14}C dated between about 1700 and 1050 BP. Houses there are said to have been circular, semi-subterranean structures.

These three sites produced similar cultural inventories. Although they have not been reported in detail, characteristic items were medium to large stemmed and notched projectile points, atlatl weights, stone mortars, hand mauls, antler digging stick handles, abrading stones of pumice, antler splitting wedges, composite bone harpoon points,shark-tooth pendants, and many pieces of worked and decorated bone or antler. This array of specimens, combined with the large size of the sites themselves, suggests that most probably all three were substantial villages. No house remains were detected at Avenue Q, but the excavations were far too limited to rule out their presence.

Of great interest, a number of carved bone and antler artifacts from Palmrose and Avenue Q show motifs closely similar to those of the Marpole Phase of Northwest Coast culture in southern British Columbia. These similarities show clearly that close contacts were being maintained over great distances up and down the coast by about 2500 years ago. These contacts presage the historic situation, when Chinookan peoples were famed traders who routinely canoed as far north as the Gulf of Georgia, and as far east as The Dalles of the Columbia River (Connolly 1992).

A detailed analysis of mollusk shells from the Palmrose and Avenue Q middens shows that the occupants of these sites harvested almost exclusively horse clam, butter clam, and littleneck clam. These are all species that live in the sheltered waters of bays and estuaries, which is of interest because such habitats no longer occur near these sites. This and other evidence suggests that quiet marine backwaters once present nearby were ultimately filled and eliminated by the sand dunes that dominate the vicinity today. Also of interest is that analysis of the growth rings of the mollusk shells show the season of death—that is, the season when the shellfish were collected—was primarily during the late winter to early spring months. The shellfish were largely harvested during the leanest season of the year, when winter stores were most likely to be depleted (Barner 1992).

Over 15,000 bones and bone fragments from limited excavations at Palmrose and Avenue Q represent terrestrial animals (Greenspan and and Crockford 1992). The faunal assemblage is highly diverse, including 25 species of birds, 23 species of fishes, and 14 species of mammals. In order of abundance, the most common fishes were skates, greenlings, surf perches, hake, salmon, rockfish, flatfish, and sturgeons. The most abundant birds were murres, shearwaters, ducks, geese, and swans. Sea mammals included cetaceans, sea otter, sea lions, and fur seals. The dominant land mammals were deer and elk. Notably, animals of both marine and freshwater habitats were common at the Palmrose site, with most of the freshwater specimens being salmon. At Avenue Q, marine animals were heavily predominant, with specimens from fresh water a much smaller percentage. The animal remains show that the two sites, though separated by no great distance, had rather different economic specializations traceable to local habitat differences.

At Avenue Q, increasing freshwater animal remains in later levels suggest some degree of change in the local habitat during the time the site was occupied. This is congruent with the evidence previously mentioned, of quiet-water marine mollusks abundant in sites where no marine embayments exist today. Also, the earlier deposits were dominated by fishes of nearshore rocky reef habitats, such as surf perches, greenlings, and sculpins. In later levels, hake and skate increased considerably, suggesting an increase in offshore fishing.

The range and variety of species found at both Palmrose and Avenue Q indicates that terrestrial, freshwater, nearshore, and offshore habitats were all exploited. Further, the seasons of availability of various species span the annual round. The long-continued occupation of this area is, thus, easily understood as based in the economic security that such a diversified portfolio of subsistence resources provided. The observed cycles of occupation/non-occupation, and eventual abandonment of the archaeological sites late in prehistory, are just as clearly rooted in geologically-based phenomena that affected the productivity of their immediate local environments.

Geomorphic studies have given evidence of cyclical earthquakes and tidal waves (tsunamis) along the Oregon Coast in prehistory, caused by large-scale tectonic processes. The underlying mechanism is concisely summarized by Connolly (1992: 9):

> The Oregon Coast parallels the central portion of the Cascadia Subduction Zone, which lies a short distance offshore. Along this zone, the Juan de Fuca Plate is subducting under the North American Plate. Frictional coupling at the plate margins accumulates strain; as the edge of the North American plate is dragged downward at the subduction zone, a corresponding uplift occurs landward of the plate's edge. When the strain is released the result is uplift at the plate's edge and subsidence landward of the edge. The abrupt

> vertical displacement of the sea floor produces tsunamis in conjunction with subsidence at the coastal margin.
>
> Darienzo and Peterson (1990; also Peterson et al. 1988) have documented cyclic episodes of tectonic subsidence along the northern Oregon Coast. They report a series of buried salt marsh deposits in cores from Netarts Bay which exhibit sharp upper boundaries with overlying sand layers (tsunami-deposited sediment) on tidal mud flat deposits. Atwater (1987) reports similar evidence from Willapa Bay on the southern coast of Washington.

Buried peat layers separated by sand lenses at Netarts Bay demonstrate up to nine major and minor cases where coastal salt marsh vegetation was buried under sand carried in by tidal waves. A series of eight ^{14}C dates from these marsh deposits span the period 3300-370 BP (Connolly 1992: Table 2-1). These findings show the inherently dynamic nature of the coastal environment, and the continuing challenge it offered its prehistoric occupants.

Tillamook Site

Final prehistoric/early historic occupation on the northern coast is best represented at the Tillamook Site, located on the Netarts sand spit about seven miles southwest of the town of Tillamook (Newman 1959). The sand spit on which the site is located extends northward from Cape Lookout for approximately six miles. It completely protects the broad, shallow Netarts Bay from the sea except for a narrow channel at its northern end. The bay is noted as a producer of clams, crabs, perch, and flounder; seals are often observed there as well. At low tide, vast mudflats are exposed, and the archaeological site on the northern end of the spit is ideally situated to take advantage of the shellfishing opportunities.

Prior to excavation, a number of depressions, encircled by low rings of raised elevation, could be observed at the site. Complete excavation of three of these depressions, and partial excavation of two others, showed all five to contain the remains of semisubterranean dwellings. The low elevations surrounding the house pits proved to be accumulations of midden debris, principally discarded marine shells.

The best preserved and most informative structure was a long, rectangular house that had been built in a large shallow pit. The floor area, which was outlined by the rotted but still visible stumps of vertically set posts, measured 52 by 15 feet. Around its edges were found the remains of split cedar planks, some of them up to 15 feet long. These had been set on edge against the roof support posts to form the structure's walls. Because there were no evident gable support posts at the ends of the building, and because of its relatively narrow width, it is inferred that the house had a shed roof rather than a gabled one. Both types are known among historic houses of the Northwest Coast. Clustered toward either end of the floor were many ash-and charcoal-stained firehearths, 18 in all. These occurred close together in groups, and clearly would not all have been used at the same time; many were only casually constructed and obviously not used on a routine basis. A number of postmolds found near the middle of the house were apparently not main structural members, but probably erected to support partitions within the building. One other house structure at the site was similar to this one in size as well as mode of construction, while the remaining three were considerably smaller but otherwise generally comparable.

The age of the Tillamook Site is established by three ^{14}C determinations, and by the occurrence of historic artifacts. From the lowest occupation level a ^{14}C date of 550 BP was obtained, and a date of 280 BP came from one of the firepits just described. The excavator rejected a third date of 150 BP as improbably recent, but in fact such a date fits very well with the finding of some nearly decomposed iron fragments, a copper pendant, and nearly 100 sherds of Chinese porcelain. These artifacts show that the prehistoric occupation continued into the era of Euro-American trade, which was well begun along the coast by the 1790s.

Aboriginal artifacts from the Tillamook site included small arrowpoints like those of the late Multnomah subphases on the Lower Columbia; bone barbs for a composite harpoon; flaked stone scrapers and gravers; and digging stick handles, wedges, awls, and needles made from the long bones or antlers of deer and elk. Some fragmentary objects of whalebone were also found. No faunal remains are reported, beyond the shells of which the midden was composed. Most of the mollusks were blue clam and cockle, with butter clam and bent-nose clam represented in negligible amounts.

A sophisticated restudy of the Chinese porcelains from Tillamook has shed interesting new light on their implications. Several lines of technical evidence suggest that the porcelains were of Chinese Ming or Ch'ing (Qing) Dynasty manufacture, made sometime between AD 1573 and 1722. This is well before the era of intensive Euro-American trade along the Oregon Coast, and the authors suggest that the specimens might actually have been salvaged by the Tillamook people from the wreckage of an early European merchant vessel. A likely candidate would be one of the Spanish galleons on the regular Acapulco-Manila run, which was made annually across the Pacific for 250 years, from 1565 to 1815. The route of the Manila Galleon passed along the Northwest Coast, and the San Antonio, lost in 1604, or the San Francisco Xavier, lost in either 1705 or 1707 (accounts differ) with "a quantity of porcelain" on board, are two possible sources of the Tillamook porcelains (Beals and Steele 1981).

Large blocks and candles of beeswax, found in amazing quantity along the Tillamook shore, are further evidence of late prehistoric/early historic shipwrecks. As summarized by Woodward (1986), large quantities of beeswax from the north coast of Oregon were documented as early as 1813. One 1908 report estimated the quantity found there at about twelve tons, and said that some six tons had been shipped to Hawaii around 1847. Woodward also describes other finds of Chinese porcelain from the coast, including flaked projectile points and other tools made by local natives from porcelain fragments. Two ^{14}C dates on a sample of the wax were 280 BP and 300 BP, putting it in the same general time range as the porcelains. Possible sources of these exotic materials, other than the Manila Galleons, could have been Japanese or Portuguese trading vessels disabled in typhoons along the Asian shore, and carried to the west coast of North America by the Japanese Current. Many examples of such inadvertent drift voyages are documented for the 19th century. Continuing research may be expected to further illuminate this earliest Oregon contact with Old World cultures.

Fishing Rocks

At the farthest end of Oregon's northern coast is Fishing Rocks, actually on the Washington State side of the Columbia River mouth. This site is dated by ^{14}C determinations of 970 BP, 640 BP, and 520 BP, spanning the late prehistoric period. One date of 50 BP indicates recent historic use. The rich but small midden revealed no house remains. A number of pits and clusters of fire-cracked rock gave evidence of repeated campfires. Excavations yielded abundant marine shell and other faunal remains. Bentnose clam, razor clam, and blue mussel were the most abundant shellfish, with a dozen other typical coastal species also represented. Perch and rockfish were the most common fishes, with dogfish, salmon, and sturgeon also present. Predominant sea mammals were the sea otter, harbor seal, and Steller sea lion. Elk, deer, and beaver dominated the collection of land mammals. Birds were represented by some 14 species, with Cassin auklet accounting for the great bulk of the remains. The array of tools, familiar from other coastal sites, included projectile points, cutting and scraping tools, choppers, abraders, pointed bone awls, and bone or antler wedges and chisels. Historic period artifacts included fragments of Chinese porcelain, chimney glass, and metal. The site gives clear evidence of repeated and productive use as a hunting and fishing camp, its limited extent suggesting occupation by small family-sized groups (Minor 1983: 99-111).

Lower Columbia River

As noted in the introduction to this chapter, the Lower Columbia valley was an especially rich and densely occupied zone. Many prehistoric sites are known to exist along the river, extending from its mouth upstream to the Columbia Gorge. In 1805, Lewis and Clark estimated that some 8000 people lived along the Columbia in just the 50-mile stretch between the mouth of the Willamette River at modern Portland, and the mouth of the Cowlitz River downstream. Some of the native villages were large enough to be called towns, and travelers on the river were never long out of sight of a settlement. Excavations in the area have so far been quite limited, but enough is known to show that the rich ethnohistoric culture recorded by 19th century Euro-American travellers has roots extending at least 3000 years into the past. The archaeological remains also show clearly the cultural affinity of the Lower Columbia with the coastal region generally.

Eddy Point and Ivy Station

Roughly 25 miles up the Columbia from its mouth at Astoria, sites at Eddy Point and Ivy Station near the town of Knappa represent occupations that overlap in time, to span the last 3000 years of prehistory and history in the Columbia estuary. Repeated use of Eddy Point over some 2000 years is indicated by a series of eight ^{14}C dates, the earliest at 3130 BP, the latest at 890 BP. These come from various levels within some seven feet of culture-bearing deposits. Ivy Station yielded one ^{14}C date of 1370 BP, and produced an abundance of historic porcelain, window glass, glass beads, metal buttons, nails, and other evidence to show that it was occupied well into the historic period.

Both sites produced rich faunal inventories. At Eddy Point, deer and elk were most abundant, with harbor seal also well represented. Fishes included salmon, sucker, sturgeon, and unidentified marine fish. Gaper clams and butter clams were attested, though not abundant. Currently, marine shellfish do not occur in the vicinity, and these were probably obtained downriver. Duck, goose, and swan were also identified. The fauna from Ivy Station is very similar.

All the major artifact categories are shared as well. Both Eddy Point and Ivy Station give evidence of flaked stone projectile points and various cutting and scraping tools. Bone and antler artifacts included parts of composite harpoon points, awls, chisels, and wedges, as well as ornamental specimens. Heavy stone items were mauls, pounding stones, and net sinkers. At neither site did the limited excavations reveal evidence of house structures. The excavator believes, however, that both probably were sedentary village settlements, in view of their rich and diverse remains and location in settings that were typical of historic villages (Minor 1983: 112-147).

Merrybell Site

Farther upstream, in the Portland Basin, excavations at Merrybell and other sites have established another local sequence that parallels in time and cultural content the one just described. In this work, chronological subdivision was a major focus of concern, and the result was a well-defined set of cultural phases that bring out some of the more subtle changes over time in artifact assemblages. This sequence has already been referred to in earlier pages, where it was cited as a general guide to coastal chronology in general. This research also gave additional perspective on village occupation and ecological factors relating to it (Pettigrew 1981; Saleeby 1983b).

The Merrybell Site, on Sauvie Island, gives early evidence of what seems to have been a major village occupation. Sauvie Island lies below the Columbia's confluence with the Willamette, and downstream from the great bend where the big river turns northward, below modern Portland. The island is long and narrow, flanked on one side by the Columbia River, and on the other by Multnomah Channel. The latter is a major stream that diverges from the Willamette several miles above its mouth and flows parallel to the Columbia for 15 miles or so before joining the big river.

Merrybell is situated on the edge of a former slough, extending along it for nearly a quarter-mile. An extensive area was dug by the Oregon Archaeological Society, yielding a large number of specimens. Subsequent stratigraphic excavations recovered a number of charcoal samples, which produced ^{14}C dates around 2900 BP for a lower level. Traces of structural remains were noted in these excavations but no well-defined dwellings were recorded. Only a few stone specimens were recovered from the very limited excavations in the lower level of the site, but remains from the upper level, along with specimens and ^{14}C dates from other sites near Portland, allowed the definition of a cultural phase named after the type site.

The Merrybell Phase is dated between 2500 and 1750 BP. Projectile points included medium-sized, broad-necked points used to tip atlatl darts, and small, narrow-necked arrowpoints. Shaped and grooved stones interpreted as atlatl weights were also present. Fish net sinkers were represented by large and small pebbles, either notched or showing evidence of having been wrapped about with cordage. There were also a few perforated specimens. Shaped and unshaped stone pestles indicated the processing of vegetal foods. Uniface knives and peripherally flaked pebble choppers were common, as were stemmed drills. These, along with small tabular stone axe or adze-heads, antler splitting wedges, and abrading stones made of pumice, sandstone, or hard igneous rock, were apparently tools for working wood, bone, and antler.

Hunting, fishing, and various domestic processing and manufacturing activities seem to be well represented by the Merrybell assemblage. Although faunal remains were poorly preserved, some survived, and the bones of deer, unidentified birds, salmon, minnows, suckers, and sturgeon show that those species, at least, were taken (Saleeby 1983a).

Cholick Site

At the nearby Cholick Site is represented the inception of the Multnomah Phase, 1750-100 BP, which followed Merrybell. This phase represents a cultural tradition that continued unbroken into the historic period, where it appeared as the lifeway of the Chinookan peoples described by Lewis and Clark. Three subphases are recognized: Multnomah I, 1750-700 BP; Multnomah II, 700-200 BP; and Multnomah III, 200-100 BP.

The Multnomah I subphase, as seen at Cholick, is similar to the Merrybell Phase in most details. But it differs in having a higher proportion of narrow-necked arrowpoints, a lower proportion of broad-necked dart points, and changes in the relative frequencies of certain other artifacts. Large cutting tools referred to as "mule-ear knives" first appear in Multnomah I. The end of this subphase is marked by a major episode of flooding in the Lower Columbia, the Cascade Landslide Flood. This followed upon a massive earth movement that blocked the narrow Columbia Gorge above Portland about 700 years ago:

> The Cascade Landslide created a temporary earthen dam, impounding the waters of the Columbia River near the site of Bonneville Dam in the Columbia Gorge. When the earthen dam broke, it caused a catastrophic flood downstream that destroyed many aboriginal settlements; it also may have caused major changes

> in the topography of river channels and land surfaces. As a consequence, villages may have been reestablished at new sites, in response to shifted salmon migration routes and alterations in the river and slough channels used for transportation (Pettigrew 1981:121).

At the Cholick Site this event is indicated by a thick stratum of silt, completely devoid of cultural remains, that occurs within the deposits not far above a ^{14}C date of 850 BP. With only one documented exception, the Cholick Site itself, those settlements in the Portland Basin known to have been occupied before the date of the Cascade Landslide Flood were not reoccupied thereafter; sites of the Multnomah II and Ill subphases, which postdate the flood period, appear in new locations.

Meier Site

The best single representative of the Multnomah II and III subphases is the Meier Site, a mile or so west of Multnomah Channel. Characteristic of both subphases are small, narrow-necked arrowpoints similar to those of Multnomah I, but also including new styles. Broad-necked points, which diminished steadily in numbers after the Merrybell Phase, were by these times quite rare. Other items presumably related to the hunt were flaked stone scrapers and some large cutting tools referred to as mule ear knives.

Aspects of the food quest were represented by bone points, barbs, and foreshafts—which seem to be parts of fish harpoons—and perforated stones interpreted as net sinkers. Vegetal food processing is indicated by stone mortar fragments, heavy shaped and unshaped pestles, and a perforated deer antler tine identical to those used historically as digging stick handles.

Manufacturing activities are represented by splitting wedges of bone and antler, abrading stones of pumice and hard igneous rock, and flaked stone graving tools, all probably used in woodworking; hammerstones and antler tine flakers, probably used in making flaked stone artifacts; and pointed bone splinters, that may have functioned as awls in the manufacture of leather and basketry items.

Objects of artistic, ornamental, or ceremonial importance were well represented at the Meier Site. Aboriginal craft work and concepts are portrayed by incised clay tablets, clay figurines, simple stone and bone sculptures of birds and other creatures, beads and pendants of ground stone and shell, and a perforated shark's tooth pendant. Euro-American trade goods, attributable to the very latest part of the occupation, included rolled copper tube beads, glass trade beads, and some unidentified metal fragments.

The remains of a large plank longhouse have been partially uncovered by new excavations at the Meier Site (Ames et al. 1992). Six ^{14}C dates, and a few glass trade beads and pipe fragments, indicate that the house was built some 500 years ago, and occupied thereafter into historic times. This remarkable structure, estimated to be about 45 feet wide by 115 feet long, would have housed a very substantial extended family. The dwelling was repaired and rebuilt many times, its use-history demonstrated by a myriad of cross-cutting and superimposed postholes and plank impressions across its whole area. Clusters of overlapping postholes show that some main wall and roof support members had been shored up or replaced as many as 8 to 10 times over the life of the house. A profusion of firepits and storage pits, dug, filled, and re-dug many times by generations of householders over several centuries of occupation, covered the floor area. These pits yielded an abundance of fire-cracked rock and tens of thousands of bone fragments from elk, deer, salmon, sturgeon and other animals, the remains of food that was stored, cooked, and eaten in the house. It is calculated that at least 40,000 board feet of western red cedar went into the initial building (a modern 3-bedroom house requires 10 to 12,000 board feet of lumber). Periodic replacement of decaying supports and planking over a use-life of 400 years probably required half a million to a million board feet of lumber. This study, bringing out the astounding longevity of the Meier longhouse, and the major continuing investment required in its maintenance, offers an important new perspective on traditional household life in the region. The results of this continuing research, not fully available at the time of writing, will greatly enrich our knowledge of later prehistory in the Portland Basin.

Resources of the Sauvie Island Vicinity

Bones of some 40 different kinds of animals were identified from the above three sites in the Sauvie Island vicinity (Saleeby 1983b). The most common large animals were deer and elk. Bear, dog, raccoon, beaver, muskrat, duck, goose, swan, and crane were also represented. Fish remains included salmon, sturgeon, sucker, and minnow. Shells of freshwater mussels were recovered as well. In all, a dietary economy very like that of the historic Chinook is suggested.

An analysis of potential food resources in the Sauvie Island vicinity mapped the spatial distribution of various species, and charted their most likely seasons of procurement. This showed that the prehistoric people here enjoyed a sufficiently rich, varied, and accessible natural resource base to permit year around occupation of sedentary villages. In this setting, there would have been no necessity for the seasonal movement so commonly seen among hunting-gathering societies elsewhere (Table 4.1, Figure 4.11).

Season	Resources	Habitat
SPRING	Salmon, Steelhead trout Sturgeon Smelt	Riverine
	Waterfowl	Lacustrine, Palustrine
	Sandhill crane	Palustrine, Grasslands
	Deer	Riparian, Grasslands
	Camas, Bracken fern Wild strawberry	Grasslands
	Wild strawberry, Wood sorrel	Conifer forest
	Horsetail	Palustrine
	Cow parsnip Wild celery Wood sorrel	Riparian
SUMMER	Salmon, Steelhead trout	Riverine
	Lupine, Kinnikkinnick Huckleberry, Oregon grape Salal berry	Conifer forest
	Skunk cabbage	Palustrine
	Cattail	Riverine, Palustrine
	Wood sorrel, salmon berry dewberry, thimbleberry blackcap, elderberry	Riparian, Conifer forest
	Oso berry	Riparian, Oak woodland Conifer forest
FALL	Salmon Freshwater mussels	Riverine
	Waterfowl	Lacustrine, Palustrine
	Sandhill crane	Palustrine, Grasslands
	Deer	Riparian, Grasslands Oak woodlands, Conifer forest
	Elk Bear Serviceberry	Conifer forest
	Acorns Hazelnuts	Oak woodlands
	Crabapple	Grasslands (edges)
WINTER	Sturgeon Smelt	Riverine
	Waterfowl	Lacustrine, Palustrine
	Deer	Riparian, Grasslands Conifer forests
	Elk Bear	Conifer forests

Table 4.1 Seasons during which various available food resources were most likely to be exploited in the Sauvie Island catchment sphere. Compare with Figure 4.11. (Saleeby 1983: Table 37).

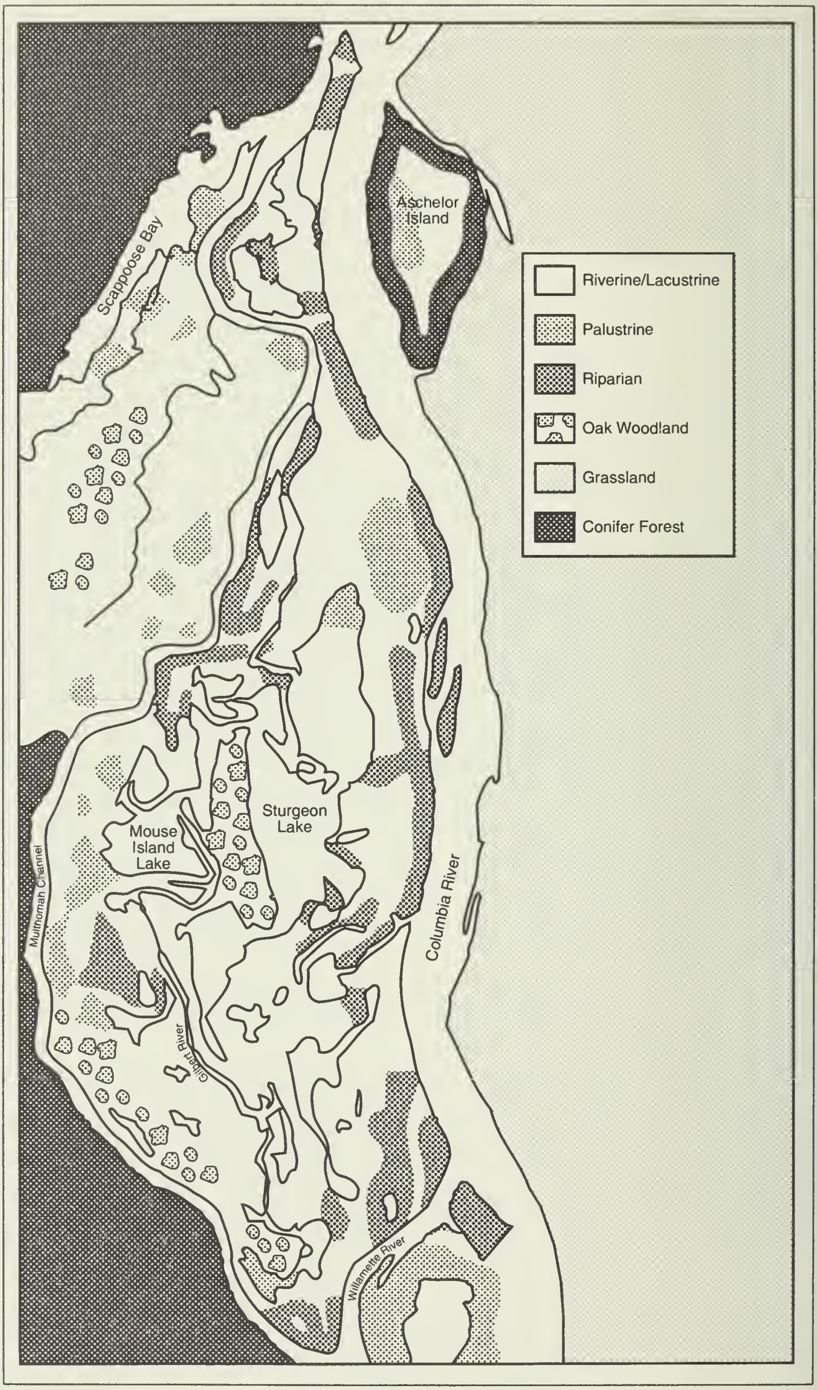


Figure 4.11 Distribution of natural resource zones in the Sauvie Island catchment sphere (Saleeby 1983: Map 9).

House Types of the Lower Columbia

As described in the Lewis and Clark diaries of 1805-1806, large multi-family rectangular plank houses were the characteristic native residence all along the Lower Columbia River. It was noted above that archaeological remains of such a house have been ^{14}C dated as early as 2550 years ago at the Palmrose site near the mouth of the Columbia, and it seems likely that comparable dates may one day be obtained for such structures in the Portland Basin. The remarkable plank house at the Meier site,just described, is a good representative of the historically-known type in that area.

But the prehistoric folk of the Portland Basin also made smaller semisubterranean dwellings and above-ground mat lodges like those of the Plateau. Excavations at the Ede Site, on the Columbia just west of Portland, exposed a shallow semisubterranean house with a saucer-shaped floor somewhat over 25 feet in diameter. Beneath this floor was found part of another. The lower floor was ^{14}C dated to 1690 BP, on charcoal from a firepit; the upper floor was dated to 1460 BP, on charcoal embedded in the floor itself (Minor 1989c). At the nearby Kersting site, circular semisubterranean houses were attested from the same level as a rectangular house that was dated by three ^{14}C determinations clustering around 2000 years ago.

At sites near Skamania and Camas, farther upriver, excavations revealed circular housepits containing projectile points like those of the Merrybell Phase (2500-1750 BP). These structures were said to closely resemble the traditional pithouses of the interior Plateau region. A bit farther upstream, near the outlet of the Columbia Gorge, the Caples site revealed oval semisubterranean housepits that were also said to suggest Plateau winter houses. Four ^{14}C determinations of 740, 490, 440, and 300 BP date this site.

In the same vicinity, a lower level of site 45SA11 gave evidence of shallow oval housepits suggestive of Plateau summer mat lodges, while from an upper level came evidence of substantial rectangular plank-walled dwellings. Eight ^{14}C dates between 465 BP and modern times establish the late prehistoric-early historic age of 45SA11. Its historic period occupation is further documented by abundant Euro-American trade goods, and descriptions of its appearance as a village of plank-walled houses in the Lewis and Clark diaries (Dunnell and Beck 1979; Minor, Toepel, and Beckham 1986; Warren 1959).

From these findings it appears that the architectural uniformity seen along the Lower Columbia by early historic explorers was only recently established. Earlier occupants made use of at least three different house forms, apparently reflecting community and seasonal variations, as well as cultural relations with the Plateau region upriver.

Artistic and Symbolic Forms

Rock art sites are little-known along the Oregon Coast. Some are reported from the lower reaches of the Columbia, but rock art is not nearly as abundant as in the Plateau and Northern Great Basin. Why sites are so few in Oregon's coastal zone is not clear, since rock art is well-represented farther north, especially in British Columbia. The relative lack of information may reflect only a paucity of research on the subject, but it could be simply that the soft sedimentary rocks of the coast do not offer surfaces sufficiently erosion-resistant for rock art to survive over long periods. Surely future field work specifically directed to rock art will bring to light at least some more examples.

Perhaps the best-known rock art site in the Portland Basin is at Gentry's Landing, on the Washington State side of the Columbia. Here several groups of boulders scattered along the river for roughly 600 feet display a great number of pits and grooves ground into their surfaces. Most of the pits are simply small depressions. The grooves take several forms. Many are just straight lines, some are zigzags, and some represent sets of parallel hash marks or nested "V" or "U" forms. Some of the grooves have a pit at one end. A number of circles are also seen, some of them occurring in concentric sets. Occasionally two or three circles are joined together by a line drawn through their centers, and a few individual circles are bisected by a short line. No humanlike or animal forms seem to be represented. Clearly these carved rocks were developed over a considerable period of time, as indicated by the hundreds of individual elements represented, and their crowding and overlapping (Loring and Loring 1982: 16-21).

Figurines carved of stone or molded in clay are an important symbolic form that is well represented on the Lower Columbia and in southwestern Oregon as well, including the far south coast. Little is known about the occurrence of such objects in the intervening area, but again this must be at least partly due to very limited research on the subject.

A series of sites bordering Lake River, on the Washington State side of the Columbia River west of Vancouver, have yielded fired clay figurines and other objects (Stenger 1991). The figurines typically taper from a broad end to a rounded tip, and lack appendages. Some are anthropomorphic, with faces represented by incised lines. Cut pieces of shell impressed into the clay before firing sometimes indicate hair or facial features. Other figurines, not of human form, exhibit punctated and incised decorative patterns. Occasional fired clay sherds, apparently representing vessel fragments, have also been found. These too are decorated with incisions or punctations. Smoking pipes and pendants complete the array of types. The specimens are believed to be of late prehistoric age, approximately the Multnomah II subphase (700-200 BP) in the Portland Basin chronology. Stenger (1991: 120) speculates about a Japanese origin for this tradition, but it must also be noted that the Lake River specimens have parallels much closer to home in southwestern Oregon (Mack 1991). Clearly a distinctive tradition, this fired clay industry merits further study and analysis of its place in Lower Columbia prehistory.

Bear, seal, owl, beetle, salamander, jay, woodpecker, otter, and salmon were known to the people of Oregon's southern coast as fellow creatures with special powers, who might become spirit helpers (Pullen 1990). Individuals who gained such guardian spirits could rely on their help in curing illness, in hunting and fishing, or in foretelling the future. Nellie Lane, a traditional doctor of the Lower Coquille community, described the role of spirit helpers in her training:

> I first dreamed about Grizzly Bear. He looked just like a person, but he was a bear. He told me, 'You're going to become a big doctor. I'm going to be your power; I shall stand behind you when you cure sick people. Tomorrow I don't want you to eat anything all day. I want you to walk around in the hills and practice this song all day." Then he sang his song for me. The next one I dreamt of was Yellowhammer. He looked like a person too. He said to me, "I'm going to be your power. When you sing my song you can cure people who are sick. When you think about me, then you can cure." These two kept coming back to me, telling me how to train myself, all the time. Once Coyote came to me. I said, "I don't want you for my 'power'." Coyote is mean, always doing mean things. He is kind of foolish too, sometimes. You know the stories about him. I didn't want him, because I was afraid he might make me do things like he does. Next I dreamed about Otter. He came to me and said, "I'm going to help you. You have to sing my song first when you want to cure someone who is sick. When you sing my song I shall be right there near you. Other people can't see me, but you will see me there helping you" (Drucker 1937: 280-281).

Stone sculptures, clay figurines, and occasional engraved petroglyphs found on the south coast suggest that people sometimes made representations of their animal helpers. They also show that the traditions of these creatures stem from prehistoric times. Pullen (1990: 122-23) reports that a number of stone and clay bear effigies have been found by artifact collectors at places on the Siuslaw, Coquille, Umpqua, and Pistol rivers. Seal sculptures have been found along the Lower Coquille. A carved bone owl effigy was taken from the Umpqua-Eden site near the mouth of the Coquille. Water beetle petroglyphs occur near the falls at Scottsburg, on the Umpqua River. Steller's Jay seems to be represented on stone sculptures found on the Smith River and near Coos Bay, and a woodpecker sculpture is known from a site near the Coquille River mouth. A sea otter figure comes from the south fork of the Coquille River near Powers. Finally, salmon effigies carved from blue schist have been found on the lower Coquille and lower Rogue rivers. Pullen suggests that all these items were linked with beliefs handed down in oral tradition, and figured prominently in the rituals and ceremonies that brought people together for various religious and social purposes.

Future Research

The stress placed throughout this chapter on continuity between prehistoric and historic cultures is warranted by many observed similarities in settlement pattern and material culture. But, as noted in previous chapters, it is easier to compare past and present in the material culture sphere than in the realm of societal organization. This caveat has particular force in western Oregon, where the native peoples described by Lewis and Clark and other early Euro-American travelers were disastrously stricken by measles, smallpox, and other Old World diseases. Their numbers had been dreadfully reduced by the time even the earliest historic chroniclers arrived in the area.

This kind of disruption would have had relatively little effect on the elements of material culture, technology, and interaction with the natural environment that are stressed in the present account. But epidemic disease would inevitably have had a powerful effect on societal organization. It is quite possible, even likely, that more complex social systems existed in prehistoric times than those implied by the ethnographic record. Archaeological information of the kind needed for definitive evaluation of this issue is still very limited, but the picture should become clearer as more research is carried out.

Thus, the nature of prehistoric social and settlement systems throughout the Pacific Coast/Lower Columbia region should be a major topic of future research. Dunnell et al. (1973) and Saleeby (1983) have addressed the matter for the Lower Columbia area. Minor and Toepel (1983) analyzed patterns of aboriginal land use along the southern Oregon Coast. Draper (1988) has made an effort to determine the different types of sites occupied by residential and task groups in the same area, and to specify the relative permanency or mobility of community groups. In all these cases, the question of a major decline in native population at the opening of the contact period is critical.

Another realm of uncertainty is the full character of occupation before about 3000 years ago along the Pacific Coast and Lower Columbia. Human presence at least 8000 years ago is established by the evidence of Tahkenitch Landing, and people were undoubtedly in the region before that. At Ground Hog Bay and Namu, on the coasts of Alaska and British Columbia, coastal occupation predates 9000 BP (Dumond 1983). Evidence from this early time is extremely thin all along the west coast, however, and much research will be needed to provide a better picture. Oregon's current beach lines are young, reflecting a postglacial rise in sea level that stabilized at the modern stage only about 3000 years ago. Future studies in the region will have to attend to this archaeological fact of life by searching for evidence of earlier occupation on high coastal headlands, on off-shore rocks and islands, beneath coastal dune fields, along river estuaries, and at higher elevations in the coastal interior.

A virtual absence of evidence for prehistoric occupation in the Coast Range also demands further research. The steep, rugged terrain and dense rainforest vegetation no doubt inhibited travel and residence there to some degree, but it must be remembered that the same factors also limit the archaeological visibility of any evidence that might be there. It would surely be poor science to infer from our current archaeological ignorance that the area was not utilized by prehistoric people. It was certainly rich in attractive resources, and the extent of its actual use must be seriously examined by future research.

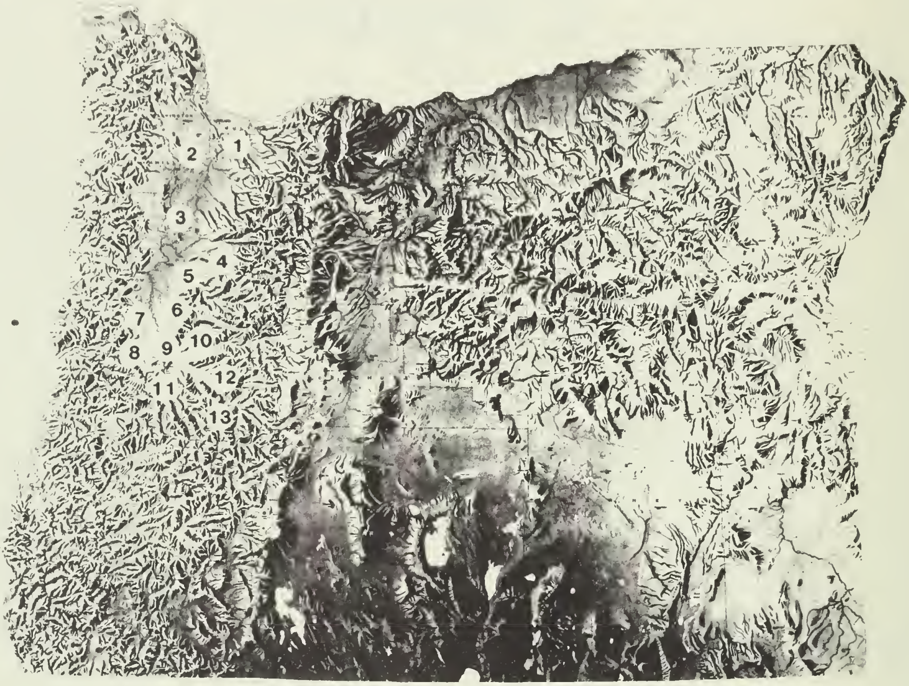
There may also be a future for underwater archaeology on the Oregon Coast. With adequate seafloor maps, diving archaeologists armed with a knowledge of factors governing site location may be able to find some of the evidence of early coastal occupation that must be there, on the ocean bottom, awaiting discovery.

Chapter 5

Willamette Valley

The Willamette Valley is completely surrounded by the other archaeological regions of Oregon. The Northern Great Basin and Plateau lie to the east and northeast, across the Cascades; the Pacific Coast and Lower Columbia River lie to the west and north; and the Southwestern Mountains lie to the south (Figure 5.1). The Willamette Valley environment has a somewhat "Californian" character that is unique within the Pacific Northwest. About 20 miles wide and 100 miles long, it is flanked east and west by the coniferous forests of the Cascades and Coast Range. Its alluvial plain is veined by rivers and creeks flowing out of both ranges to join the Willamette River on its course northward to the Columbia below Portland. Prior to 20th century agricultural land clearing, gallery forests of deciduous and evergreen trees followed the watercourses, and much of the valley floor was in open grassland with scattered oak groves (Towle 1982; Boyd 1986).

The indigenous people of the Willamette Valley, who all spoke languages belonging to the Kalapuyan family, formed a series of small, independent groups: in the north lived the Tualatin, Yamhill, and Pudding River bands; centrally located were the Luckiamute, Santiam, Mary's River Muddy Creek, and Tsankupi bands; and in the upper valley were the Long Tom, Chafan, Mohawk, Winefelly, and Yoncalla bands. East of the



Key to Sites

1 – Willamette Falls
2 – Fuller and Fanning Mounds
3 – Hager's Grove
4 – Cascadia Cave
5 – Templeton
6 – Hurd Site
7 – Benjamin Sites, Kirk Park
8 – Inman Creek, Hannavan Creek, Perkins Park
9 – Flanagan Site
10 – Mohawk River
11 – Cottage Grove
12 – Western Cascades Uplands
13 – Baby Rock Shelter, Rigdon's Horse Pasture Cave

Figure 5.1 Map showing site locations in the Willamette Valley region of Oregon.

valley, the Molalla (of a separate but related linguistic group) occupied the Cascades from about Oregon City in the north to Crater Lake in the south. How far back in time the historic pattern of life might extend is the subject of continuing research, but human occupancy probably dates back 11,500 years or so, and is firmly demonstrated as exceeding at least 8,000 years (Cheatham 1988).

Ethnographic Life Way

The lifeway of the native peoples, as described in 19th and early 20th century accounts, provides a model for understanding the archaeological evidence (Beckham, Minor and Toepel 1981; Minor et al. 1980; Zenk 1976). In the 19th century, Kalapuyan groups occupied the whole of the valley from Willamette Falls (Oregon City) southward. The range of one group, the Yoncalla, extended beyond the head of the Willamette Valley into the Upper Umpqua River region. The basic economic pattern of mobile hunting, fishing, and gathering was, of course, governed by the natural resources available in the regional landscape. As the following archaeological accounts will show, the digging of camas, gathering of wild nuts, and hunting of deer, elk, and other game are attested for the Willamette Valley as early as 8000 years ago. Evidence from the western Cascades shows that hunting camps were also occupied there by that time.

A map of individual group territories shows graphically the close relationship of the people to their natural environment. The Willamette River, flowing down the middle of the valley, separated eastern from western groups (Figure 5.2). Each group occupied an elongated territory that began at the big river and extended across the valley into the foothills of either the Coast Range or Cascades. Typically, territories paralleled the courses of smaller rivers tributary to the Willamette. This settlement pattern assured access for each group to all the basic land types of the region: river, gallery forest, grassland, oak grove, foothills, and montane woodland. By moving about within their individual ranges on a seasonal basis, groups could harvest each resource as it ripened, or was most readily obtained, or most conveniently scheduled.

Seasonal alternations gave a natural rhythm to human activities. Fishing was scheduled mainly in spring, fall, and winter, though fish were available all year. During the root harvest, from early through late summer, starchy bulbs were dug in great quantity from meadows filled with camas lilies. To bake and preserve the camas bulbs, large pits were dug and lined with stream cobbles, and a fire was built over them. When

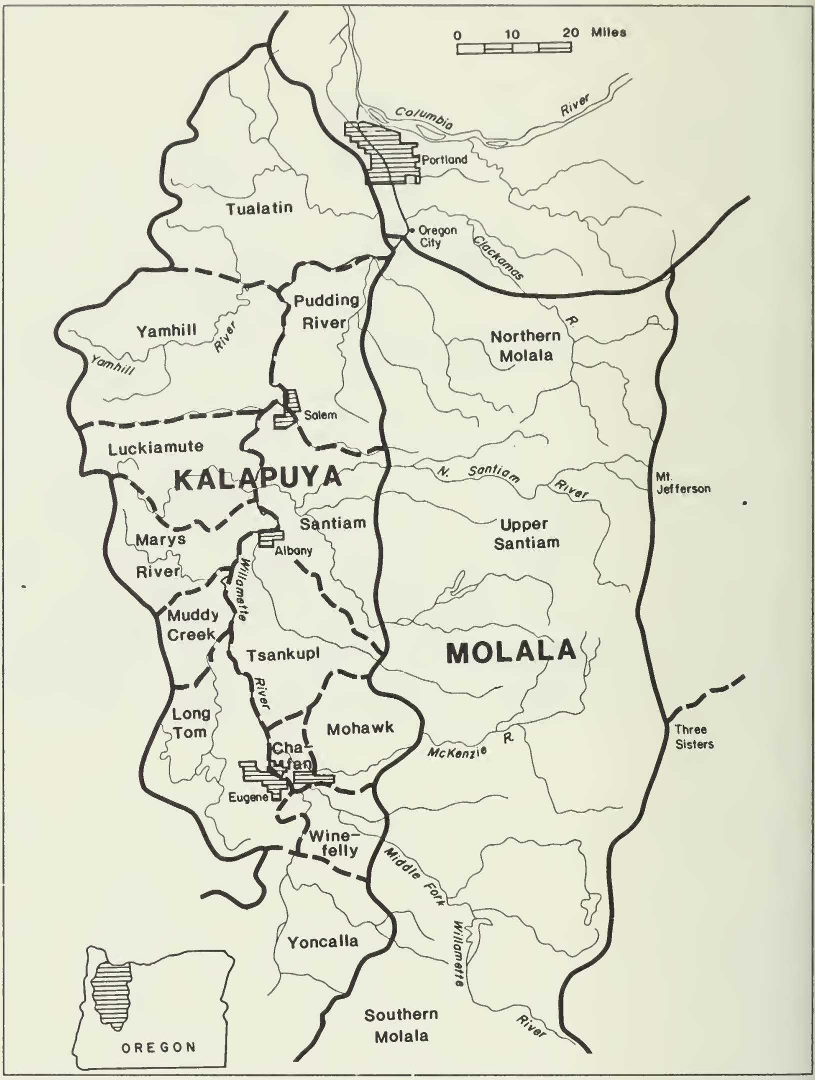


Figure 5.2 Distribution of Kalapuya group territories east and west of the Willamette River; Molala territory in the Western Cascades.

the rocks were hot the fire was raked away, the pit filled with camas bulbs, and earth placed over the top. After baking for two or three days, the bulbs were removed and pounded into cakes for winter stores. The gathering of a wide variety of seeds, berries, and other plant foods went on throughout summer and early fall. Hunting was primarily a fall season pursuit, though deer, elk, waterfowl, and smaller animals were present, and taken to some extent, the year around. Throughout the productive season, foods were dried and stored for winter, which was not a time of major food-getting activity.

Residential patterns were related to these cycles, and to the attendant weather conditions. In the busy summer months, when the weather was fine, people ranged widely. They camped in the open with only the most casual of brush shelters, when any shelters were used at all. During the cool, wet months of the year they lived in substantial houses, each sheltering multiple families. One type of structure, described by a native of the Mary's River area in the northwestern corner of the valley, was said to be up to 60 feet in length. It had a pole frame, bundles of grass tied to the frame to make up the walls, and a flat—or nearly flat—roof covered with slabs of bark. Inside, the house was partitioned off to accommodate as many as 10 families. The interior was furnished with mats of tule grass. Beds were laid along the walls, and from the rafters hung baskets and bags containing stored provisions. Another type of structure, only sketchily described, was a roughly conical shelter about 15 by 20 feet across which contained, among other things, drying racks for salmon and roots. This was apparently used during the summer season (Mackey 1974).

Kalapuyan society seems to have been basically simple, each local group practicing autonomy in governance. Marriage ties linked together different bands, and trading partnerships allied people of different areas. Historical accounts suggest that the Tualatin band of the northern valley joined with the coastal Tillamook and Alsea in raiding for slaves, which were then traded to the Chinook along the Lower Columbia River. Other kinds of trade relationships no doubt existed as well. No major chiefs, nor any well-defined elite class, apparently existed in the Willamette Valley. Society was largely egalitarian, except for a small class of slaves who occupied the lowest level of social status. Few additional details are known of the native society, largely because the Northwest, including the Willamette Valley, was stricken by a series of influenza or malaria epidemics during the late 1700s and early 1800s. These diseases devastated whole populations, destroying much of the aboriginal way of life before it could be recorded.

The Molala, who occupied the Cascades to the east of the Willamette Valley, apparently were few in number but well-established in the montane zone (Rigsby 1965, 1969). They wintered in small autonomous villages along the rivers of the lower western Cascades, and exploited the higher elevations in summer. They gathered roots and berries, hunted elk and deer, and fished for salmon, steelhead, trout, and eels in the streams and lakes of their country. They are known to have traded with the

Klamath, and to have intermarried with their Klamath, Kalapuyan, Chinookan, and other neighbors. Molala myths tell of long-standing enmity and occasional warfare between them and their Cayuse neighbors to the east, and some basis for such friction may be seen in ethnohistoric records that document hunting and gathering trips into the western Cascades (Molala territory) by east-side peoples.

Landscape and Natural Resources

The open Willamette Valley, with its cover of wild grasses, broad fields of camas lilies, and oak groves, produced edible seeds, bulbs, and acorns in great quantity. Many localities carry the name "camas swale," indicating a former abundance of this important native food that has largely disappeared under modern cultivation and stock grazing. The old oak groves have suffered a similar fate. Though both camas and oak remain characteristic of the valley's natural vegetation today, their present rather meager occurrence should not be mistaken as representing aboriginal conditions. Bottomland plant communities along the valley's streams contained other species which also produced edible or otherwise usable parts. These included hazelnut, Oregon grape, salmonberry, elderberry, and ninebark.

Historic accounts show that the Willamette Valley people regularly burned the grasslands; it is believed by some biogeographers, in fact, that the Willamette Valley would have been invaded and covered by forest had this not been an ancient practice, maintained from time immemorial (Johannessen et al. 1971). The English botanist David Douglas (whose name has been given to the Douglas-fir) travelled the valley in 1826 and related that great burned expanses were to be widely seen. Charred growth rings in old trees memorialize repeated burnings over a period of almost 300 years, between 1647 and 1943. A dramatic drop in the frequency of burning after 1848 coincided with the arrival of alien immigrants and their suppression of the native population. This supports the inference that the earlier fires had indeed been set by natives (Sprague and Hansen 1946). Such burning would have promoted the growth of important seed-producing grasses, kept the streamside forests clear of heavy underbrush, and facilitated deer and elk-hunting activities by keeping the country relatively open (see Boyd [1986] for a detailed account).

The slack water sloughs and marshes once common in the Willamette Valley attracted and supported various resources. The Pacific Migratory Flyway annually brought clouds of ducks, geese, swans, and other water birds to overwinter and breed in the mild climate. Grouse, quail, pigeons, and doves were important as well, being local residents available the year around. The edges of the valley, and the mountains behind, held yet other resources. Both the Cascades to the east and the Coast Range to the west were densely covered with Douglas-fir. Mature stands of coniferous forest are not notably rich in edible life forms, but along stream bottoms, in burned-off areas, and around lakes and bogs in these mountains, were found salmonberry, elderberry, huckleberry, and an abundance of woodland game. Elk, deer, black bear, grizzly bear, beaver, raccoon, and squirrel were just a few of the mammalian species available.

The subsistence economy of the Willamette Valley was conditioned very significantly by a specific feature of local geology, as Cheatham (1988: 199) points out:

> The lava flow that underlies the Willamette River near Oregon City stands in a special relationship to prehistoric cultural development in the Upper Willamette Valley, for the waterfall it created there presented an almost insurmountable barrier to anadromous fish attempting to migrate upstream. The result was that salmon constituted at best an undependable subsistence resource for the prehistoric peoples who lived upriver. The lava sill also prevented the river from increasing its slope, resulting in the maintenance of a broad, moist valley flood plain in the Upper Willamette Valley, an ideal setting for abundant propagation of the camas lily. In effect, the falls denied Willamette Valley natives the use of salmon, a major subsistence resource throughout the Northwest Coast and Plateau, while significantly increasing the availability of camas, a secondary staple elsewhere.

The Willamette Falls themselves were nevertheless a fishery of importance, which seasonally attracted people from both the Portland Basin and Lower Willamette Valley. The locality was, in a smaller way, a gathering place like The Dalles of the Columbia River east of the Cascades. And with the high water of spring, some salmon could indeed ascend the falls, as observed by Charles Wilkes in June, 1841:

> The salmon leap the fall; and it would be inconceivable, if not actually witnessed, how they can force themselves up, and after a leap of from ten to twelve feet retain strength enough to stem the force of the water above. About one in ten of these who jumped would succeed in getting by . . . (Wilkes 1845, quoted in Minor et al. 1981: 58).

But though anadromous fish were not wholly excluded from the upper valley, the impact of the barrier on human subsistence is seen in the diaries of 19th century travellers. Those who moved along the Columbia, or other Northwest rivers, frequently mentioned eating salmon. In the accounts of Willamette Valley travellers, however, fish are rarely mentioned; instead, the diarists hunted or traded for elk, deer, various small mammals, and birds such as ducks, geese, and pigeons (Cheatham 1988: 8).

Thus the Willamette Valley offered its natural largesse widely dispersed over a broad area. The human population adapted to this reality by developing a quite dispersed pattern of settlement, and a comparatively mobile society.

Time and Environmental Change

Floods emanating from the Cascades and Coast Range over a long period of geological time have buried the Willamette Valley floor ever deeper in gravel, sand, and silt. In the late glacial period, the catastrophic Missoula floods more than once surged up the Willamette Valley, carrying silt and ice-rafted rocks almost as far south as modern Eugene (Baldwin 1976). As a result of this history, large areas of the valley floor are geologically very recent. They cannot be expected to yield evidence of early people, unless it is fortuitously exposed by erosion or excavation. The regional geomorphology is, therefore, of great importance to prehistoric cultural investigations.

Ten major geomorphic surfaces have been defined for the Willamette Valley. In order of decreasing age these are the Looney, Eola, Dolph, Quad, Calapooyia, Senecal, Champoeg, Winkle, Ingram, and Horseshoe units (Balster and Parsons 1968). The Horseshoe unit is the currently active modern floodplain. The Ingram unit is assigned an age between about 550 and 3300 BP, while the next older Winkle unit appears to range in age from about 5250 BP near its surface to sometime near 34,400 BP at its base. These assessments are based on ^{14}C determinations. Clearly there is great potential for cultural remains to exist within the Ingram and upper Winkle alluvium, which together extend back well into, and beyond, the time that human beings are known to have been in the New World.

Only the most recent sites are likely to be detectable on the modern valley floor. Cultural remains left in mid-valley by early occupants must now lie deeply buried in alluvial sediments. The older geomorphic surfaces along the edges of the valley, however, have not been subjected to flooding and heavy deposition since the river cut itself down below their level. There ancient artifacts are likely to be less deeply hidden, and early sites are most likely to be found.

Postglacial climate in the Willamette Valley is known through studies of fossil pollen from the sediments of Onion Flat and Lake Labish near Salem (Hansen 1942, 1947). Pollen counts show that after the last glaciation, local climate shifted from a cool, wet regime to one markedly warmer and drier. The early postglacial period, between about 9000 and 7000 years ago, was a time of transition, when white pine and Sitka spruce—trees which thrive under cool, moist conditions—declined in numbers. By 4000 years ago there had been further decline in the abundance of cool-climate species, and an increase in Douglas-fir and ponderosa pine; the latter especially is a tree that does well in relatively warm, arid situations. The white oak, which does best under relatively warm, dry conditions, reached a maximum during this latter interval. After 4000 years ago the climate again turned somewhat cooler and moister. This led to the forest patterns seen around and in the valley today, with Douglas-fir and some ponderosa pine on the surrounding hills, and oak and other deciduous species on the valley floor.

This sequence reflects the same general trends noted for other parts of Oregon; in fact, these local fluctuations belong to a pattern of world-wide climatic change during postglacial times. The degree to which these climatic changes affected the lives of prehistoric Willamette Valley peoples is an interesting question. To the extent that climatic changes affected the vegetation, they would surely have influenced people, who harvested both plants and the animals that feed on them. This remains an area to be explored by future research.

Cultural Chronology and Time Markers

The earliest artifacts known from the Willamette Valley are of Paleo-Indian type; Clovis fluted spearpoints have been found on the surface at several places (Toepel 1985). The Clovis type appears in dated sites elsewhere between about 11,500 and 10,500 BP, and the local specimens probably were made during the same time range.

An Early Archaic occupation follows the very scantily attested Paleo-Indian period. Characteristic of the Early Archaic is the willow-leaf-shaped Cascade point, which has been ^{14}C dated to nearly 8000 BP. Toward the end of this period there appeared large, thick, side-notched points reminiscent of the Northern Side-notched type from the Plateau and Great Basin.

The Middle Archaic is ^{14}C dated after about 6000 BP. Large points similar to the Northern Side-notched type, along with large stemmed points, are characteristic of this period. The large Early and Middle Archaic points all appear to have been made for use with the atlatl and dart.

A number of ^{14}C dates indicate that the Late Archaic began around the start of the Christian era, about 2000 BP. Small triangular and stemmed points are quite abundant after this date, marking the inception of bow and arrow use. The same styles were made into the historic period, when they appear in some sites along with metal tools and glass trade beads from Euro-American sources (Figure 5.3).

The same stylistic characters in point types that mark change over time also offer clues to the cultural affiliations and contacts of their makers. In the case of the Willamette Valley, the styles reflect close ties to the Columbia Plateau.

Mohawk River, Templeton, Cottage Grove

A large Clovis fluted point, its edges battered and rounded by stream-rolling, was found along the Mohawk River near Springfield in 1959 (Allely 1975). Another Clovis point, said to have been found near Cottage Grove in 1935, was donated to the Oregon State Museum of Anthropology. Two large lanceolate points were reportedly found with mammoth bones in the side wall of a drainage slough on the Templeton property near the Calapooia River, along with mammoth bones. But since these finds were made in 1895 and reported from memory a half-century later, the association must be regarded as a possibility rather than an established fact. Other finds of possibly related mammoth bones and projectile points have also been reported from the area (Cressman and Laughlin 1941; Cressman 1947). From the scanty evidence so far available for the Paleo-Indian period little can be said about the people's lifeway, but the traces do indicate human presence in the valley about as early as it has been established anywhere on the continent.

More sites of the Early Archaic period are known from the Willamette Valley, and sites belonging to the Middle and Late Archaic are fairly numerous. In the upper valley near Eugene, the Hannavan Creek, Flanagan, Benjamin, and Hurd sites—among others of similar significance that will be more briefly mentioned—document these three periods of occupation. The same basic pattern of hunting and gathering is suggested throughout the period of record, although details are scanty for earlier times.

Figure 5.3 Projectile points from the Willamette Valley, Oregon. Bottom row, Early Archaic; middle row, Middle Archaic; top row, Late Archaic. All from the Hager's Grove Site.

Hannavan Creek Site

The Hannavan Creek Site is a continuous scatter of lithic artifacts that extends for nearly a half-mile along a small tributary of the Long Tom River, a few miles west of Eugene (Cheatham 1988). The site lies just where the river flows out of the wooded Coast Range foothills into the extreme southwestern corner of the Willamette Valley. The surrounding locality, formerly known as the Long Tom Marsh, is now covered by Fern Ridge Lake. This is a flood-control reservoir backed up behind a U.S. Army Corps of Engineers dam. The Hannavan Creek Site was exposed and investigated during a winter draw-down of the reservoir.

The Land Survey Maps of 1854, compiled before Euro-American farming markedly changed the landscape, show that the Hannavan Creek Site was well-situated amid the plant and animal resources of four major vegetation zones: open prairie, marshland, deciduous gallery forest along streams, and mixed evergreen-deciduous woodland. Plant foods available in some quantity would have included camas bulbs, acorns, hazelnuts, tarweed seeds, sunflower seeds, cattail rhizomes, and a variety of berries. Large animals of the area were elk, deer, black bear, and grizzly bear. Smaller creatures included raccoons, rabbits, squirrels, beavers, and other rodents. Marsh birds included ducks, geese, and other water-loving species, as well as grouse, quail, and wild pigeon. Trout, suckers, freshwater mussels, and crayfish were available in the streams. Grasshoppers, yellowjacket larvae, and caterpillars were also endemic. All these species were characteristic foods of the Kalapuyan people who occupied the Willamette Valley during the early 19th century (Cheatham 1988: 22-25).

The fluctuating waters of Fern Ridge Lake have washed the Hannavan Creek Site over many years. Five major concentrations of artifacts were exposed in a broad zone along the stream, including many small clusters of fire-cracked rocks that mark former firehearths and roasting pits. Excavation of one such rock cluster yielded some 350 camas bulbs that had been accidentally charred, and thus preserved. Two ^{14}C determinations on bulbs from this oven were 7750 BP and 6830 BP. Though the dates are not fully consistent with one another, they nevertheless suggest that the roasting of camas bulbs in earth ovens was a tradition of high antiquity in the Willamette Valley, going back to the Early Archaic period.

Artifacts from Hannavan Creek included projectile points, scrapers, and knives that probably represent hunting and butchering tasks. Fragments of ground stone suggest the grinding and pounding of plant foods. Hammerstones, anvils, cores, flaked stone debris, choppers, drills, spokeshaves, and gravers indicate the working of stone, bone, and wood. This is a generalized tool kit that may have been used over thousands of years with little change. The projectile points were of more distinctive types, however, and add some time perspective. They include a few large broad-necked dart points assignable to the Early and Middle Archaic periods, and a number of small arrow points that indicate significant occupation during the Late Archaic period. The projectile point assemblage thus shows that the early ^{14}C dates from Hannavan Creek indicate only a portion of the time over which the site was actually used.

No evidence of house floors or wall posts was observed on the surface or located by limited subsurface testing. It cannot be affirmed, however, that structures were never built there, because erosion by the lake waters might well have destroyed or obscured any archaeological traces of them. Dwelling structures could conclusively document residential stability, but even without such evidence the excavator of Hannavan Creek believes that it was probably a winter village site and year-around base of operations for its occupants. The site's very large size, its location on the edge of a pre-Holocene land surface usually safe from flooding, the occurrence of many small and medium-sized sites on the nearby lakebed (formerly the Long Tom Marsh) that may represent activities staged from Hannavan Creek, and the favorable situation of the site at the juncture of four different biotic zones, all suggest that it played a central role in the local subsistence-settlement system (Cheatham 1988).

Perkins Park Site

The Perkins Park Site, on a peninsula jutting into Fern Ridge Lake less than a mile east of Hannavan Creek, was probably a winter village too. Numerous lithic scatters nearby in the old Long Tom Marsh probably mark the sites of short-term activities staged from Perkins Park. As at Hannavan Creek, a very extensive scatter of fire-cracked rock and lithic artifacts occurs along the course of an old creek bed. This scatter is roughly a quarter-mile long, with six areas of major artifact concentration. One of them centers on the tip of the ridge that is now Perkins Peninsula, the others being on adjacent lower ground. Again in parallel with Hannavan Creek, the Perkins Park Site lies on pre-Holocene land surfaces that would be above the level of most flooding, and near the juncture of prairie, marshland, gallery forest, and woodland zones. The artifact assemblage is likewise highly similar. Animal bone was present, but too fragmentary to be identified beyond the fact that birds and mammals were both represented. Macrobotanical remains included charred camas bulbs, acorn and hazelnut hulls, and cherry seeds. Large stemmed and side-notched projectile points indicate some Early and Middle Archaic occupation, and many small arrowpoints represent Late Archaic time. Two ^{14}C dates were 1220 and 1085 BP, falling at about the midpoint of the Late Archaic.

Upper Long Tom River Sites

Other finds, on the grounds of the Oregon Country Fair west of Fern Ridge Lake, add to the local prehistory. About two miles up the Long Tom River from Hannavan Creek, near the town of Veneta, three deeply buried sites yielded charcoal dated at 9660, 9485, and 9130 BP. At the Long Tom Site in the same vicinity, an amorphous rock feature about five feet below the surface yielded an obsidian scraper and a ^{14}C date of 8890 BP. All these sites document Early Archaic activity in the area. Four Middle Archaic sites showed many earth ovens scattered across the flood plain, represented by fire-cracked rock and charcoal. Ten ^{14}C determinations place these sites between 4600 and 3120 years ago. Plant food processing was manifestly an important activity in the Long Tom area over a long period of time. Some confirming remains of camas bulbs, hazel nuts, and acorns were also recovered. Four additional sites in the same vicinity are dated to the Late Archaic period by eight ^{14}C determinations ranging between 2080 and 380 BP. These later sites yielded many small arrowpoints, but relatively slight evidence of the plant-processing ovens so well-represented by the Middle Archaic finds.

This research also produced a detailed geologic history of the Long Tom River floodplain over the past 10,000 years, a stratigraphic sequence that will facilitate future investigations. Subsurface prospecting with a proton magnetometer also suggested the presence of many more buried cultural features in the area. The locality thus represents an important archaeological resource "in the bank" for future research. (Friedel et al. 1989).

The Ralston and Bradley-Moen sites, farther upstream on a Long Tom tributary called Spencer Creek, demonstrate early exploitation of the foothills zone above the valley floor. These sites gave evidence of fire-cracked rock cooking features that were placed in the Early and Middle Archaic periods by ^{14}C dates of 6525 BP and 4290 BP respectively (Cheatham 1988: 209-217).

Kirk Park

Downriver to the north of Hannavan Creek, on the Long Tom floodplain below Fern Ridge Lake, four sites have been investigated at Kirk Park. Detailed comparisons of their archaeological assemblages identify them as a related complex of base camp and activity locations. Eleven ^{14}C dates show that they were occupied sequentially, with considerable temporal overlap, from at least 3310 BP down to less than 150 BP. The Kirk Park sites gave much evidence of fire hearths, earth ovens, and camas bulbs, with hulls of acorns and hazelnuts also found. Bones of deer, bear, rabbit, beaver, muskrat, raccoon, and turtle were also present. Winter flooding would have precluded year-around occupation in this setting. Stream flow records for the Long Tom at nearby Noti show that peak flows occur from December through March, and this circumstance, as well as the camas, hazel, and acorn remains, suggest that Kirk Park must have been primarily a summertime encampment (Cheatham 1988).

Inman Creek

Along Inman Creek, which flows out of the Coast Range between Hannavan Creek and Kirk Park, downcutting has exposed ancient gravel beds that contain large obsidian nodules. This apparently was an important source of obsidian used for tool-making by inhabitants of the Fern Ridge area and other parts of the Willamette Valley (Skinner 1991). Geologically, however, the Coast Range is a very unlikely source for obsidian, and in fact geochemical analysis indicates that the stone originated in the western Cascades. This is shown by very close matches in the abundances of certain chemical trace elements found in both Inman Creek obsidian and that from a flow on the southern flanks of Mount Douglas, in the upper Willamette River drainage. Further, it is known that alluvial sand, gravel, and mudstone eroded from the western Cascades was deposited in parts of the western Willamette Valley to a depth of nearly 200 feet during the late Pleistocene and early Holocene. Both the Willamette and McKenzie rivers, flowing out of the Cascades, probably contributed to the catastrophic late glacial flooding that moved these sediments. The obsidian-bearing gravels exposed by the downcutting of Inman Creek were most probably transported by the Willamette River, which has meandered back and forth across the valley floor during recent geological times.

Whatever the ultimate geological origin of Inman Creek obsidian, the source was quite important to Willamette Valley inhabitants. In a series of local sites, flaking debitage from places very near Inman Creek was 60% to 80% obsidian, but the percentage of obsidian to other kinds of toolstone declined rapidly with distance from Inman Creek. The percentage of obsidian debitage in sites 30 miles out was below 25%. Most interestingly, beyond 30 miles the percentage of obsidian debitage in archaeological sites rose again, growing ever higher as the sites lay closer to the high Cascades source at Obsidian Cliffs (Skinner 1991: Figures 14, 15). Further research is needed to test these conclusions and extend this promising beginning to a fuller understanding of raw material transport and exchange among Willamette Valley people.

Flanagan Site

The Flanagan Site, located on an old stream meander channel west of Eugene, overlaps in time with the Fern Ridge sites. Over a dozen ^{14}C dates on charcoal, from deposits up to three feet deep, cluster around 5700, 3300, 1800, 900, and 500 BP. These dates, and rich cultural remains, show that the site was repeatedly occupied throughout the Middle and Late Archaic periods (Toepel 1985; Beckham, Minor and Toepel 1981).

The Flanagan artifact assemblage was highly similar to those from Hannavan Creek and Perkins Park. Only a single leaf-shaped point was found, but large side-notched, corner-notched, and stemmed dart points were common. Small, stemmed triangular arrowpoints were also well represented. Other tools probably used in butchering and hide processing were biface knives, scrapers, perforators, and use-modified flakes. Wood and bone working are suggested by hammerstones, choppers, drills, spokeshaves, and a grooved sandstone abrader that might have served to smooth down arrowshafts or comparable artifacts. Stone tool manufacture is suggested by many exhausted stone cores. Other indicators were battered hammerstones, roughly shaped bifaces which may have been unfinished "preforms" for projectile points, and abundant lithic debitage from the flaking process.

Food preparation was well-attested at the Flanagan Site. Several pit-ovens three to six feet across were found, as were a few charred specimens tentatively identified as camas bulbs. Excavation revealed quantities of fire-cracked stream cobbles and charcoal fragments that had obviously been raked out of such roasting pits. The low-lying terrain around the site, saturated by the spring floods that were endemic to the valley before modern dams were built, no doubt supported camas lilies in great abundance. A few charred acorn hulls, and some pits of wild cherry and Klamath plum, also represent foods probably gathered by the site's aboriginal occupants. It was also evident, however, that recent disturbances or rodent action had intruded some modern plant remains into the prehistoric site. Barley seeds and walnut shells found at Flanagan were of Old World species that must reflect modern farming in the area.

The Flanagan Site was probably occupied by groups who came in summer to gather plant foods and hunt game such as deer and elk in the woods along the stream where the site lay. The wide range of artifacts suggests that people stayed for perhaps several weeks, carrying out various food processing and tool-manufacturing chores while there. The encampment must have been less than permanent, however, because its low elevation would have made it a morass during the wetter months of the year. Neither were any house structures discovered there, though faint architectural traces could have gone unseen in the excavations.

Benjamin Sites

A number of low mounds, the Benjamin Sites, are scattered along old meanders of the Long Tom River several miles north of Fern Ridge Lake. Excavations of varying scope were carried out in several of the mounds, and major digging in two of them provided abundant evidence of human activity (Miller 1975). Each mound rose about three feet above the surrounding terrain. One was roughly circular, about 60 feet in diameter. The other was ellipsoidal, measuring about 50 by 100 feet. No house remains were found in either mound, suggesting that these were not long-term residential sites. The evidence indicates rather that they were visited seasonally by people who harvested a variety of natural resources in their vicinity.

Plant food gathering and processing was certainly a major focus of attention at the Benjamin Sites. The mounds contained much fire-cracked rock, fire-reddened earth, and charcoal, which related to many small firehearths and large earth ovens. Some of the latter were as much as two feet deep and five feet across. Charred camas bulbs made it clear that they functioned as roasting pits. Additional clues come from mortar and pestle fragments, which probably served in the cracking and grinding of hard-shelled nuts such as the acorn and hazelnut. No nutshells were recovered from the archaeological deposits, but no doubt in prehistory, as now, the Benjamin sites were flanked by streamside gallery forests where oak and hazel are common.

The number of projectile points recovered—nearly 250—suggests that hunting was also of considerable importance at the Benjamin Sites. Flaked stone scrapers, retouched flakes, choppers, and biface knives were also well-represented, demonstrating the prevalence of butchering and hide-processing activities normally associated with hunting. The woods fringing the Long Tom River are today known as excellent hunting country for deer and small game, and probably were in the past as well.

The Benjamin Sites almost surely represent seasonal use. The low, wet lands they occupy beside the Long Tom River would have been frequently if not invariably flooded during the winter/spring runoff season. But during the dry, sunny summer these soggy lands became meadows, probably filled with camas lilies and other harvestable plants. The lack of any archaeological evidence for houses at these intensively-used sites is no enigma, for during the pleasant Willamette Valley summers people could have lived comfortably in the open, using only the simplest and most perishable of temporary shelters.

Two ^{14}C dates on charred bulbs from the earth ovens were 2300 and 1600 BP; these place in time one interval of occupation at the Benjamin Sites. But the projectile points found suggest that human use began earlier and continued later than these dates indicate. To judge from the artifacts, the Benjamin Sites were probably occupied through about the same range of time as the Flanagan Site. As at Flanagan, the earliest Benjamin projectile points were large leaf-shaped specimens, and large stemmed, corner-notched, and side-notched dart points. Later arrowpoints were the familiar small stemmed and unstemmed varieties described for sites previously mentioned.

Hurd Site

The Hurd Site, near Coburg on the eastern edge of the valley, was in contrast probably a winter village (White 1975). The remains of a semisubterranean house structure, the site's location on higher ground, and its distinctive artifact assemblage, all suggest that the Hurd Site was a more permanent, wet-season settlement. The occupied area is on the forward edge of the Winkle geomorphic surface, overlooking a lower flood plain through which the McKenzie River flows toward its confluence with the Willamette, several miles west of the site. Though the difference in relief between the two land surfaces is only a few feet, it was enough that the Hurd Site, on the Winkle surface, would be above the level of all but the most unusual flooding.

A ^{14}C assay on charcoal from a firehearth on the house floor gave a date of 2800 BP; a confirming date of 2820 BP came from a second hearth intruded into the housepit. The house was oval in plan, defined by the outlines of a large, shallow pit a few inches deep and about 16 by 23 feet across. In addition to the firehearth were a number of small pits, probably post-holes. These small pits did not add up to any complete pattern of wall and roof supports for the house; but if the superstructure were lightly built, some of its fainter traces might have been obliterated by the passage of time, or missed in excavation. The shallowness of the house pit, and lack of evidence for really substantial support timbers, suggests that the structure may have resembled the semi-conical grass-thatched lodges of historic Willamette Valley peoples rather than their more substantial long rectangular houses with sunken floors and bark-shingled roofs.

A cluster of eleven ^{14}C dates on charcoal from various firehearths and earth ovens elsewhere in the Hurd site indicates a second major period of occupation extending from 1100 BP to late prehistoric times. No house structure was identified for the later occupation; instead, there were many large and small earth ovens and fire hearths. It has been suggested that in its later period, the Hurd Site was a summer encampment rather than a base settlement (White 1975). But the artifact assemblage is so much more varied than that found at other sites as to suggest that Hurd may have been a base settlement during its later occupational phase as well. The lack of evidence for later house remains could reflect simply the limitations of the archaeological sample.

The importance of hunting at the Hurd Site is documented by over 400 projectile points from the excavations. The assemblage was similar to that found at the Flanagan and Benjamin sites, except that early leaf-shaped, and large stemmed and side-notched dart points were extremely rare. Small triangular stemmed and corner-notched arrowpoints, like those from later phases of the other sites, dominated the Hurd collection. Scrapers, flake knives, and utilized flakes in large numbers no doubt represent associated hide processing.

An extensive and varied series of large scrapers, gravers, reamers, choppers, scraper planes, drills, abrading stones, and denticulate tools were probably used in the manufacture of wooden objects, and perhaps in the working of bone as well (Figures 5.4-5.7). Abundant flakes of varying size and degree of modification also indicate the on-site manufacture of stone tools, and a number of battered hammerstones were found that may have been used in the lithic reduction process.

The processing of vegetal foods is well-attested, not only by the abundance of earth ovens, but also by charred camas bulbs, pestles, and mortar fragments (Figures 5.8, 5.9). These latter tools were rare, but this is perhaps not surprising; a great deal of work went into their manufacture, and they would not be lost or discarded lightly.

Finally, the interpretation of the Hurd Site as a stable central base settlement is bolstered by the facts of its broader context. Not only is it on

Figure 5.4 Basalt bifaces from the Lynch Site.

Figure 5.5 Heavy pointed tools from the Hurd Site.

high enough ground to be safe from all but unusual flooding, but it lies at the base of the Coburg Hills, an outlier of the western Cascades. From here its occupants could exploit, at relatively short range, both valley floor and montane settings. They could target the natural resources of different environmental zones on various kinds of hunting and gathering missions, without having to traverse any major distances.

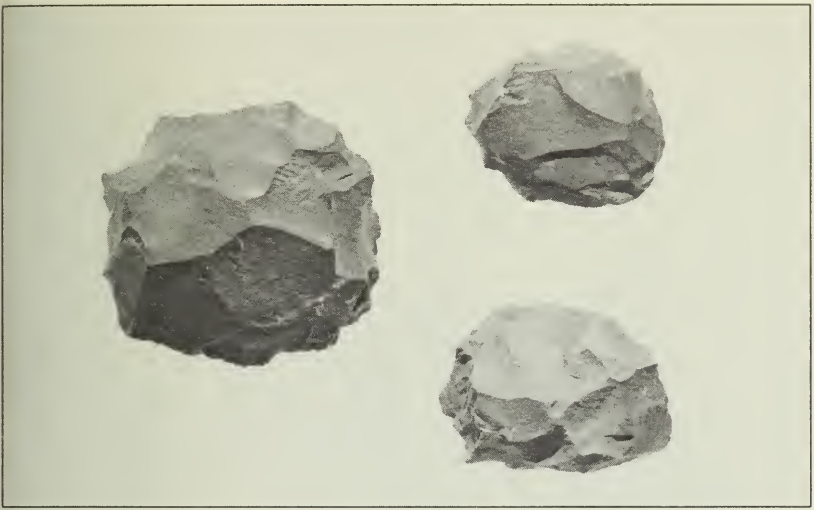


Figure 5.6 Heavy uniface chopping tools from the Hurd Site.

Figure 5.7 Uniface chopper and shaped pestle from the Hurd Site.

Hager's Grove

Near Salem is Hager's Grove, a locality that provides a record of Middle and Late Archaic prehistory for the central Willamette Valley. Charcoal from fire features at location MA7 yielded ^{14}C dates of 3800, 2900, 2700, and 1200 BP, while similar features from location MA9 produced dates of 3700, 1200, 1100, and 400 BP (Pettigrew 1980b). The sites lie along

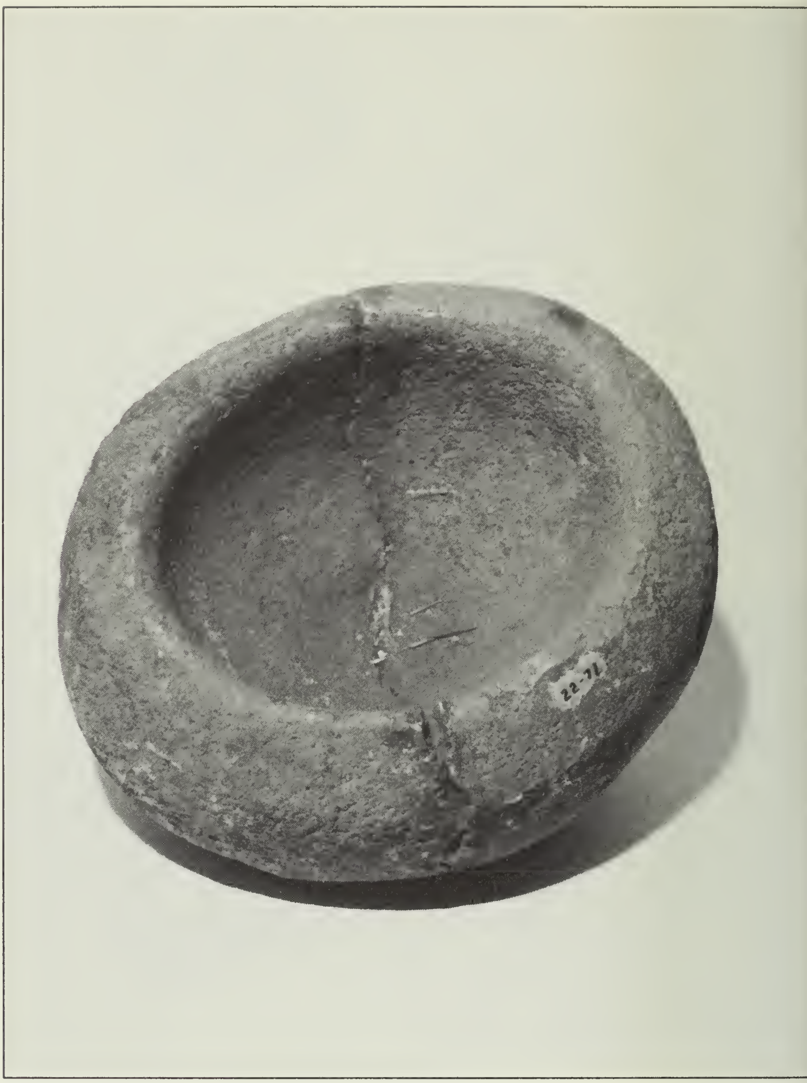


Figure 5.8 Stone bowl from the Willamette Valley.

meandering stream channels that were probably, in prehistoric times as now, cloaked in gallery forest and surrounded by grassland. The two excavated locations both produced numerous stone artifacts, associated with charcoal-filled firehearths and apparent earth ovens. Artifact-strewn occupation surfaces were located, but no dwelling structures were discovered.

Projectile points of the earliest occupation were fairly large, leaf-shaped specimens, and associated with them were large stemmed and occasionally

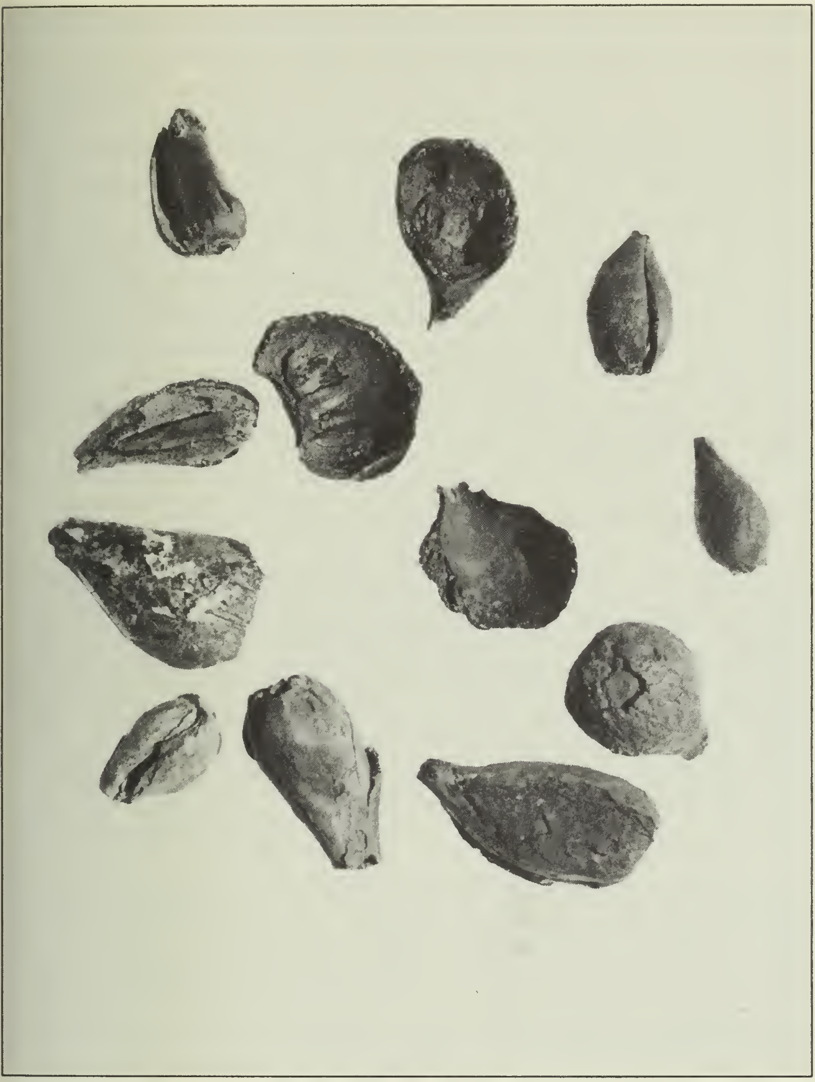


Figure 5.9 Charred camas bulbs from an earth oven.

side-notched points. These were probably used with the atlatl and dart. They were succeeded, after about 2500 BP, by smaller points with narrow stems, which were clearly used to tip arrows. Other specimens from Hager's Grove included biface knives, scrapers, drills, and use-modified flakes, as well as large unifacially flaked cobbles. A single well-made mortar shaped from a large piece of vesicular basalt was also found there.

The flaked stone tools indicate the importance of hunting, while the mortar and earth ovens document the gathering and processing of plant foods. Found among the fire-cracked rocks and charcoal of the earth ovens were a number of charred camas bulbs, hazelnuts, and acorns, along with a few examples of other species. In all, the archaeological collections, as well as the geographical setting, indicate that Hager's Grove served as a seasonal camp where game—probably deer and smaller animals—was hunted and plant foods collected during a few weeks of the year. This was probably during midsummer and early fall, when camas, acorns, and hazelnuts would all have been at a harvestable stage together. The people seem not to have made substantial shelters, and perhaps they camped in the open during the fine weather. Although there were some changes in artifact styles over the period of occupation, and the bow and arrow replaced the atlatl and dart during that span, there seem to have been no fundamental changes in the character of human activity at Hager's Grove over nearly 3500 years of time.

Fuller and Fanning Mounds

The final phase of aboriginal occupation in the Willamette Valley is best represented by the Fuller and Fanning mounds. These two sites are considered together because of their nearly identical artifact assemblages and close proximity to one another. They are located on the Yamhill River some 20 miles northwest of Salem, near the town of McMinnville. Both sites were of considerable extent, the Fuller mound measuring some 80 by 120 feet across, the Fanning mound some 120 by 180 feet. Both also varied between about three and five feet in depth. These sites were excavated in the early 1940s, before the development of ^{14}C dating, and they have never been fixed precisely in time. Euro-American trade goods of brass, copper and glass show that the latest occupation extended into historic times, probably the early 1800s. Such artifacts were very few, however, and the bulk of the specimens were of prehistoric native types. Comparison of the projectile points with specimens from ^{14}C-dated sites suggests that the Fuller and Fanning mounds were probably occupied throughout the Late Archaic period, from about 2000 BP onward (Laughlin 1943; Murdy and Wentz 1975; Woodward, Murdy, and Young 1975).

Like the Hurd Site, the Fuller and Fanning mounds were probably stable residential locations. Although no evidence of house structures was recovered, both sites contained many human burials, and a wide variety of artifact types. These facts suggest that occupation must have been relatively stable, that the sites must have represented "home" to their inhabitants. Domestic refuse included much evidence of firehearths and fire-cracked rock. The lack of any reported evidence for house structures at the sites may well reflect no more than the fact that the excavations were carried out by untrained local collectors, who could easily have failed to observe the subtle clues that would lead to the recognition of collapsed and decayed dwellings.

Hundreds of projectile points were recovered from the Fuller and Fanning mounds. They comprised a remarkably uniform collection, being almost exclusively small triangular arrowpoints, either corner-notched or stemmed at the base. They are very similar to the points from other Late Archaic sites in the Willamette Valley, particularly to the later specimens from the Hurd and Benjamin sites. Flaked stone knives and scrapers represent other aspects of the hunting complex, as do bone awls probably used in hide-working. Bone points, and pieces that represent parts of composite harpoons or fish spears, were also represented. Fishing with nets is suggested by the presence of grooved pebbles that may have served as sinkers. The game obtained with this equipment included elk, deer, beaver, fox, various birds, and fish.

The collecting and processing of wild vegetable foods on a large scale is also suggested, as at other sites, by abundant fragments of fire-cracked rock, probably from earth ovens used in baking camas bulbs. A number of large elk antler tines, perforated at the center, were exact representatives of an artifact type used by historic Columbia Plateau people as handles for root-digging sticks. That camas was an important staple of the Fuller and Fanning site occupants seems assured. Mortars and pestles that could have served to crush or mill wild seeds, acorns, hazelnuts, and other products were also recovered.

Several tool types indicate that wood-working was another important activity of the Fuller and Fanning villagers. Large, heavy wedges of antler no doubt served in splitting out boards or slabs of wood. Flaked stone drills and gravers, as well perhaps as some of the bevelled scrapers and knives recovered from the sites, could have served in the shaping and fitting of these pieces. Another industry was the making of stone tools, suggested not only by the abundance of stone tools themselves, but also by discarded flakes of stone, hammerstones that may have served in initial rough flaking activities, and pointed flaking tools made of antler tines that would have served to put the final touches on lithic artifacts.

Artistic and ceremonial aspects of life were well-represented at the Fuller and Fanning sites by artifacts of both native and Euro-American manufacture. A large, beautifully flaked double ended knife of obsidian is of a type highly prized by the historic Yurok and other people of northern California. Two large paddle-shaped "fish clubs," beautifully carved of whalebone, are of types best known from the Columbia River

Figure 5.10 Necklace from Fuller Mound made up of *Olivella* and butter clam shells from the Oregon coast, sheet copper bangles, and a brass button.

and the coasts of British Columbia. Shell beads of *Olivella*, *Glycymeris*, and *Haliotis* (abalone), strung as necklaces or bracelets, represent marine species imported from the Pacific coast. Euro-American trade goods included a number of brass buttons, some brass finger rings, a brass thimble, some sheet copper that had been rolled into tubular beads, and glass trade beads of several different kinds (Figures 5.10-5.13).

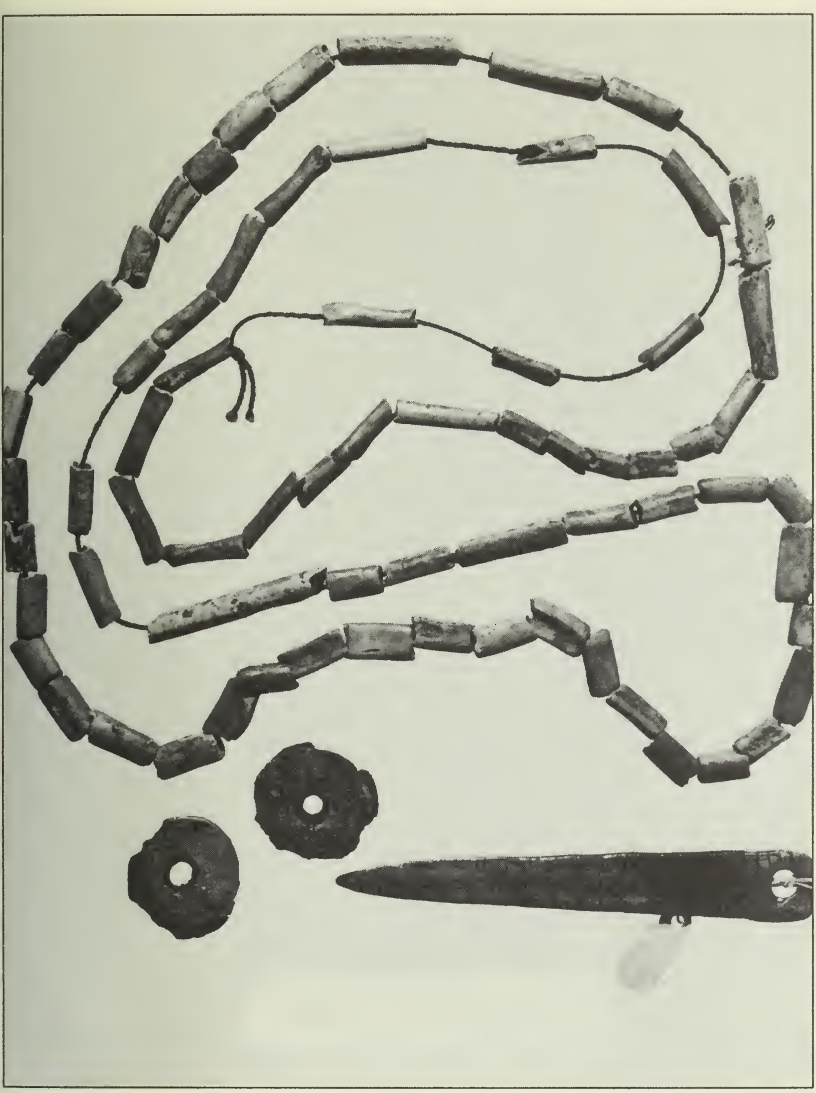


Figure 5.11 Bone artifacts from Fuller Mound. Top, necklace of cut and polished bird bone beads; lower left, bone earspools; lower right, incised bone pendant.

The richness of the artistic and ceremonial complex from these two sites contrasts markedly with what is known from elsewhere in the Willamette Valley. It is not yet clear whether this richness can simply be attributed to the relative recency of the sites, which allowed the preservation of objects normally lost to gradual decomposition, or whether the Fuller and Fanning mounds may have been home to societies considerably richer and more complex than those known from other parts of the valley. Further research will be needed to resolve this question.

Figure 5.12 Whalebone club from Fuller Mound.

Cascadia Cave

The montane woodlands of the Cascades were, like the Willamette Valley, occupied from early times. During the ethnohistoric period, as mentioned above, the lower-lying western Cascades were the year-around homeland of Molala bands. Higher elevations locked by winter snows were visited in the warmer season, both by Molala and by other people from both sides of the mountains. Kalapuyan groups from the Willamette Valley probably hunted and gathered in the Cascades during

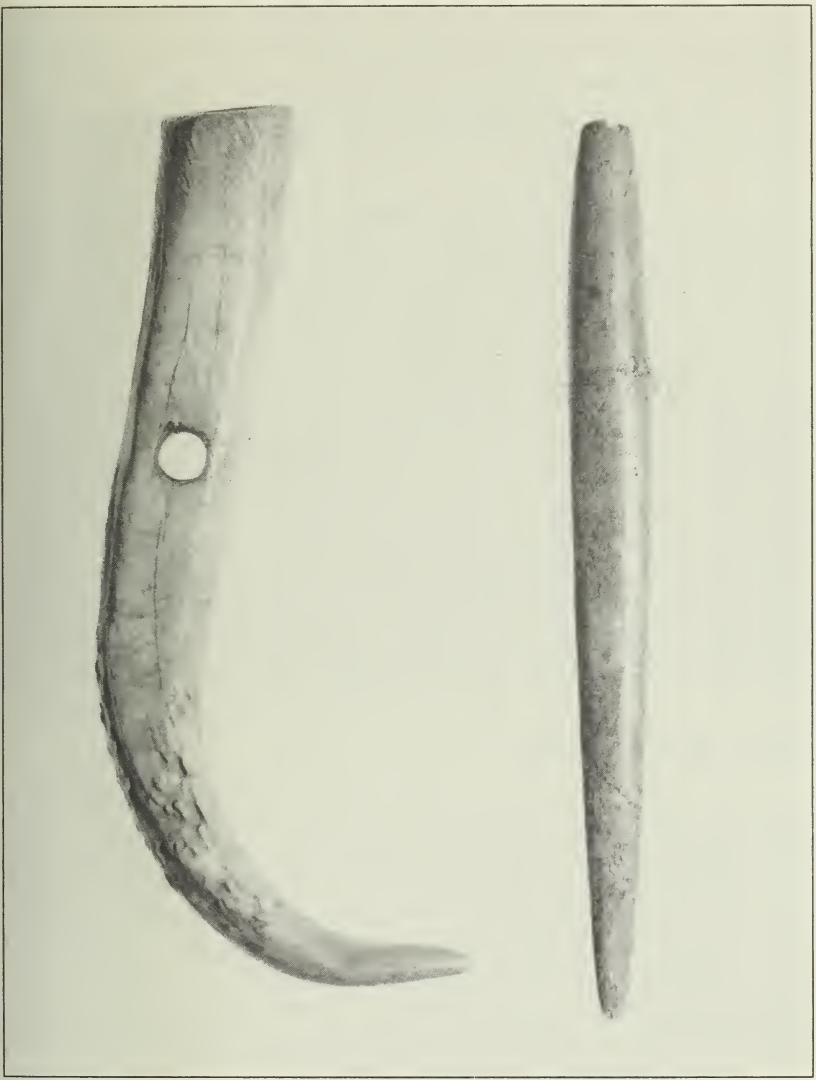


Figure 5.13 Bone wand and antler digging stick handle from Fuller Mound.

the summer, but this intriguing possibility is scarcely touched by the available evidence. The archaeological record for the mountains is still quite thin, but archaeological data are beginning to suggest that a lifeway like that of the historic Molala is of ancient standing in the mountains.

Cascadia Cave, on the South Santiam River, gives early evidence for human use of the mountain forests (Newman 1966). Excavations revealed between 9 and 12 feet of earth overlying its bedrock floor. Throughout this fill were flaked and ground stone artifacts, left by repeated visitations over a long period of time. A ^{14}C date of 7910 BP pertains to the earliest occupation, and major use of the site may have ended by about 6000 BP. The later prehistory of the site is unclear, because digging by private artifact collectors had largely destroyed the upper deposits before scientific excavations took place.

The occupants of Cascadia Cave left behind many leaf-shaped obsidian points of the Cascade type. These were especially common in the earlier levels; they continued into levels dated about 6000 BP, but by then large side-notched points were also common. All these points were of quite large size, no doubt used to tip atlatl darts. The bow and arrow had not yet made its appearance at the time of the Cascadia Cave occupation. Knives, scrapers, and use-modified flakes were common, probably used in butchering and skinning the game brought down with stone-tipped projectiles. The bones of deer were found in every level of the excavations, and elk, snowshoe rabbit, and marmot bones also appeared. Hazelnuts found at one spot during the excavations indicate the gathering of vegetal foods. A dozen or so hand grinding stones, or manos, show that vegetal foods such as nuts and seeds were crushed and milled at the site. Occupation in late summer and fall is suggested by the evidence for plant food processing, and the prevalence of deer bone.

Baby Rock Shelter

Another early montane occupation is known from Baby Rock Shelter, near Oakridge on the Middle Fork of the Willamette River (Olsen 1975). At this site, badly disturbed by looters, a number of artifacts were found. Notched projectile points, knives, scrapers, perforators, and gravers appear to represent hunting and hide working. Choppers, mauls, manos, and milling stone fragments suggest vegetal food processing. No ^{14}C dates were obtained from Baby Rock Shelter, but a few artifacts lay beneath volcanic ash that came from the Mount Mazama eruption of about 7000 BP (Kittleman 1973). In addition, the projectile point types suggest the Baby Rock occupation overlaps that of Cascadia Cave, just mentioned, and Rigdon's Horse Pasture Cave, next to be described.

Rigdon's Horse Pasture Cave

In the upper Middle Fork drainage of the Willamette River a few miles east of Oakridge is Rigdon's Horse Pasture Cave (Figures 5.14, 5.15). This site has been ^{14}C dated between 2500 and 200 BP (Baxter et al. 1983). Rock-lined firehearths, oven-like cooking features, and storage pits were found in the deposits. A considerable quantity of bone—dominated by deer remains—indicates that hunting was of major importance. Large, side-notched dart points like those from Cascadia Cave are the earliest type found at Horse Pasture Cave. They are succeeded by smaller, stemmed and corner-notched arrowpoints, and finally by a series of very small Desert Side-notched points. The latter type is known to be very late in the Northern Great Basin, and extremely rare in the Willamette Valley (Figure 5.14). Many knives, scrapers, and flake tools complement the projectile point assemblage and give evidence of the butchering and hide processing characteristic of a hunting camp. There were very few ground stone tools, suggesting that plant food processing was of only minor importance there.

A few fragments of basketry and plant-fiber cordage were found in the dry upper levels of the cave (Figure 5.15). Blue and white glass beads, and tubular beads of rolled sheet copper, also came from the top of the deposits. These finds show that native use of the site continued into the time of 19th century alien incursions. One important suggestion to come from the distinctive Desert Side-notched points and historic trade goods was that, particularly in late prehistoric and early historic times, Horse Pasture Cave may have been a stopping place for travellers on the Klamath Trail, which led across the mountains and down the Willamette Valley to the Columbia.

Western Cascades Uplands

The research at Horse Pasture Cave opened up a new perspective on prehistoric use of the mountains. This work, and follow-up excavations at Vine Rockshelter, the Colt Site, and the Saddle Site in the same vicinity, documented four phases of cultural development in this part of the western Cascades. These phases generally parallel the Early/Middle/Late Archaic sequence known from the Willamette Valley, but suggest that early projectile point styles persisted much longer in the mountains than they did in the valley below. This research also made the very important point that hunter-gatherer subsistence in woodland areas critically depends on extremely restricted micro-environments:

> The Upper Middle Fork is characterized by a constricted valley floor, with bottom lands widening and closing in a series of semi-isolated prairies. Openings in the forest are common on ridge tops and hillsides. These prairies vary from large openings, such as High Prairie near Oakridge, Oregon, to moderate ones such as Rigdon Meadows [Rigdon's Horse Pasture], to very small glades. Today these prairies amount to about 5% of the timbered areas of the

Figure 5.14 Projectile points from Horse Pasture Cave. Top row, late prehistoric Desert Side notched points; middle row, Late period points typical of the Willamette Valley; bottom row, Middle period points typical of the Willamette Valley.

Western Cascades, yet their micro-environments support about 85% of the Western Cascades floral variation. This variety provides a rich habitat for game of all species. Between these oases lies a virtual desert of coniferous forest. Early explorers realized the barrenness of the forest. Wood's 1856 exploration of northern California moved from prairie to prairie, feeding on the flora and

Figure 5.15 Basketry fragments from Horse Pasture Cave.

> fauna present there, and fasting for weeks at a time as they passed through the forest between (Baxter 1986: 6).

Important predictable effects of this biotic situation are a low human population density for montane woodlands generally, and human settlements that were small and sparsely scattered. Pursuing especially the latter point, a study was made of archaeological site and artifact distributions in the Upper Middle Fork area, in relation to the habitats of plants and animals known to have been traditional staple foods. The resulting correlations suggested deep prehistoric roots for a mobile seasonal round like that of the Molala:

> According to the hypothesized seasonal round, in the spring multifamily Molala winter villages split into small family groups which scattered to harvest camas and other resources relatively common in the small prairies throughout the valley. As the summer passed, hazelnuts, acorns, and camas, as well as grass seeds, fern roots and other vegetables were harvested and processed for storage. Hunting, drying and storage of meat may have been even more important activities. These scattered low concentrations of resources were probably very stable, but able to support the subsistence and food storage needs of only fairly small groups.
>
> In the mid-to late summer the upland berry fields were exploited by small, short term task groups, whose harvesting and production of dried berries was probably more limited by human ability to transport the product than by its availability. It is likely that the uplands (>3500 feet), no more than two linear miles from the lowlands at any point on the main stem of the Upper Middle Fork, were not occupied for long periods, but were visited again and again by hunting and berrying expeditions. That is, it is not likely that summer base camps were located in that area. While the concentrated food supply available at the berry fields might have allowed larger groups to congregate, such groups would probably have quickly scared or hunted the game out of the immediate area. After all, berries were desired as sweeteners to make other foods more palatable but they did not serve to stave off starvation throughout the winter.
>
> In the fall, families remained dispersed as they gathered acorns from the scattered oak trees and burned and collected the grass seed fields. In the late fall and winter, however, they again gathered at the winter villages. The gathering deer and elk herds at that season may have made group hunting productive enough to support larger social units for a time before they resorted to their stored winter supplies (Baxter 1986: 163-164).

In related but independent research, Snyder (1987) developed a thoroughgoing quantitative study of site locations in a different part of the central Cascades. She convincingly showed that prehistoric land use in the montane zone focused strongly on the relatively small number of non-wooded openings that exist in upland forests. Her environmental data base was derived from U.S. Forest Service Soil Resource Inventory maps that establish land types based on vegetation, soils, drainage, and vegetation. The detailed nature of the environmental data is shown by the fact that 48 land types were present in the area studied. The archaeological data base came from Forest Service cultural resource survey reports, which documented search patterns and the locations of 189 archaeological sites in a transect across the Cascades between the towns of Eugene and Bend. Analysis of these two data bases allowed Snyder to determine both the types of environmental settings where archaeological sites *were* found, and the types of settings where they were *not* found. She demonstrated with statistical rigor that the edges of meadows, lakes, or other openings are dominantly the places where archaeological evidence of prehistoric human activity is concentrated. Wooded settings rarely yielded such evidence, even though their sparser ground cover generally afforded better possibilities for discovery than did the dense vegetation of moister settings.

Strong biological reasons for such a concentration of human activity loci were seen in the fact that non-forested openings within the woodlands support most of the species common to the Oregon Cascades flora. They offer not only the plants that people seek, but also the most abundant habitats for game, which people also seek. Woodland openings, particularly lakes, mires, and meadows, were also shown to be long-lived, making them stable and predictable resource locations for human groups. For example, two contemporary mires in the central Cascades have been shown to predate 7000 BP, by the occurrence in their sediments of volcanic ash from the Mount Mazama eruption. At Odell Lake and the nearby Wickiup Dam Site, projectile points and other artifacts have been found beneath this same volcanic ash horizon. At Cascadia Cave, as mentioned above, a ^{14}C date of 7910 BP was obtained for deposits containing projectile points and other tools, along with the bones of deer, elk, smaller mammals, and birds. Based on her analysis, and a systematic review of the growing archaeological data base for the Oregon Cascades generally, Snyder (1987) concluded that the ethnohistorically documented pattern of late spring/early fall occupation of the higher elevations by transhumant hunter-gatherers has probably existed since at least 7000 years ago.

A further contribution to archaeological knowledge of the montane zone is an account of 10 upland sites on the westernmost flanks of the central Oregon Cascades, brought together by Southard (1991). These reports document a series of small, sparse activity locations in upland settings that are not particularly remote from valley floor locations. Projectile points, cutting tools and flakes, occasional hammerstones, and a few fire-cracked rocks, suggest that these were most probably hunting stands, or spots where animals brought down in hunting were butchered or prepared for transport. It seems likely that continued research will document many more such sites, leading to a better understanding of the degree to which people of the Willamette Valley proper may have exploited the montane woodlands.

Continued work in the mountains will add to the picture just sketched. It remains to discover unequivocal evidence of the postulated winter village settlements of the western Cascades. These, if found, should be sites with substantial house remains and other indicators of sedentary occupation. Prospects for archaeological success here are surely limited by the fact that Euro-American towns and settlements have been built in many of the best places for such villages, but continued research may yet be fruitful.

Artistic and Symbolic Forms

Deeply grooved boulders have been reported along a road leading to the summit of Spirit Mountain, on the northwestern edge of the Willamette Valley. The grooves form parallel lines, and some are embellished by smaller appended lines. In one case a triangle is shown at the end of a straight line, suggesting a point on the end of a shaft. Engraved on boulders at Black Point, immediately below Willamette Falls at the northernmost end of the valley, are a series of circles, many with pits or crossed lines, or both, filling the circles (Loring and Loring 1982: 154, 157).

At Cascadia Cave, many petroglyphs are incised into the soft stone of the cave wall. Zigzag and wavy lines are most common, along with sets of short parallel lines and U-shaped motifs. A number of inverted U-shaped motifs with five or more short vertical lines at their open ends might be fancied as human "feet," though the likeness is certainly not exact. There are also a number of circles with pits at their centers.

The Hadleyville Boulder, southwest of Eugene, is a large stone about 5 by 10 feet across. Its surface is covered by perhaps 300 small shallow pits one to two inches in diameter, and several larger depressions three to four inches in diameter. On the Briley Ranch Site, in the same vicinity, is a boulder on which is engraved a large oval with branching lines inside. The figure is somewhat reminiscent of a veined leaf. Northeast of Eugene, the Petersen Ranch Site contains another pitted boulder.

Finally, two sites in the Western Cascades near Oakridge give evidence of painted figures that appear to depict horses with riders. One of these sites is Baby Rock Shelter. The archaeological debris known here is quite early, but the painted figures are clearly of historic vintage, unrelated to the earlier occupation.

All of these sites are reported by Loring and Loring (1982: 214-221). Evidence of rock art in the Willamette Valley region is still very limited, but the sites described suggest that others must surely await discovery. Little is known of native art forms in general for the Willamette Valley, indicating this field as one in need of considerable investigation.

Future Research

Current knowledge of Willamette Valley prehistory shows that major elements of the historically known lifeway extend at least 8000 years back in time. Continuity in artifact types, most notably the progression of projectile point styles, also indicates continuity of cultural tradition. Back beyond 8000 years ago, however, the archaeological record is all but blank. As noted at the beginning of this chapter, flooding of the Willamette River and its tributaries has, over millennia, buried earlier land surfaces beneath river silts and gravels. Whether earliest human life in the valley differed radically from that known back to 8000 BP is a question for future research. The geomorphological and remote sensing approaches applied in the Long Tom River study mentioned above (Friedel et al. 1989) must play a major role in efforts to more fully understand the earliest occupation.

The archaeological record for the mountains remains extremely scanty. Occupations as early as 8000 BP are also known there, but evidence comes from only a handful of sites. Despite important new research in the mountains (Baxter 1986; Snyder 1987; Southard 1991), the continuum of occupation over time, and the range of site types and activities there, are yet to be adequately documented.

In the beginning of this chapter, a question was raised about climatic change and its effect on the human population. This question is yet to be satisfactorily answered. Although it seems likely that postglacial climatic change did affect the lives of prehistoric Willamette Valley peoples, a much more detailed sequence of human occupation, with many more dated sites, must be established before it will be possible to discuss this topic with confidence. Fuller paleoenvironmental data are also essential to fill out the details of of current paleoclimatic frameworks.

It has long been thought that the native economy of the Willamette Valley was largely denied the salmon harvest, so important to other peoples of the Northwest, because fish could not ascend the falls of the Willamette at Oregon City in significant numbers (Kroeber 1939; Cheatham 1988). The presumption that this was always the case has been cogently challenged, however. It may be that at some periods, under different environmental conditions, salmon were a good deal more important to people of the upper valley than they were historically. For example, a moister climatic regime might have fostered higher waters, that would allow fish to pass the falls in greater numbers. Future archaeological research at suitable sites, carried out with due attention to possible evidence of fishing, may open up a new perspective on this matter (McKinney 1984).

As all the above comments suggest, an important focus for continuing research is the domain of settlement pattern studies. Ethnohistorical records have provided little detail about the kinds of groups people formed, and the nature of their camps and villages. While the native Willamette Valley settlement cycle is understood in a very general way, archaeological evidence is beginning to show that there was considerable variation in patterns of settlement and adaptation in different parts of the region (Connolly 1983; Baxter 1986; Snyder 1987; Cheatham 1988). Continued investigation along these lines will further enrich our understanding of the relations between natural landscape and biota on the one hand, and patterns of human subsistence and settlement on the other.

Finally, much is yet to be learned about artistic and symbolic forms, and about patterns of trade in the Willamette Valley. The study of rock art is not well advanced, though an important beginning has been made (Loring and Loring 1982). Similarly, research into the sources and transport of obsidian toolstone in the region is just beginning (Skinner 1991). Both areas of study have the potential to reveal yet-unexplored relationships among the prehistoric societies of the region .

Chapter 6

Southwestern Mountains

The natives of interior southwestern Oregon were a mountain people, relatively few in number and isolated by the ruggedness of their country into many scattered bands (Figure 6.1). The Shasta, a Hokan-speaking group, extended from the middle Rogue River southward to the Klamath River in California. Speakers of Penutian languages included the Lowland Takelma of the upper Illinois and middle Rogue River valleys, the Upland Takelma of the upper Rogue, and the Cow Creek Umpqua and Yoncalla of the Umpqua Basin. Speakers of Athabaskan languages occupied the western Klamath Mountains, their range extending in from the coast to include the Upper Umpqua and Upper Coquille valleys as well. Islands of Athabaskan-speakers also lived in the Medford-Grants Pass area, surrounded by speakers of Penutian languages. Athabaskan groups included, from north to south, the Upper Umpqua, Upper Coquille, Kwatami, Tututni, Shasta Costa, Chetco, Tolowa, Galice, and Applegate bands. The lifeways of these diverse peoples shared a great deal in common. They also displayed definite Californian affinities, no doubt a reflection of both geographical proximity and environmental similarity.

Key to Sites

1 – Standley Site
2 – North Umpqua Narrows, Limpy Rock Shelter
3 – South Umpqua Falls, Times Square Rockshelter, Hughes 1 Rockshelter
4 – Marial, Tlegetlinten, Blossom Bar
5 – Applegate River
6 – Ritsch, Marthaller
7 – Gold Hill, Saltsgaver
8 – Far Hills Ranch
9 – Elk Creek
10 – Salt Creek
11 – Border Village

Figure 6.1 Map showing site locations the Southwestern Mountains region of Oregon.

The diverse languages spoken in the Southwestern Mountains show that the native peoples, despite their prominent cultural similarities, have very distinct ancestries. The Shasta speak a Hokan language, descended from an ancient Californian speech community that goes back perhaps 7000 to 10,000 years. The Takelma, Cow Creek Umpqua, and Yoncalla, whose clearly related languages all belong to the Penutian phylum, are the linguistic descendants of a speech community that became widespread in Oregon 5000 or more years ago. A much later migration was that of the Athabaskans, who speak closely related languages of the Na-Dene phylum, with their main linguistic relatives centered a thousand miles away in western Canada and Alaska. The Athabaskans probably entered the region between about 1500 and 1000 years ago (Shipley 1978; Moratto 1984: 530-574).

Ethnographic Life Way

Firsthand information on the traditional lifeways of the Southwestern Mountains is quite scanty. Yet it is invaluable, both in its own right and as a guide to interpreting the archaeological record of prehistoric times. Three recent syntheses bring together the available data from early ethnohistoric (LaLande 1990) and later ethnographic (Gray 1987) as well as archaeological (Hannon and Olmo 1990) sources. These volumes are highly recommended as indispensable to a fuller understanding of the region's native cultures.

Broadly, the people of the Southwestern Mountains were all hunter-fisher-gatherers who made their living from a wide variety of natural resources to be found in the narrow canyons and small interior valleys they occupied. They stayed in small settlements of a few houses each, and these central settlements, occupied for the greater part of the year, served as home bases from which people ranged out over considerable distances to exploit the surrounding environment.

The main villages were generally located on alluvial terraces of the major streams. A surviving illustration of an Umpqua house of the 1850s shows a large, substantial plank structure with gabled roof, apparently semisubterranean, very much like the plank houses known up and down the Northwest Coast and along the Lower Columbia. Takelma and Shasta houses were of similar construction, some with plank covering and others, of poorer folk, sheathed with slabs of bark.

Major sources of food were salmon, trout, suckers, crayfish, and freshwater mussels from the streams; deer, elk, bear, squirrels, rabbits, acorns, pine nuts, berries, and other items from the savannahs and forests; and camas bulbs, sunflower seeds, and tarweed seeds from the grasslands. These of course are but a few prominent examples among the many species that were depended upon. Winter villages were all but abandoned in early spring, as people scattered widely into small hunting-gathering camps. Camas roots were dug in early spring and summer, baked in earth ovens, and stored against the coming winter. Acorns were gathered in early fall as another winter staple. For eating they were pulverized in a hopper mortar, and the meal leached in water to remove its bitterness. It could then be boiled as a gruel, or baked in leaf-wrapped cakes.

The salmon harvest was a major event in summer and early fall, when fish abounded in the rivers leading up from the Pacific. Fish weirs built across streams constricted the passage of salmon, guiding them through a narrow gateway where they might be netted or speared. Basketry traps were also used in conjunction with these weirs. Fish were elsewhere taken with hook and line.

With winter approaching, people regrouped in their permanent villages. They occupied the cold season with such food-getting efforts as were profitable, and with domestic chores. Hunting, and fishing for riverine species, went on all year, but were perhaps most important in fall and winter. They were about the only economic pursuits left after the plant-gathering and salmon seasons had ended. Deer were stalked by hunters disguised with deer heads and skins, or driven by men with dogs, or caught in deep winter snow. Some groups took deer and elk in deep pit traps dug in game trails. These pits contained upright sharpened stakes, to impale and dispatch the unlucky creatures falling onto them. Deer and elk were also taken with rope snares, hung over game trails in appropriate spots.

Villages were made up of closely related families, and sociopolitical organization was simple. Each village was an autonomous unit bound to no larger polity, but certain purposeful and short-lived alliance arrangements did exist. Each settlement was led by one or more respected elders, who enjoyed a social standing and level of influence above that of ordinary folk. A sense of territoriality was strongly felt by some groups, especially the Athabaskan-speakers, and skirmishes were sometimes fought over trespasses. Despite these attitudes, there were nevertheless occasions when larger groups came together for ceremonial events and at especially productive fishing or gathering localities. Further, since it was the rule for people to seek mates outside the community they were born in, families were linked to others in all directions by ties of kinship and marriage.

The degree to which people maintained definite intergroup boundaries seems to have varied according to circumstances. Societies maintained home settlements, but localities where different groups converged to hunt, gather, or fish at certain seasons are also well documented. It is probably accurate to conclude that each group had both a heartland where it was the dominant presence, and a hinterland that it shared in common with neighboring peoples. Such patterns are commonplace among hunting-gathering people generally, especially when population densities are relatively low.

Many elements of the traditional lifeway can be seen archaeologically. Earlier cultures were not, however, identical with those known from historic times. For example, the linguistic evidence just discussed clearly shows that the Southwestern Mountains received migrations of people over a long period, and cultural changes must have accompanied those migrations. There was also climatic change and adaptation to it, and there was no doubt population growth, and social adjustments stemming from it. The ethnographic lifeway thus provides a model for interpretive analysis, but much is left to be learned from the archaeological data.

Landscape and Natural Resources

Interior southwestern Oregon includes a variety of terrains and distinctive environmental types. The Klamath Mountains, reaching westward to the Pacific coast and southward into California, are formed of geologically ancient and contorted precambrian rocks. On the north they adjoin the Coast Range, and on the east they face the western Cascades. The region includes a few small areas of relatively low lying, open country, along the north and south forks of the Umpqua River near Roseburg, and the Upper Rogue and Illinois rivers in the vicinity of Grants Pass and Medford. Elsewhere, steep mountains, sharp ridges, and deep, narrow canyons are characteristic.

The Coast Range and the seaward side of the Klamath Mountains are generally covered by western hemlock and Douglas-fir forest. Additionally, sitka spruce grows in the coastal fog belt, western red cedar is common in moist settings, and ponderosa and sugar pine occur on drier sites. In the Cascades, the higher elevations are covered with forests of Pacific silver fir, Shasta red fir, and grand fir. These montane evergreen forests ring a compact interior zone of mixed coniferous and broadleaf forest that covers the intermediate and lower elevations. This forest, with intermingled stands of Douglas-fir, broadleaf evergreen tan oak, and madrone, is similar to the dry, open Californian woodlands farther south.

At the center of this zone, in the interior valleys around Roseburg, Medford, and Grants Pass, there occurs yet another kind of vegetational mosaic. This assemblage, adapted to the hot, dry summers of the area, includes varying mixtures of Douglas-fir, ponderosa pine, Oregon white oak, California black oak, and manzanita. Again the greatest similarity is with Californian rather than Oregonian vegetation patterns (Franklin and Dyrness 1973).

The mammalian fauna of southwestern Oregon includes black bear, Roosevelt elk, mule deer, rabbits, squirrels, and many smaller rodents, to name only a few of the species known historically to have been important in the traditional diet. Characteristic birds included grouse, woodpecker, band-tailed pigeon, and a host of small passerine species. Salmon and steelhead ran in the Umpqua, Coquille, Rogue, Illinois, and Klamath rivers in considerable numbers, though not of course in the abundance known from the Columbia River. Trout were year-round residents in these rivers as well, and in many smaller streams of the region.

Time and Environmental Change

Temperature and moisture set the conditions of existence for each kind of plant, and the fact that southwestern Oregon is a transitional zone between moist coast and dry interior, warm south and cool north, is reflected in a broad range of species. Salal, rhododendron, and evergreen huckleberry are primarily coastal species that are found in the southwestern Oregon interior as well. Sagebrush, antelope bitter brush, mountain mahogany, western juniper, and other species are plants common to the Great Basin that have found a foothold in southwestern Oregon. Plants of northern affinities are subalpine fir and Engelmann spruce, and plants of southern habitats include digger pine, buckbrush, manzanita, and three-leaf sumac. This present-day flora offers clues to the climatic history of the region, and makes it clear that the same postglacial fluctuations in warmth and moisture as were mentioned in previous chapters affected southwestern Oregon as well (Todt 1990).

The summer-dry Californian climate of southwestern Oregon was established in pre-human times. Drought-adapted species moved up from the south during warm intervals. Cooler and drier intervals allowed northern and Great Basin species to extend into the area. With postglacial warming, those species adapted to warmer and drier conditions were able to expand, giving prominence to the oak, manzanita, and buckbrush that characterize the valleys of southwestern Oregon today. At higher elevations, and in places with distinct microclimates, coastal, northern, and Great Basin species persisted. This climatic and vegetational history has made the region today a mosaic of great biotic diversity, with one of the most varied floras in North America (Todt 1990: 71).

During the mid-postglacial period of increased warmth and dryness, about 7000 to 4500 years ago, oak savannah probably dominated the lower and middle elevations of the mountains, while grassland and brushy chaparral species occupied the valley floors and lower foothills. Coniferous species were forced upward to higher, cooler elevations. The last 4500 years have brought somewhat cooler, moister conditions, and some re-expansion of coniferous woodlands at the expense of oak and chaparral (Detling 1968).

Systematic research which might reveal effects of environmental change on the native lifeway is just beginning in southwestern Oregon. It has been speculated that, because grasslands with oak savannah along streams are rich in edible grass seeds and acorns, the mid-postglacial expansion of this vegetation may have greatly benefited the prehistoric people. It has been further speculated that southwestern Oregon natives may purposefully have set fires, as did historic people in the Willamette Valley and central California, to foster rapid regrowth of grasses or keep meadows from being taken over by brush (Lewis 1973, 1990). Systematic paleoenvironmental research, carried out with reference to questions of human adaptation, is greatly needed in the Southwestern Mountains region.

Cultural Chronology and Time Markers

The earliest period of human occupation in the Southwestern Mountains, as elsewhere in Oregon, is attested by Clovis fluted points. One has been reported from the Umpqua river area near Roseburg (Hanes 1978a). Another was found in the vicinity of upper Butte Creek, a tributary of the Rogue River (Dyck 1982; LaLande and Fagan 1982), and another near the California border (Deich 1977). Four cultural phases succeed the pioneer Clovis occupation, the first three spanning the time when the atlatl and dart were in use, and the last the time when the bow and arrow were introduced (Pettigrew and Lebow 1987; Nilsson and Kelly 1991).

The Applegate Phase, 10,500-8500 years ago, is recognized by large broad-stemmed points reminiscent of the early Windust type from the Plateau, and broad-based, short pentagonal points of locally distinctive form. This phase is defined on the basis of very limited evidence, and needs further research to clarify the diagnostic types and establish its age by ^{14}C dating.

The Marial Phase, 8500-4500 years ago, is marked most prominently by willow-leaf bipoints. These are quite large in early times, but become progressively smaller throughout the phase. In the Plateau they are called Cascade points. Broad-necked points with stems that broaden toward the base are also characteristic, as are large side-notched, straight-based points. These too have analogues in the Plateau, the first in the Rabbit Island stemmed type, the second in the Northern Side-notched type.

The Coquille Phase, 4500-2200 years ago, is marked by roughly diamond-shaped points that are short and broad, with barbs and a broad tapering stem. These locally distinctive points have been given the name Coquille Series Broad-necked. Also characteristic are medium and small willow-leaf points. This phase is not yet well-defined and dated, and it may begin and persist somewhat later than specified here.

The Rogue Phase, 2200-150 years ago, marks the arrival of the bow and arrow with a range of small, narrow-necked points. The beginning date of this phase is somewhat problematical, and should perhaps be a few hundred years later. The early end of the phase is indicated by Coquille Series Narrow-necked points, small willow-leaf points, and small triangular stemmed points given the name Elk Creek Square barbed; these latter are reminiscent of the Pin Stem points of the Columbia River, and the Rosegate type of the Great Basin. The later part of the phase is dominated by highly distinctive Gunther Island (or Rogue River) points. These are delicately made corner-notched and base-notched specimens which often have long, drooping asymmetrical barbs. Also present at this time are small concave-base triangular and side-notched points, the latter reminiscent of the Desert Side-notched type of the Great Basin.

Applegate River Sites

Archaeological studies along the Applegate River, just north of the Oregon-California border, established the outlines of a cultural sequence that may reach back 8000 to 10,000 years (Brauner 1983). At Site JA53a, on a high terrace overlooking the river, excavation of two broad 30-foot square areas recovered over 80 large spearpoints of apparently early type (Figure 6.2). The specimens have triangular blades and broad stems, and are highly similar to the Windust type ^{14}C-dated in the Plateau region to the period 10,000-8000 years ago. Edge-faceted cobbles believed to be hide-working tools, flaked stone scrapers, and cutting tools also occurred. Some peculiar circular discs, an inch or so across and flaked entirely around their edges, are enigmatic. Traces of crushed and decomposed bone were found in association with the artifacts, and it seems apparent that the site was a hunting and butchering station. No structural remains were identified, but the distribution of natural stones across the archaeologically exposed area suggested that the site occupants may have deliberately cleared work spaces by shifting and piling the rocks which littered the area.

Site JA53b, on the next lowest terrace of the river, yielded a number of serrated lanceolate points comparable to the Cascade type of the Plateau. Site JA52, ^{14}C-dated between 8000 and 4000 BP, produced similar specimens. Stone bowl mortars and shaped pestles were associated with these points, as were hopper mortar bases and mano and milling slab fragments. The grinding tools suggest that processing of plant foods such as camas roots, acorns, and grass seeds was carried out in the locality. Hunting persisted also, as indicated by the projectile points (Figure 6.3).

The Sinn's Bar Site, located in the valley bottom, represents the later end of the Applegate sequence. The basal levels of the site extended to a depth of 10 feet. They produced large serrated lanceolate points like those found on the higher river terrace, and large, relatively crude side-notched points as well. In upper levels, leaf-shaped points of the Gold Hill type occurred, along with a variety of small, notched points (Figure 6.4). Pithouse remains were encountered in the upper levels of the site, but details of their structure remain unknown. A single point of the late prehistoric Gunther Barbed type was found, in a contact period pithouse that culminated the site sequence. Other characteristic tools of the region included flaked stone knives, drills, and scrapers (Figures 6.5, 6.6).

Marial Site

The Marial Site, on the interior Rogue River about 50 miles inland from the Pacific coast, has produced a sequence of human occupation that spans most of postglacial time (Griffin 1983; Ross 1987; Schreindorfer 1985). Situated where a tributary stream joins the main river, on a terrace that overlooks quiet water between major rapids above and below, the site commands a good salmon and steelhead fishing locality. Additional food species close at hand include freshwater mussels, otter, and beaver in the river; oaks, pines, and manzanita on the flanking hills; and deer, elk, bear, raccoon, rabbit, and squirrel in the woods. The richness of its surrounding biota suggests that Marial would be a highly desirable residential location. Although limited test excavations have not revealed

Figure 6.2 Early projectile points from Site JA53, Rogue-Applegate area.

any housepits at the site, the work has been too limited to rule out their presence.

Stratigraphic excavations at Marial sounded a deposit of river silt and loam nearly 15 feet deep from surface to underlying gravels. Flaked stone artifacts, fire-cracked rocks, and bone fragments were found throughout. Seven cultural components have been recognized. Six of these occurred in one layer-cake sequence, with cultural zones separated from one

Figure 6.3 Projectile points of the Middle period from the Rogue-Applegate Area.

another by sandy river deposits containing few artifacts. The latest occupation was found in a different part of the site, on the terrace edge near the river.

The lowermost occupation, in Cultural Zone 6, has a radiocarbon date of 8560 BP. From lower Cultural Zone 3 came a ^{14}C date of 6845 BP; slightly higher in Zone 3, a date of 5850 BP was obtained on charcoal found near a tight cluster of fire-cracked river cobbles. Higher still, a date of 4060 BP

Figure 6.4 Projectile points of the Late period from the Rogue-Applegate area. Top two rows, historic period; bottom row, protohistoric.

came from Zone 2, and a date of 2810 BP from Zone 1. The latest component, found in a separate location, yielded a ^{14}C date of 710 BP (Figure 6.7).

Over 4000 pieces of bone, most of them finely fragmented and thus not identifiable to species, were recovered from the Marial excavations. Three identifiable salmon vertebrae came from levels at 48 inches, 24-25 inches, and 12-16 inches. A cougar bone was found at a depth of 55 inches.

Figure 6.5 Stone tools from the Rogue-Applegate area. Left row, protohistoric.

Figure 6.6 Grooved stone object from site JA52, Rogue-Applegate area.

Carbonized fragments of hazelnut hulls were found at depths of 13 feet, 10 feet, and 3 feet. All these items appeared in levels dated between 5850 and 2810 BP. Many fragments of deer-sized bone were found throughout the deposits. The excavators suggest that the relative abundance of pulverized bone may give evidence that the practice of crushing and boiling bones for soup, known ethnographically from many Native American groups, was practiced at Marial from early times.

Hunting practices are indicated by a series of projectile points. Earliest were relatively large atlatl dart heads. These first appeared in the lowest levels of the site, dated before 8560 BP. They were succeeded shortly before 2810 BP by smaller, lighter arrowheads, which continued to the end of the occupation (Figure 6.7). Choppers, flakes, and scrapers that were probably used to break up bones, slice through meat and ligaments, and clean hides, continued throughout the sequence. Stone pestles shaped by grinding, along with fragments of milling stones, give evidence of plant food processing. The historic Takelma people of the Rogue River used such pestles in the shelling and processing of hazelnuts and acorns, among other things.

The making of stone tools is indicated throughout the cultural sequence by pockets where hundreds of small waste flakes occurred. In several cases these were found along with battered hammerstones that were no doubt used to break up nodules of raw lithic material. Basalt and chert occur naturally among the cobbles of the adjacent riverbed, and in the site itself were found both worked and unworked nodules of these common toolstones. Flakes retaining traces of the rough cortex of stream-rolled cobbles were commonplace as well.

Obsidian, like basalt and chert, was used for tool-making throughout the period of occupation, but it was much scarcer. The nearest obsidian outcrops are more than 100 miles to the east, and all of this toolstone reaching Marial had to be imported. Its presence there, even before 8560 BP, attests the antiquity of far-flung exchange relationships—or long-distance travel—within the region as a whole. Obsidian quite clearly arrived in the form of finished or at least roughly finished artifacts. The excavations did not yield any flakes that retained traces of the weathered cortex of raw obsidian nodules. Manifestly, obsidian was very precious so far from its geological sources. Artifacts made of it were resharpened and reworked when dulled or broken to a much greater extent than were artifacts made of other kinds of stone. This is shown by the disproportionate abundance of tiny flakes of obsidian at the site, as compared to fewer equally small flakes of chert or basalt.

Tlegetlinten and Blossom Bar

Two additional sites that together span much the same time range as Marial are Tlegetlinten and Blossom Bar. Tlegetlinten is located at the juncture where the Illinois River flows into the Rogue, about 30 miles inland from the Pacific coast. In early historic times Tlegetlinten was occupied by the Shasta Costa band of Athabaskans. The probable site of

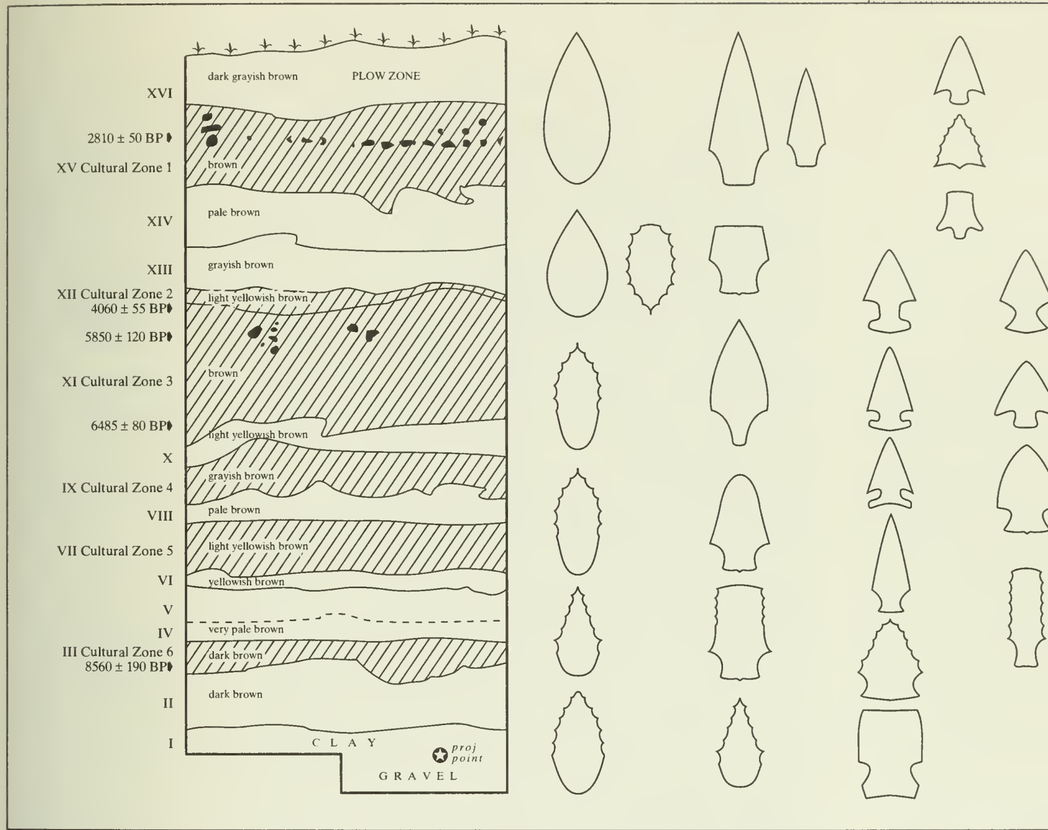


Figure 6.7 Idealized stratigraphic sequence at Marial, showing depositional layers, occupation zones, radiocarbon dates, and point type distributions. Based on Ross (1987: Figures 4-7).

this recent occupation, archaeologically recorded in 1935, was eroded away by a major flood in 1964. Subsequent excavations on a terrace higher above the river produced large and small lanceolate projectile points comparable to those from Marial, suggesting that this earlier part of the Tlegetlinten site probably dated between about 7000 and 3000 BP.

The occupation at Blossom Bar, on the Rogue River between Tlegetlinten and Marial, was marked by small, basally-notched arrowpoints of Gunther Barbed type. These are comparable to those dated about 710 BP at Marial. Other sites, not yet investigated, are also known from this stretch of the Rogue River. There is little doubt that the area was a significant theater of human occupation throughout prehistoric times (Griffin and Schreindorfer 1984).

Gold Hill

The Applegate and Marial sequences lead up to what was for long the only archaeologically reported culture of interior southwestern Oregon, that of Gold Hill. This first major prehistoric find in the region was made at a very rich site on a shoreline terrace of the Rogue River, opposite the small town of Gold Hill. The discovery was made by a landowner in the process of levelling a knoll in a cultivated field. The levelling proceeded by first plowing deeply to break up the soil, and then dragging the loosened earth to an adjacent low area using a horse-drawn scraper. When the knoll had been reduced by some three feet in this way, the plow began to bring up human remains and artifacts in remarkable quantity. Dr. L. S. Cressman, of the University of Oregon, was called in; he subsequently directed salvage operations at the site in 1930, 1931, and 1932. As before, earth was initially removed by plowing and scraping, but the work shifted to hand troweling and screening when signs of occupation were discovered (Cressman 1933a, 1933b).

The area investigated in this way measured about 120 feet across, and the maximum depth reached by excavation was seven feet. Some 39 human burials were uncovered, mostly in the southern part of the mound. Approximately 30 areas of concentrated occupation were recorded, mostly in the northern part of the mound. The human remains had all been placed in a flexed position, in small pits. The areas of concentrated occupation were roughly circular or ovate in plan, and varied from four feet to 15-20 feet across. They consisted of fire hearths and associated fire-cracked stones, ash, charcoal, artifacts, and bone and antler fragments. No house floors or house pits were identified, but given the plow-and-scraper method of excavation, it would be surprising if any such features were preserved. Indeed, given the abundance and variety of artifacts and human remains from the site, it seems quite clear that it must have been an important residential location. The predominant occurrence of occupational debris at the north end of the site, and burials at the south end, also suggests a village/cemetery situation.

No clear-cut soil stratification was documented, but the excavator reported his definite impression that cultural remains were roughly concentrated into three levels or zones, each two to three feet in thickness. This depth of deposit implies that the site was occupied over a considerable period of time, an impression borne out by the typology of the recovered projectile points (Figure 6.8). Many medium-sized points of willow-leaf shape, since dubbed Gold Hill points, are very similar to specimens ^{14}C-dated at Marial between about 4500 and 2200 BP.

At the other end of the time scale, many small, very finely made arrowpoints of the Gunther Barbed type were found. These, as noted above, are ^{14}C-dated within the last 1000 years on the lower Klamath River. The complete absence of Euro-American goods at Gold Hill implies that the site was abandoned before historic contact. Thus a reasonable estimate would place the main occupation between about 3000 BP and late prehistoric times, though there is some possibility that it may have begun earlier. The absence of medium-sized corner-notched and side-notched points, which seem in the Applegate chronology to represent a period intermediate between the time of the Gold Hill point and Gunther types, suggests that there may have been a significant hiatus between earlier and later periods of occupation at Gold Hill. Perhaps the divisions sensed in the stratification of the site are related to breaks in the occupational sequence.

The projectile points already mentioned would seem to represent the hunting component of the local economy. A number of ground stone pestles, bowl mortars, and hopper mortar bases represent the processing of vegetal foods, such as camas roots and acorns (Figure 6.9). Some of the pestles were very finely made, carved with raised bosses on either side of the handgrip area. Moore (1973), a long-time local resident and collector, reports a large number of "heavy, slightly concave metates" from the site that actually may have been hopper mortar bases rather than grinding slabs, as the term "metate" implies. This is not certain; however, he also illustrates (Moore 1973; Figure 169) several flat, smooth hand-sized stones, and two highly distinctive two-horned mullers of the well-known Klamath type, which correspond to the manos or hand stones commonly used to crush seeds on the metate (the occurrence of these highly diagnostic horned mullers so far from historic Klamath territory is striking).

Manufacturing tools reported from the site are limited, but included numerous flaked stone scrapers and pounding/rubbing stones, as well as many well-made flaked stone drills. It is likely that other tools of more casual form existed, such as gravers and choppers, but were not differentiated from the stone detritus of the excavations.

The most impressive finds made at the site were the human burials and their contents. As noted earlier, 39 pit graves were recorded from Gold Hill. A disastrous flood on the Rogue River, which devastated the site in 1964, revealed more that were previously unknown—very fleetingly, as the deposits were calved off and carried down the river. A number of the buried individuals were accompanied by exquisitely shaped obsidian blades, 8 to 12 inches long, evenly flaked over both surfaces, and slightly

Figure 6.8 Projectile points from the Gold Hill Site. Top two rows, Late period; bottom row, Early period.

constricted at the midpoint as if for a handgrip (Figure 6.10). In total some 22 such blades have been reported from Gold Hill, and it is likely that others were recovered by collectors, who published no record of their plunder. The blades occurred singly or in pairs in most of the graves which possessed them, but one interment held five obsidian blades and one comparable specimen made of slate. Another grave held a quantity of beads made from the seed of the digger pine, several hundred beads of the marine *Olivella* shell, and several pieces of *Glycymeris* and abalone

Figure 6.9 Stone bowl or mortar from the Gold Hill Site.

shell. Yet another yielded seven tubular smoking pipes of serpentine or greenstone schist, finely shaped and smoothed, and varying between four and eight inches in length (Figures 6.11, 6.12).

The large obsidian blades are of a type traditionally used by Hupa, Karuk, Wiyot, and Yurok people of northern California in the White Deerskin Dance. The use of such blades by the people of Gold Hill suggests that ancient Oregon groups belonged to the same far-reaching intertribal

Figure 6.10 Obsidian blades from the Gold Hill Site (courtesy of Richard Hughes).

ceremonial network. The White Deerskin Dance was an important ritual in which highly valued family treasures and heirlooms were displayed, among them very large obsidian blades. In addition to being important ceremonies that expressed the elevated social status of community leaders, these dances brought together partners from different communities, even different tribes. They functioned as major occasions for trade and social interaction over a broad area. Still practiced in historic times, the White Deerskin Dance clearly has prehistoric roots. This was

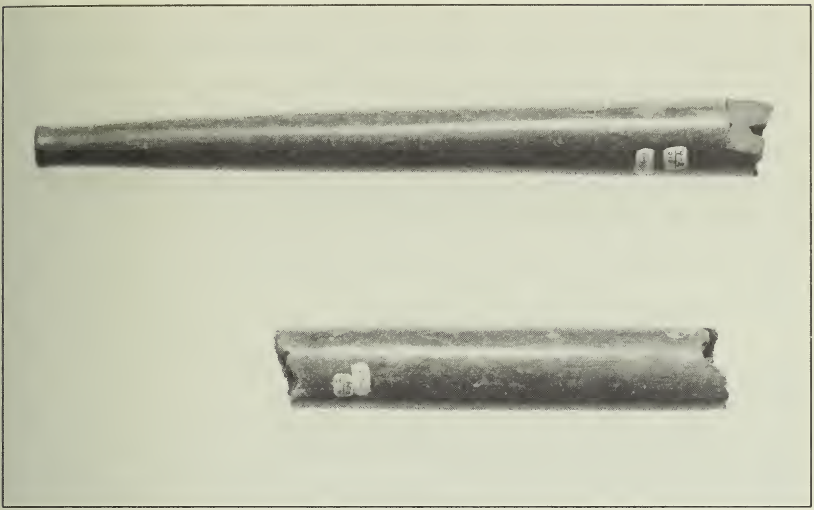


Figure 6.11 Tubular steatite pipes from the Gold Hill Site.

Figure 6.12 Bone whistle or hair ornament (?) from the Gold Hill Site.

first shown by the finding of large obsidian dance blades in archaeological context at Gunther Island, near Eureka on the northern California coast (Loud 1918, Hughes 1978), and subsequently by the Gold Hill artifacts. The beautifully made stone smoking pipes from Gold Hill also have their greatest similarities among northern California specimens. These two classes of objects, along with the distinctive Gunther Barbed projectile points mentioned previously, strongly indicate the northern California cultural connections of the Gold Hill inhabitants.

Geochemical analysis of the large obsidian blades from Gold Hill has matched their trace element composition to that of distant obsidian flows east of the Cascades (Hughes 1990). Six different sources are represented, the farthest away being Glass Butte in east-central Oregon, some 175 miles from Gold Hill. These facts show that the people of Gold Hill maintained significant relationships in another direction as well, into the territories of Klamath and Northern Great Basin groups. Not only the large size and exquisite workmanship of the obsidian blades made them precious, but also the far places from which they came, and the social ties and travel that obtaining them required.

Saltsgaver Site

Further insights into the local lifeway are afforded by sites much closer at hand. Quite near Gold Hill, in the same little section of the Rogue River valley, is the Saltsgaver Site. Here over 100 roasting pits or earth ovens were exposed by the tilling of a field (Prouty 1989). Fires made in the pits had baked the surrounding earth red and brick-hard, rendering the pit rims clearly visible when agricultural work disturbed the surface soil. Excavation of several pits revealed charcoal and fire-cracked rocks. From one pit, 14C-dated at 5300 BP, charred nut shells were recovered. Though the identification is not certain, they were probably acorn hulls. A charred specimen from another pit is probably a camas bulb. Oak trees and camas lilies are now abundant in the general area of the site, and may have been more common before the area was converted to farmland. Earth ovens of this sort were used down into historic times by native people to bake camas and other bulbs for winter storage. The Saltsgaver Site seems to parallel Gold Hill closely in age, as shown by the occurrence there of the same early willow-leaf and later Gunther Island projectile point types as found at Gold Hill. The many earth ovens at Saltsgaver give evidence of a major emphasis on plant food processing by native people who were surely the neighbors, if not themselves at least sometime occupants, of the Gold Hill settlement.

Ritsch and Marthaller Sites

A few miles downstream from Gold Hill are the Ritsch and Marthaller sites. These are neighboring and undoubtedly related occupations on either side of Applegate Creek at the point where it joins the Rogue River (Wilson 1979; Steele n.d.). Willow-leaf points and many contracting-stem, small side-notched, and Gunther Island points suggest that Marthaller may have overlapped to some degree with the early occupation at Gold Hill, and to a great degree with its later phase. Human burials and a dense occupational zone suggest the pattern of a stable village with associated cemetery. The Ritsch Site was dominated by small concave base and Gunther Island points, and apparently lacked a significant earlier component. Two house floors show this to have been a residential site, but no cemetery was discovered. Conceivably the neighboring Ritsch and Marthaller communities shared a single burial ground. Radiocarbon dates from the Ritsch Site of 1470, 1400, 1150, and 460 BP place it firmly in late prehistoric time.

Far Hills Ranch

A few miles upstream from Gold Hill, close to where Elk Creek joins the Rogue River, is the Far Hills Ranch Site. Like Gold Hill and Marthaller, this site seems to have been a stable village with a cemetery associated (Davis 1983). Far Hills Ranch has been archaeologically studied only to a very limited extent, but reportedly over 90 human burials were removed from it before World War II, and reinterred at the nearby town of Trail. Restricted excavations here identified a probable residential component. The projectile point assemblage included a high proportion of early willow-leaf forms and a few late Gunther Island specimens. This is an assemblage quite similar to that from Gold Hill, suggesting that Far Hills Ranch was occupied over a similar timespan.

Elk Creek Sites

The sites known along the main stem of the interior Rogue River seem to exemplify a pattern of stable settlements that were occupied over generations, long enough for substantial cemeteries to develop in association with them. Similar but rather less intensive occupations may have been characteristic of the tributary valleys. This is suggested by the evidence from Elk Creek, where a major research project has provided a rich and systematically gathered database that describes the environmental setting and resources as well as the artifactual remains.

Elk Creek is a short upper Rogue River tributary that heads in the Cascades west of Crater Lake. Low water often limits the late summer and fall salmon runs in Elk Creek, but spawners are there from September to February, and steelhead peak there between December and May. People could have obtained exhausted, spawned-out fish from the shallow stream even without special equipment, simply by flipping them onto the bank with their hands. Elk Creek receives snowfall, but it normally melts off quickly, and the valley is a favored winter refuge for elk and deer. In modern times, hard snowy winters have only increased the concentration of deer along Elk Creek, as stragglers were driven more completely from the high, cold mountains to the east. During spring, summer, and fall, small animals and plants for food and artifact making could be taken from a series of local environments on easy day trips. Environmental zones extended from thickets of alder, ash and cottonwood along the stream course, upward through buckbrush and mountain mahogany scrub into forests of oak, madrone, and Ponderosa pine. Especially important were the oak groves of intermediate elevation, where great quantities of acorns offered a readily storable winter staple. Higher yet grew Douglas-fir, hemlock, white pine, and sugar pine. On more distant peaks above 5000 feet, where snow lingered until July, were forests of red fir and white fir with delicious gooseberries, huckleberries, elderberries, and currants growing in the understory. One such place was Huckleberry Mountain, about 10 miles away (Budy and Elston 1986; Lyman 1987; Pettigrew and Lebow 1987).

Some three dozen archaeological sites were found by systematic survey along a seven-mile reach of Elk Creek. At several, only sparse flakes of worked stone appeared on the surface. At others flaked stone was more abundant, and a few also showed depressions in the ground, thought to be old housepits. Six sites were excavated to a significant extent, revealing an archaeological record in Elk Creek Valley that began as early as 5000 years ago and became quite rich within the last 1000 years. The absence of earlier archaeological sites probably does not indicate an absence of earlier occupation in the area, but rather the destruction or deep burial of any earlier record by geological forces. A radiocarbon date of 7400 BP on gravel deposits more than a meter below the modern surface shows that the present Elk Creek valley bottom was still forming then. The absence in valley floor deposits of any volcanic ash from the eruption of nearby Mount Mazama (Crater Lake) about 7000 BP suggests continued major stream erosion after that date. The finding along Elk Creek of artifact types dated from about 5000 BP onward may reflect stabilization of the modern surface around that time (Brauner and Lebow 1983; Budy and Elston 1986; McDowell and Benjamin 1987; Pettigrew and Lebow 1987).

At site JA100 four housepits were excavated, one of which had a second occupation floor superimposed over the first. One housepit was roughly rectangular, measuring about 11 by 19 feet across and a foot deep. The others were roughly circular, about 14 feet across and one or two feet deep. Typically they had the remains of wall posts around their edges, central fireplaces, and small pits dug into the floor, probably for storage; one structure had six such pits. Splotches of red, baked earth on the floors, along with charcoal and scattered patches of charred bark, suggested a probable end to pole-and-bark superstructures by fire. One structure had been used after its abandonment for a cremation burial, as indicated by a fragmentary human skeleton found within a dense concentration of charcoal. Outside, between two of the houses, partial excavation revealed a pit about two feet deep and three feet in diameter. This pit contained numerous fire-cracked rocks, and near it were recovered 27 acorns of the Oregon white oak. Thirteen radiocarbon dates on debris from the JA100 houses indicate several episodes of intensive occupation and reoccupation between about 1000 and 200 years ago. A few scattered projectile points of earlier broad-necked and willow leaf types suggest occasional visits to the site over the preceding several millennia (Pettigrew and Lebow 1987).

A single housepit excavated at site JA59 was roughly circular, about 16 feet in diameter. It had been dug into a hillslope, so that the downhill edge of the level floor was at the ground surface, while the uphill edge lay at a depth of about two feet. A large irregular hearth near the center of the housepit yielded a ^{14}C age of 740 years ago. As in the JA100 houses, red-fired earth and charred bark suggested burning of the pithouse superstructure. A series of six additional dates from the later fill of the housepit imply that it was afterward used intermittently as a refuse dump, between about 500 BP and historic times. This refuse may indicate the former presence of other structures nearby, perhaps now destroyed by the grading of a road through the site. As in the case of JA100, a few scattered broad-necked and willow-leaf points suggest earlier visits (Budy et al. 1986; Pettigrew and Lebow 1987).

Site JA27A apparently once had housepits, but uncontrolled digging by looters prior to the archaeological study made this impossible to verify. Excavations there yielded a concentration of cobble tools, a cluster of cobbles, a cluster of fire-cracked rocks, and a small shallow pit with heavily fire-reddened walls. Also found were a few fragmentary human bones, evidently placed as a disarticulated burial in a small pit about a foot deep. The burial pit was lined with stream cobbles, and with seven milling stones, or metates. Seven radiocarbon dates showed episodes of occupation between about 1600 BP and historic times. A few broad-necked and willow-leaf projectile points from a lower stratum suggest occasional earlier visits beginning as much as 5000 years ago (Pettigrew and Lebow 1987).

Three of the excavated sites had no housepits, and clearly were occupied ephemerally. Interestingly, each of these was closely adjacent to one or more housepit occupations. Site JA27B, on a terrace above JA27A, revealed only a few concentrations of fire-cracked rock, charcoal and burned red earth. Site JA102, also on a high terrace, produced only a sparse scatter of flaked stone. Site JA107, at low elevation on Elk Creek, yielded considerably more abundant flaked stone debris. Although the excavators saw this as a residential site because of its wide variety of tools, the absence of any housepits suggests that it may have been simply a short-term seasonal field camp, albeit a well-situated and frequently used one. All three sites had projectile points of types dated throughout the last 5000 years. Sites JA27B and JA107 especially had relatively high percentages of broad-necked and willow-leaf points, indicating that they saw the most intensive earlier occupations among the six excavated sites (Budy and Elston 1986; Pettigrew and Lebow 1987). It seems likely that many if not most of the unexcavated Elk Creek sites, known only from limited surface indications, were of character similar to these three—ephemeral field camps, some with a long history of use, that during late times served as activity locations subsidiary to the main housepit occupations.

All the Elk Creek sites yielded flaked stone points for hunting projectiles. These included mostly small, narrow-necked arrowheads, while larger broad-necked points probably used to tip atlatl darts were much less numerous. Willow-leaf points, which ranged from quite small to quite large, probably were used during both the bow/arrow and atlatl/dart periods, with the narrower forms tending to be late and the broader forms early. Flaked stone tools for processing meat, hide, and bone included bifacial and unifacial knives and scrapers, drills, burins, and large cobble choppers. Numerous distinctive keeled end scrapers from JA107, which showed heavy use-wear and much resharpening, suggest that woodworking was particularly important at that site (Budy and Elston 1986).

The fine-grained stone used in tool making was predominantly chert, locally available in stream gravels and rock outcrops. Local basalt was also used. But obsidian brought from remote sources was important as well, comprising 3% to 10% of the flaked toolstone at various sites. Obsidian does not occur locally, and the limited fragmentation of flaking debris, as well as the absence of weathered cortex on flake debitage, indicate that it was imported as already shaped and retouched tool preforms (Spencer 1987). Some 200 obsidian artifacts from Elk Creek were traced by geochemical "fingerprinting" to three distant flows: Silver Lake/Sycan Marsh 70 miles to the northeast, Spodue Mountain 70 miles due east, and Grasshopper Flat, 90 miles to the southeast. The three sources were all strongly represented in the Elk Creek samples. There was somewhat less obsidian from Grasshopper Flat, as might be expected due to its greater distance, but at the same time Grasshopper Flat obsidian reached its highest local proportions in those Elk Creek sites nearest that source (Hughes 1987; Zeier 1986). The essential conclusions of these studies have been independently substantiated by a later analysis using other data (Nilsson and Kelly 1991).

Ground stone plant-processing tools included bowl-shaped mortars, hopper mortar bases, pestles, metates, manos, and edge-faceted cobbles. Battered hammer and anvil stones probably served various functions. Quartz crystals, pigment stones, and fragments of steatite smoking pipes no doubt reflect the social realm.

Nearly 500 pottery sherds were found at JA100, and 90 more at JA27A. Pottery was conspicuously—and inexplicably—lacking at JA59, only one sherd having been found. On a housepit floor at JA100 was found a broken but reconstructable shallow bowl, eight inches in diameter and about four inches deep. It was thick and hand-modeled, as shown by numerous finger impressions. The inside of the bowl rim had been decorated with fingernail incisions, and the inner surface was incised in an irregular cross-hatch pattern. The bowl exterior was rough, the surface having largely exfoliated or eroded away. Baking in an open fire had given it an uneven reddish brown color. Pottery sherds from the Elk Creek assemblage as a whole showed that such bowls were the prevalent form, though one small cup about two inches in diameter and one inch deep was also recognized. This pottery belongs to the Siskiyou Utility Ware tradition, recently discovered to be widespread in southern Oregon and northern California. Found with the pottery were also a few fired clay figurines, small and very simply made. These included a deer's head, a human torso, a fish tail, and some nondescript flattened and conical broken pieces (Mack 1983, 1987; see also Endzweig 1989).

Bones and bone fragments from the Elk Creek sites numbered more than 26,000, of which 650 were complete enough to be identified to genus or species. Most of these represented deer; much less common were elk, beaver, pocket gopher, mountain lion, canids (dog, coyote, or wolf), fox, turtle, and salmon. The modern excellence of Elk Creek as a winter deer habitat is shown by these data to be of long standing. Analysis of the stages of eruption and wear on deer teeth indicates that the animals in the sample were killed predominantly in the fall, winter, and spring. The dental age profiles also showed young and old animals in disproportionately great numbers, while prime adults were rarely taken. This implies individual hunting, because the very young and very old are most likely to fall prey to human (or other) stalkers, while alert, healthy adults are most likely to escape (Lyman 1987). Chemical analysis of projectile points and butchering knives confirmed the importance of deer hunting at Elk Creek, by identifying cervid (deer, elk) blood on most of the artifacts examined (Loy 1987).

Charcoal and charred seeds from firehearths and soil samples taken at the Elk Creek sites reflect a prehistoric vegetational mosaic comparable to that which exists in the area today. Table 6.1 shows the species identified, the environmental zones they represent, and their probable economic use and season of collection.

Table 6.1. Economic use and seasonality of plant remains from Elk Creek sites (Davis and Miksicek 1987: Table B.6).

Common Name	Economic Use	Season
Mixed Conifer Forest		
Fir	basketry, wood, sap-medicine	year round
Douglas-fir	baskety, wood, sap & twigs-medicine	year round
Pine-Oak Woodland		
Pine	wood, nuts, edible cambium, sap-medicine	nuts-fall
Oak	edible acorns, wood, medicine	acorns-late summer
Incense Cedar	Wood, medicine, fragrant boughs	year round
Cascara	bark-medicine	year round
Madrone	edible berries, wood, leaves-medicine	late summer
Manzanita	edible berries, wood, leaves-medicine	late summer
Hazelnut	edible nuts, basketry, bark-medicine	nuts-late summer
Blackberry	edible berries, roots-medicine	summer
Elderberry	edible berries, flowers & bark-medicine	late summer
Huckleberry	edible berries, bark-medicine	summer
Stream Forest		
Red Alder	wood, basketry, bark-medicine	year round
Willow	basketry, bark-medicine	year round
Oregon Ash	wood, roots-medicine	year round
Meadow Herbs, Grasses		
Bluegrass	edible seeds	early summer
Ryegrass	edible seed	summer
Panic Grass	edible seeds	summer
Fescue Grass		early summer
Lamb's quarters	edible seeds, greens	summer
Bedstraw	medicine	summer
Plantain	edible leaves, medicine	summer
Borage		early summer
Dock	greens, medicine	summer
Knotweed	edible seeds	summer
Lupine	edible leaves, roots, medicine	summer
Lotus		summer
Hop Clover	edible seeds	early summer
Buckwheat	edible young stems, medicine	summer
Thistle	edible stems, medicine	summer
Tarweed	edible seeds	summer

Food waste, ash from campfires, and human excrement are three by-products of human activity that can leave concentrations of phosphorous in the earth of archaeological sites. Phosphorous tends to be quite insoluble and not readily leached away from its original place of deposition. Thus its accumulation can indicate the intensity of human activity at occupation sites. Chemical analysis of soil profiles showed intense concentrations of phosphorous at JA59, strong concentrations at JA100, and somewhat lesser but still significant concentrations at JA27A. The first two of these are housepit sites, where the structures themselves and the general abundance of artifacts also signal heavy human activity. Housepits are believed to have occurred at JA27A as well, but digging in the site by looters eliminated the possibility of verifying this. Site JA27B showed relatively little phosphorous. This too is congruent with other indicators of more limited occupational intensity there (McDowell 1987). Two other sites, JA102 and JA107, were not tested for chemical residues, but lack of housepits and low artifact densities indicate limited occupational intensity there as well.

In broad view, the culture history of Elk Creek demonstrates a high degree of continuity throughout the 5000 years of record. The basic functional artifact types changed little throughout this period, except for the introduction of the bow and arrow about 2000 years ago, and the introduction of pottery about a millennium later. Manifestly however, along Elk Creek as elsewhere in the Southwestern Mountains, human occupation intensified significantly during the last 1000 years. As noted above, two basic kinds of sites have been identified: domestic homesteads with housepits, and apparent field camps or activity locations where human use was less intensive, probably seasonal. The seasonal sites give evidence of use over a generally longer timespan, from a period when willow-leaf and broad-stemmed projectile points were dominant—perhaps as early as 5000 BP—down to the time of the main housepit site occupations, after 1000 years ago. The housepit sites, though most intensively occupied within the last thousand years, also yielded some projectile point types suggestive of earlier occupation. There was thus an overlap in the time of occupation of the two kinds of sites, but no housepit sites are documented for earlier times.

How may the change in settlement pattern be accounted for? An appealingly simple hypothesis points out that salmon and steelhead runs in the Rogue River system would provide an important native food resource concentrated in good fishing localities. Deer and acorns are also abundant and highly important food resources in the same area, but tend to be much more dispersed. Thus, the best choice for a homestead site would be near a good fishing spot. Here people could exploit a major dependable food source close at hand, and range out on short trips to camps and activity locations for deer and acorns. During the last 1000 years it appears that Elk Creek provided such spots. But perhaps in earlier times, dryer or warmer climate made for lower and warmer waters in Elk Creek; fishing might then have been sufficiently unproductive that people were not induced to build permanent homes in the valley. In such times, they might have chosen instead to live along the main stem of the Rogue River, not many miles away. Elk Creek would even then have been a good place to gather acorns and hunt deer, but this could be accomplished on forays out from homesteads elsewhere, with only temporary bases established along Elk Creek. Exploration of this hypothesis will challenge investigators to develop a much better understanding of the regional climatic history than now exists (Pettigrew and Lebow 1987).

Hinterland Sites

As just discussed in relation to Elk Creek, activity locations and field camps in the hinterlands must have been a regular complement to the more settled homesteads known along the rivers and major streams. Major pithouse settlements such as Gold Hill, Far Hills Ranch, and those along Elk Creek must all have been ringed by small sites where brief visitations required no substantial shelters. In fact, small sites attested only by scattered flakes, points, or ground stone artifacts are known to occur in various settings sometimes quite distant from known pithouse occupations. Most of these are known only from surface observations, but a few from the Upper Rogue River area have been examined through limited excavations.

The Salt Creek Site, on a ridge overlooking Little Butte Creek Valley, may be a typical example of a hinterland location. It gave evidence of scattered flakes, and a variety of projectile points including leaf-shaped, side-notched, stemmed, and triangular types. The range of forms suggests that the site may have been visited repeatedly over a considerable span of time. Sites JA1 and JA2, in the Emigrant Dam reservoir area, also appear to have been seasonal camps. They yielded only lithic flakes and a few arrowpoints. Site JA85, on a terrace above Jackson Creek, produced only a few small projectile points, but a considerable number of pestles, mortar bowls or bases, and grinding slabs. It was manifestly a special plant-processing location (Pettigrew and Lebow 1987).

Border Village

Looking southward from the Rogue River center, another major focus of prehistoric occupation was along the Klamath River (Mack 1983, 1990). A number of sites have been studied along the middle reaches of the river, just at the point that it crosses from Oregon into California. This general area was a borderland shared historically by the Klamath, whose homeland centered to the east and north, and the Shasta, who were a well-established people of the Southwestern Mountains. A ^{14}C date of 7650 BP from Klamath Shoal Midden shows human presence in the area at an early time, and several sites along the river contain Gold Hill, Northern Side-notched, and Elko series projectile points that are generally dated between about 7000 and 2500 years ago. Thus, occupation of the Klamath River canyon spans at least the last 7500 years, but sites from which the most detailed record has been derived are much later, dated near the end of the prehistoric period. Of interest here for illustrative purposes is Border Village, located on the Klamath River a scant half-mile north of the California border. The nearby Big Boulder Village and Iron Gate sites furnish comparable records, but to avoid substantial duplication they are simply mentioned here.

Border Village occupies an area about 600 feet in length and 100 feet in width, on an alluvial terrace overlooking the Klamath River. Within this space were observed 19 apparent pithouse depressions, which occurred, irregularly spaced, in two parallel rows. Two of these depressions were completely excavated, revealing pithouse floors, and a third was cross-sectioned by means of an X-shaped trench, confirming that it was a similar structure.

Housepit 1 proved to contain four occupation floors, the deepest about two feet beneath the surface. The others apparently represent episodes of rebuilding or refurbishing the initial structure. The floor of this building was circular, slightly over 21 feet in diameter. In the center was a large firepit, and lying on the floor were scattered artifacts, including many muller fragments and several milling slabs. Charred wooden posts and slabs lay on the floor, and three stubs of apparent roof support posts remained in vertical position near the center of the unit. Two vertically placed wooden planks, and the wood fragments lying on the floor, suggested that the superstructure of the dwelling had consisted of wooden planks leaned inward from the edges of the housepit to rest against the support posts observed near its center. The floor which overlay this one, separated by a few inches of earth, exhibited similar characteristics, as did the two which followed in sequence above it. The three uppermost floors all exhibited both a central firepit and a subsidiary fire area to one side nearer the house wall. Burned materials found on all four floors suggested that each cycle of occupation had been terminated by fire, after which a new structure had been built in the same pit.

A ^{14}C determination made on a vertical post stub associated with the third occupation floor indicated an age of 550 BP. It seems that no great amount of time separated the four occupations represented within the housepit. The same kinds of projectile points, predominantly Gunther Barbed, of late prehistoric age, were found throughout (Figure 6.13).

Excavations showed the other two houses examined at the site to have much the same character. The projectile points excavated were also predominantly of the Gunther Barbed type, suggesting a similar age. Whether all 19 of the structures indicated by surface depressions at the site conformed to this same pattern of content and age is speculative, of course. It would not be surprising if further work at the site suggested a broader time range for the location as a whole, but currently available evidence gives little sign of it.

The artifact assemblage from Border Village was rich; the collection from Housepit 1 is illustrative. Projectile points and a variety of knives and scrapers imply hunting. The processing of plant foods is indicated by a large number of milling stones and manos, or mullers, as well as by the occurrence of over 400 pottery fragments from cooking vessels. Manufacturing activities are attested by flaked stone cores, drills, gravers, knives, and scrapers. A few fragments of twined basketry were also preserved, which is very unusual in open sites of this kind.

Bones excavated from the housepits at Border Village represent a varied bag of food species; fish included salmon, chub, and suckers; mammals included deer, antelope, elk, mountain sheep, beaver, porcupine, a variety of small rodents, jackrabbit, cottontail, river otter, and such predators as grizzly bear, mountain lion, and red fox. It is thus clear that the inhabitants of the village relied both on the river and the wooded hinterlands beyond it for protein foods. Though no actual plant remains were preserved, it seems likely that plant gathering followed a similar pattern. Certainly the grinding tools recovered from all occupation floors indicate consistent processing of vegetal foods.

Site distribution data show that settlement and activity locations in the Klamath River canyon were well-chosen to give their occupants optimum access to the natural resources of the area (Mack 1990: 15-17). Typically, sites were located on the first or second terrace of the river, adjacent to

Figure 6.13 Projectile points from the Middle Klamath River area. Top row, Gunther Barbed and small basal notched point; middle row, left, Desert Side-notched, right, small stemmed points; bottom row, earlier stemmed and leaf-shaped forms.

wide stretches of shallow water, and near springs or places where small streams joined the main river. Such spots offered flat, well-drained ground on which to live, fresh water, good fishing, and immediate access to the varied flora and fauna of the riparian zone along the stream as well as the wooded mountains through which the river cut. In such places people could have maintained year-around settlements, making forays as needed to nearby hunting areas, root grounds, and acorn-gathering localities. The floral and faunal evidence just described from Border Village seems to exemplify precisely such a pattern.

From the occurrence of pottery sherds in Klamath River sites, including Border Village, Mack (1983) defined a new artifact type for southwestern Oregon and northwestern California. It was long believed that the people of the west coast did not make and use pottery. In historic times none did to any significant extent. But archaeological discoveries have now shown that in late prehistoric times pottery was widely distributed in the drainages of the upper Klamath, Pit, and Rogue rivers. This pottery, called Siskiyou Utility Ware, is crudely hand-molded, variable in thickness, coarse in texture, and generally buff in color (Fig 6.14). Fingernail impressions frequently decorate vessel rims, and incised lines occur on body surfaces. Exterior surfaces are often exfoliated and rough, while interior surfaces are smooth. Wide-mouthed shallow bowls seem to have been the most common forms, but cups have also been identified. Radiocarbon dates for sites at which this pottery has been found place it between about 1100 and 400 BP (Mack 1990).

Siskiyou Utility Ware was obviously a tradition of local origin. A survey of the archaeological literature by Mack (1987) identified sparse and scattered finds of late prehistoric brownware pottery in the Sacramento/San Joaquin Valley and the Columbia River drainage, as well as in the Great Basin, but none of these definitively resemble Siskiyou Utility Ware. The same is true of small earthenware figurines representing people and animals (see below, *Artistic and Symbolic Forms*) that are often found together with Siskiyou Utility Ware in archaeological sites. Although clay figurines of varied forms were made in central California from Early Horizon (4500 BP) times onward, and along the Columbia River at least in late prehistoric times, the figurines associated with Siskiyou Utility Ware are quite separate in their emphasis on animal and human subjects and their realistic rendering. In the absence of clear connections among these various regional traditions, it is reasonable to suggest that all are most likely areally restricted developments that grew out of a widespread general knowledge of fired clay technology that is itself of great antiquity.

North Umpqua Narrows

A third major focus of occupation in the Southwestern Mountains region is the Umpqua River Basin, north of the Rogue River drainage. Until recently all but unknown archaeologically (Hanes 1978a), a number of important sites have now been excavated which begin to define the outline of prehistory in the area.

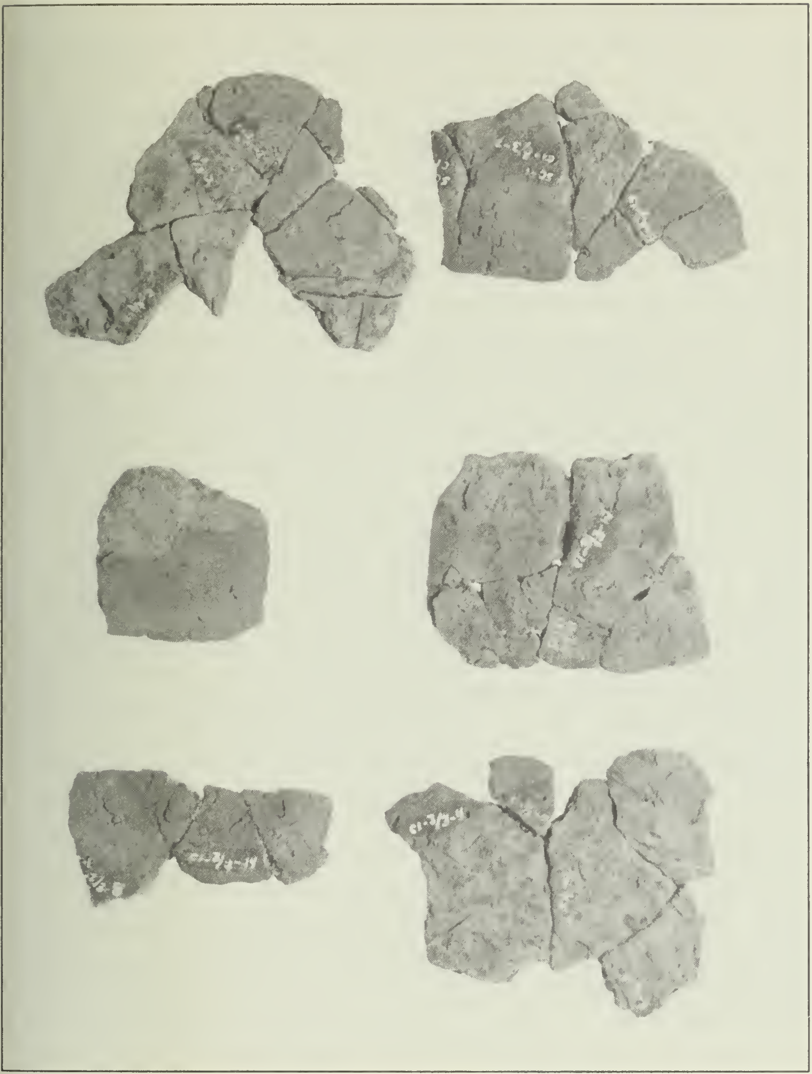


Figure 6.14 Fragments of Siskiyou Utility Ware pottery from the middle Klamath River.

A key site is that at the Narrows of the North Umpqua River, where the stream churns through a tight chute and over a falls about 10 to 15 feet high. This locality was described in an 1855 cadastral survey report as the site of an extensive Indian fishery. It remains a popular spot today, where salmon, steelhead trout, and other species are taken in considerable abundance. The Narrows is located at the very edge of the Western Cascades, and a short distance downstream the river emerges from a deep canyon into the broad, open flood plain of the Umpqua Basin. The archaeological site is thus situated within a vegetational ecotone, where the woodland species of the mountains and the grassland species of the valley intergrade. People coming there would have had ready access to not only fish from the river, but the varied range of plants and animals native to two quite different natural habitat zones. O'Neill (1989: Table 5) tabulates 31 plant species identified from the vicinity, virtually all of which have some nutritive, medicinal, or industrial use.

Archaeological excavations revealed a stratified sequence of human occupation at the Narrows that reached back more than 6000 years, dated by ^{14}C determinations on firehearth charcoal of 6270, 5090, 1020, 450, 330, 320, 140, and 90 BP (O'Neill 1989, 1990). Throughout this sequence were found flaked stone projectile points, biface and uniface cutting and scraping tools, cobble choppers, hammerstones and pounding tools, and ground stone mortars and pestles. Numerous cores and thousands of flakes of chert, basalt, and obsidian gave evidence that stone tools were manufactured on the spot throughout the history of the site. Bone was rarely found in the excavations, and plant remains other than charcoal not at all, owing to poor conditions for preservation. Nevertheless, the site's location and the tools found there clearly imply that fishing, hunting, and gathering activities were all staged from the place. At Martin Creek, another riverine site some miles downstream, excavation of a protected rockshelter gave evidence of artifacts associated with the bones of deer, hare, squirrel, salmon, and sucker, as well as shells of the freshwater mussel. Charred hazelnut hulls were also reported (O'Neill 1989).

Traces of a pithouse at the Narrows, ^{14}C dated on hearth charcoal at 1020 BP, suggest that people stayed at the locality for some weeks or months; at any rate for long enough stretches of time to make such construction worthwhile. The 1855 cadastral survey notes mention a nearby village then occupied by Indians who fished at the Narrows, but its archaeological trace has not been found.

Limpy Rock Shelter

Upstream, Limpy Rock Shelter is one of some 20 sites deep in the rugged terrain of the North Umpqua River headwaters that have been identified as seasonal upland hunting camps (Baxter 1989: Table 1, Figure 2). The site is a large overhang filled with rocky rubble. Limited excavations recovered some 200 flaked stone tools, including projectile points, knives, scrapers, and other items. More than 4000 pieces of flaked stone debitage and a few spent cores indicate that tool making was one of the activities carried out at the site. All the flaked stone tools, especially the projectile points, can be associated with hunting tasks; a few grinding slab fragments and a hopper mortar base indicate the processing of plant foods as well.

The centrality of hunting at Limpy Rock Shelter is suggested by the recovery of nearly 3300 bones of mammals, birds, and fishes, most of the identifiable specimens being of deer or other medium to large mammals. As in the case of most such finds, it is not wholly clear to what extent the bones might reflect the activities of other predators besides human hunters. The faunal inventory is certainly congruent, however, with a tool assemblage unmistakably suited to hunting and butchering tasks. No occupation floors or distinct cultural features were found at Limpy Rock Shelter. That camp fires were made there is suggested by scattered charcoal, but no definite hearths were discovered. A ^{14}C determination of 430 BP on charcoal gathered from the excavated deposits dates the occupation to the late prehistoric period.

South Umpqua River Sites

The South Umpqua Falls, Hughes I, and Times Square rockshelters comprise an apparently related complex of base camp and hunting sites situated within several miles of one another. The South Umpqua River Falls are high enough to concentrate fish, but not high enough to prevent the passage upstream of spawning salmon and steelhead trout. Chinook salmon spawn in the fall. Steelhead enter the river in fall and spawn during the winter. Lamprey eels are also seasonal migrants. In addition to these anadromous species the river is inhabited year around by rainbow and cutthroat trout, suckers, chubs, sticklebacks, and squawfish. The vicinity is further important as an overwintering area for deer and elk, lying as it does somewhat below the elevation of persistent winter snowpack. The South Umpqua Falls are a traditional camping and fishing location of the Cow Creek Band of Umpqua Indians, who continue to use the area today (Minor 1987).

Two small rockshelters overlook the South Umpqua Falls, and excavation revealed that both were occupied prehistorically. Similar projectile points and other artifacts from the two shelters suggest that both span approximately the same time range, and three glass trade beads from the lower shelter indicate that its occupation continued into historic times. A ^{14}C date of 3190 BP from the upper shelter relates to the earliest occupation, while a date of 600 BP pertains to later occupation in the lower shelter.

People encamped in the rockshelters left behind a number of flaked stone projectile points, knives, scrapers, drills, and other tools. They also left cores of tool-making stone and thousands of flakes of chipped stone debitage. Cobble tools included hammerstones, anvils, and grinding stones. Bone or antler artifacts included wedges, stone-flaking tools, awls, and sharpened bone splinters. Also found were shell disk beads, *Olivella* shell beads, and a number of bear claws perforated at one end for suspension. The inventory represents a variety of hunting, food-processing, and manufacturing tasks, suggesting that people spent a considerable amount of time at this location and were involved while there with a number of different activities. The remains of five burials found in the upper shelter, presumably of people overtaken by death there in the normal course of events, imply fairly regular human presence at the site.

Animal bone from the South Umpqua Falls Rockshelters included more than 46,000 items, mostly fragmentary. Some 4300 identifiable specimens represented predominantly mammals (55%) and fish (36%). There were also small or trace amounts of land snails, freshwater clams, birds, reptiles, and crustaceans. Deer were by far the most common species among the identified mammals, and most of the unidentified fragments were also of the size and thickness of deer bone. Some 21 other mammal species included creatures as small as shrews, voles, and wood rats, and as large as mountain lion and elk. The fish bones were not tabulated quantitatively by species, but included salmon, sucker, squawfish, chub, and lamprey eel.

Seeds and nuts from the excavations included predominantly pine nuts, hazelnuts, Douglas-fir seeds, and seeds of the rose family. Some hazelnut shells and rose seeds were charred, suggesting that they had been roasted or toasted. The bulk of the seeds and nuts, however, could not be certainly identified with human agency. Although they may have been brought into the sites by people, it is also highly possible that they were brought in by rodents or perhaps reflect the natural "seed rain." At the least, all are known historically to have been used as food, and their occurrence in the rockshelters shows that they were available in the near vicinity should the human occupants choose to seek them out.

Much less abundant and diverse evidence of occupation was found at Hughes I Rockshelter, high on a densely forested slope about a mile distant from South Umpqua Falls. The small artifact assemblage was dominated by projectile points, knives, and scrapers, though a grinding slab and handstone were also found. A ^{14}C determination of 1025 BP on charcoal from an ash lens dates the deposit. Over 1700 whole and fragmentary bone specimens were recovered from the small test excavations, most of them so broken up as to be unidentifiable. Of the bones that could be identified, 96% were of deer. Most of the fragments are also believed to represent deer, based on their size and thickness. Clearly this was a hunter's camp where deer were brought for processing, and must have seen only brief occasional use.

Times Square Rockshelter, about three miles above South Umpqua Falls, like Hughes I also gives evidence of upland hunting, but it yielded a considerably more detailed record. It lies in an area of considerable biotic diversity, within the Mixed Conifer zone but close to the boundaries of the Subalpine Mountain Hemlock and Interior Valley vegetation zones; plant associations characteristic of all these zones occur in the vicinity of the site (Spencer 1989: Figure 4). Growing in the immediate vicinity of the rockshelter are salal, blackberry, oregon grape, gooseberry, strawberry, thistle, wild buckwheat, ferns, manzanita, chinquapin, madrone, ponderosa and sugar pine, white oak, and hazel, all of which yield edible berries, seeds, roots, or nuts. Most of these plants ripen during August and September. The fish and mammalian species available near the site are essentially the same as those named for the South Umpqua Falls rockshelters.

Animal bones were recovered in abundance from the dry Times Square deposits, consistent with artifactual indications (below) that it served as a hunting camp. Although the bones were heavily fragmented, specimens representing 14 mammalian species were identified, in addition to remains of fishes, birds, reptiles, and amphibians (Schmitt 1989). Hundreds of rodent and rabbit-sized bones were partially digested, making it clear that carnivores and possibly raptors had delivered them into the cave in fecal pellets. Woodrats ("packrats") also commonly collect bones in their nests, and woodrat bones themselves indicate that these creatures did live in the rockshelter. On the other hand, many flakes of heavier bone, bones with butchering marks, and bones showing evidence of burning give ample evidence of human processing as well. Deer and elk bones most commonly exhibited these traces, and a great amount of highly fragmented deer and elk bone indicates that in addition to butchering to remove meat, skeletons were subjected to pounding and breakage for the extraction of marrow.

Radiocarbon dates of 3240, 2690, 1500, 1380, and 800 BP were obtained on charcoal from Times Square Rockshelter. Two small white glass trade beads, dated most commonly to the period 1820-1840, a piece of wrought iron, and a fragment of tin-ware bring the evidence of human occupation into early historic times. Remnants of a recent pole-supported shelter attest contemporary usage of the site. Most of the archaeological specimens from the site came from the uppermost strata, and are referable to the last 1500 years.

Flaked stone artifacts included a number of fragmentary projectile points, many cutting and scraping tools made on flakes, a number of cores, and nearly 10,000 flakes of working debris from artifact manufacture. This assemblage can be readily identified with hunting, butchering, and tool-maintenance activities. The high percentage of broken projectile points, as well as the abundant lithic manufacturing debris, indicates that broken points were replaced at Times Square Rockshelter in the process of refurbishing damaged arrows. Two pestles and three hopper mortar bases, one ground into a bedrock ledge, indicate that some plant food processing also went on at the site. Most of the toolstone was chert, with a small but significant percentage of obsidian also present. A small sample of obsidian artifacts from the site, their chemical compositions identified by the X-ray fluorescence method, were traced to sources at Silver Lake, Sycan Marsh, and Spodue Mountain. A single specimen was traced to a source at the Newberry Craters. These obsidian flows all lie east of the high Cascades, some 70 to 80 miles away.

A number of artifacts made of normally perishable plant materials were preserved in the dryness of Times Square Rockshelter. Five fragments of twined basketry have been described, and some 70 fragments of cordage. Many of these latter were knotted, suggesting that they may be fragments of light nets, fish line, or snares. Several small packets were made by folding madrone leaves together and tying them with strips of fiber or grass. Miscellaneous plant stems and fibers of maidenhair fern, bear grass, dogbane, rushes, and cedar bark represent materials that were used in weaving and spinning by many historic native groups. Their presence, along with the formed specimens, strongly suggests that basketry and cordage were not only used at the site, but manufactured there as well.

Wooden artifacts included a bow stave fragment, two arrow shafts, two projectile foreshafts, three wooden points, several awls and eyeless needles, and a firedrill hearth, among less readily identifiable specimens. As in the case of the fiber specimens, manufacturing activities are suggested at the site itself by the finding of many wood chips and sticks that have been peeled, cut, and broken (Fowler 1989).

Hunting camps tend to be thought of as representing only male activities. In ethnohistoric times, men typically did the actual hunting, and manufactured the lithic tools used in hunting and butchering. And in most archaeological sites the lithic artifacts, and perhaps the bones of the hunter's quarry, are all that is preserved for later analysis; the evidence thus suggests only male occupations. At Times Square Rockshelter, however, where dryness favored the preservation of wood and fiber artifacts, it appears that weaving and cordage-making—typically female activities—are also well-represented. With better archaeological preservation a significantly different picture thus emerges, of visits to the uplands that were probably familial in character rather than being all-male hunting forays. Such visits apparently included both manufacturing activities and the gathering of plant resources in the vicinity by non-hunting members of the group. Without the perishable artifacts, the only clues to female presence at Times Square would be the few mortars found, by themselves suggestive but isolated and therefore less than compelling evidence of activities typically carried out by women. Given the proximity of Times Square Rockshelter to South Umpqua Falls, where fairly substantial and long-term occupation is suggested, it would seem quite expectable that women and children, as well as males, would be in the complement visiting the site.

Standley Site

Toward the coastward edge of the Umpqua Basin is the Standley Site, an open settlement quite different in character from those just discussed. Research there has figured importantly in developing a long-term perspective on cultural continuity and change in the Southwestern Mountains as a whole (Connolly 1991). Archaeologically represented by a dense scatter of stone artifacts along the edge of a terrace overlooking the Camas Valley flood plain, the Standley Site was clearly a substantial encampment in prehistoric times.

Excavations revealed a number of buried cultural features, most of them comprised of fire-broken stones, burned earth, and charcoal. Some of these features contained charred hazelnut hulls or camas bulbs, and were undoubtedly fireplaces or the remains of earth ovens. Concentrations of burned wood and bark suggested the presence of dwelling structures, but none could be defined with assurance.

A wide range of tasks and activities was carried out at the Standley Site. The stone tool assemblage includes pestles, stone bowls, abrading stones, edge-ground cobbles, gouges, hammers, anvils, cores, flakes, knives, scrapers, drills, gravers, projectile points, clay figurines, and painted tablets. In addition to hunting, gathering, and food-processing tasks, a distinctive wood-working industry seems to be indicated by distinctive end scrapers and gouges.

Obsidian, a common though not dominant toolstone at the Standley Site, gives evidence of distant exchange relationships. Of 40 specimens studied by geochemical analysis, 70% came from the Silver Lake, Sycan Marsh, and Spodue Mountain sources, nearly 150 miles east across the Cascades. Most of the rest came from California's Medicine Lake Highlands, more than 150 miles south and east.

Eleven ^{14}C dates ranging between 2350 and 310 years ago, and some 40 obsidian hydration measurements, place the most intense and continuous occupation of the Standley Site between about 3000 years ago and late prehistoric times. Some obsidian hydration dates indicate that earliest occupation began about 4500 to 5000 years ago.

The occurrence in the Standley Site artifact assemblage of leaf-shaped bipoints; distinctive shouldered, contracting-stem points; broad-necked stemmed points; edge-faceted cobbles; and stone bowl mortars first prompted the recognition of a Glade Tradition in southwestern Oregon. This tradition was seen as a regional continuation of the Old Cordilleran or Cascade pattern recognized throughout the Pacific Northwest (Connolly 1986; Connolly and Baxter 1986). Comparative statistical analysis of 47 artifact assemblages from the Southwestern Mountains region in Oregon and California showed that the Glade Tradition began some 9000 years ago and persisted long in the region, to late prehistoric times in the Umpqua and Coquille river basins (Connolly 1988). The deep, stratified Marial Site (mentioned earlier in this chapter) demonstrated the age and continuity of this tradition particularly well, and the Standley Site documented the last 3000 years.

Beginning about 1700 years ago the Glade Tradition was replaced in the Klamath and Rogue River drainages by the Siskiyou Pattern, which differed dramatically. Nucleated pithouse villages, predominant use of metates and hopper mortars, small side-notched and basally-notched projectile points, and a florescence of long-distance trade in marine shells and obsidian indicated a major cultural change. Connolly (1988) suggested that in-migration of a new people might account for this change, but noted that accelerated trading activities among people already resident could also have had far-reaching effects on the overall cultural pattern.

About 1000 years ago the Gunther Pattern appeared at Gunther Island on the northern California coast and spread rapidly, bringing distinctive triangular concave-based points, bone harpoon points, shallow steatite oil lamps, large ceremonial obsidian blades, baked clay figurines, flanged pestles, bell-shaped mauls, zoomorphic stone clubs, and a variety of bone and shell ornaments. Because Gunther Pattern sites appeared in the area occupied historically by Athabaskan peoples, whose language identifies them unmistakably as immigrants from western Canada or Alaska, Connolly suggested that the sudden appearance of the Gunther Pattern marked the arrival of the Athabaskans in the Southwestern Mountains region. The archaeological date of about 1000 years ago for this event matches well with language-based estimates suggesting that the Oregon-California Athabaskans split off from their northern relatives about 1300 years ago.

In historic times, the area in which the Standley Site occurs was occupied by the Athabaskan-speaking Upper Umpqua, who are thought on ethnological evidence to have moved up the coast from farther south only a short time earlier. In Connolly's (1991) reconstruction, the lack of Gunther Pattern diagnostics at Standley implies its abandonment before or perhaps coincident with the local arrival of the Athabaskans.

Artistic and Symbolic Forms

Native rock art from the Southwestern Mountains is documented in a series of drawings and brief descriptions by Loring and Loring (1983: 1-15). Various interesting manifestations suggest the diversity that remains to be more fully studied and reported as research continues in the region.

The Yoncalla Boulder lies in a wooded draw near the modern town of the same name, not far from the boundary between the Southwestern Mountains and the Willamette Valley. The location is within the territory historically occupied by the Yoncalla tribe. A large stone about four by six feet across, the Yoncalla Boulder is incised with many short, deep grooves often arranged as sets of parallel lines or inverted v-shapes. Much longer grooves form bands enclosing these sets of lines in broad and narrow panels. The overall effect is strikingly geometric, and the fact that almost the entire surface of the boulder has been heavily engraved gives it a very imposing character.

Representational features are more characteristic of the paintings in red and blue pigment that are found on the walls of Dog Creek Cave in the Upper Umpqua valley. One figure shows a person standing with feet planted wide apart, holding a bow in one hand. The archer may be running, or perhaps has just let fly an arrow. Other human figures either hold bows, or stand with arms outspread. Geometric figures are present as well. Circles with dots at the center are most common, but there are also sets of short parallel lines.

At Two Mile Rapids on the Rogue River, a boulder field contains a number of stones that have been heavily marked with pits, grooves, zigzags, and curved lines. Some of the pits are large and deep enough to be bedrock bowls or mortars. One simple fish outline is reported, but the elements overwhelmingly form geometric rather than representational patterns.

As discussed for other parts of Oregon, these markings on stone are understandable in a general way as symbolic figures and indicators of human activities, but detailed interpretations are elusive. The study of rock art in the Southwestern Mountains is still in its infancy. A fuller understanding of these prehistoric expressions should be achievable with systematic study of elements and motifs, and efforts to relate them to the value systems of the traditional people through historical study and consultation among their local descendants.

Fired clay figurines depicting animals and humans are a portable art form only recently found to be widespread in the Southwestern Mountains (Deich 1982; Mack 1991). These figurines exhibit the same reddish brown color, coarse texture, hand modeling, and fingernail-impressed decoration as seen on Siskiyou Utility Ware pottery, and generally occur together with such pottery in archaeological sites. Over 20 ^{14}C dates place these figures (and Siskiyou pottery) between about 1000 and 400 years ago (Mack 1991: Table 1).

Animal figures, including deer, elk, fish, rodents, carnivores, owls, and possibly bears account for most of the figures; only about 10% are human representations. Breasts or penises show the sex of some of the human figures, but for most specimens sex is not indicated. Most of the human figures exhibit no facial features, but animal's heads often show such details as eyes, ears, mouths, muzzles, and antlers, that allow different species to be identified. Most of the known specimens are broken or damaged, though complete objects have also been found.

The figurines are believed to be children's toys because of their informality and lack of stylization. This is also suggested by the wide range of creatures depicted, their usually broken condition, and the fact that the figurines are typically found near main living areas, but outside the immediate work areas of adults. This distribution appears to reflect child play behavior, which is often so patterned (Mack 1991).

Fired clay figurines have been found in the middle and upper drainages of the Pit River, the Klamath River, and especially the Rogue River, where most of the currently known examples have been recorded. Historically, these were the territories of the Achomawi, Shasta, and Upland Takelma. More broadly, fired clay figurines are known from central California, some parts of the Great Basin, and the middle Columbia River. But the figurines of these areas lack the focus on animal representations, and the realistic depictions of facial features and limbs that set apart the objects from the Southwestern Mountains (Endzweig 1989). It is evident that the specimens from the Oregon-California borderlands comprise a distinct tradition, unique to that area. Notably, this tradition spread across a territory that in historic times was home to some very different tribal/linguistic groups, which ethnohistoric evidence shows to have nevertheless interacted intensively in trade, exchange of mates, and occasionally warfare. The sharing of a tradition that seems to have centered on the culture of children offers a poignant suggestion of the closeness that apparently grew between the ethnically and linguistically diverse people of the Southwestern Mountains.

Future Research

Archaeological research in the Southwestern Mountains has progressed remarkably in recent years, and an increasingly detailed picture of the regional prehistory is emerging. The biotic richness, cultural unity, and ethnolinguistic diversity of the region invite, however, much fuller exploration. A beginning has been made in outlining the course of past environmental change in the Southwestern Mountains, based on biogeographical study of the modern flora. But systematic paleoenvironmental research, based on geological study, pollen, tree-ring analysis, and other approaches, is just in the planning stages. Census and evaluation of the native food resources of the region, in terms of location, abundance and cyclicity, is being pursued but has not yet reached the stage of publication (Nan Hannon, personal communication). A provocative investigation into the relationship between seasonal and short-term climatic fluctuation, resource distribution and abundance, and the economic ranges of different groups, is also underway (Richard Olmo, personal communication).

The marked degree to which people of very different ethnic origins and languages came in the Southwestern Mountains to share a common way of life needs continuing investigation. Speakers of Hokan, Penutian, Athabaskan, and Algonquian languages interacted quite intensively in ethnohistoric times, and commonalities in the archaeological record indicate that this interaction has deep roots. While retaining their own ethnolinguistic identities, people came to share most of the everyday patterns of residence, hunting, gathering, tool manufacture, and so on. Important socio-ceremonial observances apparently united diverse groups. For example, archaeology suggests that the White Deerskin Dance has a long history in both northern California and southwestern Oregon. On a more homely level, the making of children's toys from fired clay has a similar distribution. Further archaeological investigation of such relationships will be of much historical and anthropological interest.

Finally there are the unanswered questions and controversies that inevitably stem from ongoing research. Pettigrew (1990) provocatively catalogs problems and controversial interpretations that are actively under debate by regional researchers. A major item is how or whether two differing characterizations of the archaeological sequence of the region may be reconciled. In this survey, both ideas have been presented: the one, a periodization based on the concept of temporal phases (Pettigrew and Lebow 1987); the other, a view stressing continuities, based on the concept of cultural traditions (Connolly 1988, 1991). At the present stage of knowledge and analysis, the two schemes do not harmonize as well as could be wished. But the view taken here is that the different conceptual frameworks are (or should be) complementary, and that with further work both are likely to contribute important perspectives on the regional prehistory. As always, the call is for continuing exploration.

Chapter 7

Oregon Cultures in Perspective

The traditional cultures of Oregon were varied and distinctive, reflecting the different environments they grew in and the particular social factors that channeled their own courses of development. In a broad way, however, the forces that shaped them have also shaped other cultures, and native Oregon lifeways share much in common with those of other places, near and far. This concluding chapter briefly places early Oregon cultures in a larger comparative context, to show some of the ways in which they relate to or resemble other important developments in the northern hemisphere.

The Peopling of the North and the Peopling of America

It is abundantly clear that human origins lie in the tropics and semitropics of the Old World, probably in Africa and probably around three million years ago. The north-temperate zone was populated only very late in the human career, and the far north much later yet. With the emergence of fully modern humans and their development of a varied and sophisticated technology, people began adapting to the arctic climes of the Old World about 30,000 years ago. The far north is an extremely rigorous environment for humans, but fish, fowl, and mammals school, flock, and herd there in overwhelming concentrations. Once people learned the habits and developed the technology to live in the arctic and exploit its riches, the entire north was opened to human occupation. From Norway on the west to Greenland on the east, the arctic biota is remarkably uniform, and that was perhaps even more true during the terminal Pleistocene period, when mammoths, mastodons, horses, camels, caribou, musk ox, and other large animals were widespread throughout the north. The peopling of the arctic was prerequisite to the peopling of the New World, and indeed the two events are seamlessly related. The precise dates of this epochal expansion of the human domain are not agreed upon, but the best evidence suggests that it began about 30,000 years ago, with the crossing to America achieved between about 18,000 and 14,000 years ago (Fagan 1987; Aikens 1991, with references).

The first Americans came from northeast Asia across the Bering Land Bridge. A broad plain more than 600 miles wide emerged from the shallow Bering Sea as terminal Pleistocene glaciers grew, and increasingly kept much of the world's water from returning to the oceans. The first immigrants probably crossed Beringia shortly after the last glacial maximum, when world climate was beginning to warm but much glacial ice remained unmelted, and sea level was still relatively low. Large parts of Alaska had remained unglaciated throughout the ice age, and during the time of the Bering Land Bridge, this territory was continuous with the arctic tundras that stretched endlessly across northern Asia and Europe.

An earlier entry into the American interior is rendered unlikely by the fact that during the last glacial maximum, the Laurentide ice sheet, spreading outward from the Hudson Bay region, and the Cordilleran ice sheet, spreading outward from the northern Rocky Mountains, covered much of Canada. In one area of northwestern Canada the terminal moraines of these two glaciers overlapped, suggesting that for at least the period of greatest cold, continuous glacial ice would have blocked movement southward from Beringia and Alaska into the continental interior. Human movement down the west coast at that time is equally unlikely, because there the way southward was blocked by immense glaciers that extended to water's edge, calving directly into the sea. A theory that people traveled along this coast by boat during terminal Pleistocene times (Fladmark 1979), though highly implausible given the ice-age conditions, must nevertheless be conceded as not wholly beyond imagining. As recently pointed out in a broad-ranging examination of this problem, there is archaeological evidence for human occupation in Australia and New Guinea 40,000 to 50,000 years ago; in the New Britain, New Ireland,

and Solomon islands 20,000 to 32,000 years ago; and on offshore islands of Japan during about the same period. Such facts do show clearly that people of these areas were living on coastal resources and travelling substantial distances across water at an early time (Erlandson 1992a, 1992b). Whether such clues from the equatorial and middle latitudes foreshadow an archaeological finding yet unmade, however, that seagoing people also spread along the arctic shores of the northern Pacific in terminal Pleistocene times, remains to be seen. The archaeological evidence so far discovered on these coasts documents only post-Pleistocene occupation.

A ^{14}C date of 13,200 BP for Fort Rock Cave in Oregon, and dates of 14,500 and 15,000 BP for Wilson Butte Cave in Idaho (Gruhn 196), are the earliest to be possibly associated with evidence of human presence in the Northwest. They are in fact among the earliest dates that might reasonably be claimed for human presence in the New World as a whole, but it must be noted that all currently available dates in this and earlier time ranges are controversial, due to limitations or ambiguities in the evidence.

By at least 11,500 years ago, however, people were clearly present all over North America. Numerous ^{14}C dates from Arizona, New Mexico, and elsewhere establish a time range of 11,500 to 11,000 BP for sites of the highly distinctive Clovis complex (named for a discovery near the town of Clovis, New Mexico). Clovis fluted points have been found from Nova Scotia to California, and from Alaska to Panama (Haynes 1969; Bryan et al. 1978). Well-made spear points of the Clovis fluted type have been found in all parts of Oregon, and the Dietz Site, in the eastern half of the state, has yielded a considerable number of Clovis points and related artifacts. How much before 11,500 BP the Clovis people or their direct ancestors entered North America remains to be determined. So far, fully convincing evidence for earlier occupation has not been found, but many devotees continue the search.

The Clovis Paleo-Indians of late glacial times are known from a number of sites in North America to have been hunters of mammoth, giant bison, and other large game animals which shortly became extinct as the cool, moist conditions of the ice age gave way to the warmer and drier climate of postglacial times. It is a reasonable presumption that Oregon's Clovis people hunted the Pleistocene animals then extant in the area, and at this period Oregon cultures were probably more closely related to those elsewhere in North America than they ever were again. The Clovis horizon marks the only time in North American prehistory when a single diagnostic artifact style spread over the entire continent. Manifestly, Paleo-Indian hunters traveled fast and far over the rich, untapped landscape of the New World, and in so doing laid down the cultural base from which all later regional traditions sprang.

Postglacial Readaptation: Archaic Hunter-Fisher-Gatherers

North American environments changed dramatically as the climate warmed and dried with the waning of the glacial age. By shortly after 11,000 years ago, the mammoth, horse, camel, giant bison, and other species once hunted by Paleo-Indians were reduced to extinction. Only in the Great Plains, where vast grasslands and herds of bison persisted, did a big-game hunting way of life continue. In the east, forests replaced open tundras, grasslands, and parklands. In much of the west, shrubby semidesert vegetation replaced richer, grassier floras as warmer postglacial climate dried the landscape and shrank the great lakes once present there. In both east and west the large herding species were replaced by smaller, more scattered animals, and Paleo-Indian big-game hunters gradually became Archaic foragers and collectors, hunting and gathering a wide variety of plant and animal foods.

The Archaic lifeway developed differently in various parts of the country, as individual societies adapted themselves to woodlands, rivers, seacoasts, mountains, or deserts. All these groups were characterized by broad-spectrum hunting and gathering, hence may all be labeled by the same general term. But they differed in detail, in ways reflecting the specific environments to which they became adapted. During the Archaic period, the continent-wide uniformity of the Clovis horizon gave way to a large series of regional culture patterns. Within Oregon five regional traditions have been recognized, as reflected by the central chapters in this book. All these traditions represent cultures of Archaic type, and all continued from the early postglacial right into historic times.

In the Great Basin of eastern Oregon the Clovis Paleo-Indian way of life is well-attested at the Dietz Site. But even at Dietz was foreshadowed the Archaic desert culture tradition that was emerging by 11,000 years ago at the Fort Rock and Connley caves. By 9000 years ago, the Desert Archaic pattern was well-developed. Hallmarks of this adaptation were the milling stone and mano, for crushing seeds; woven textiles that included carrying baskets, nets, matting, and other elements; woven sandals of sagebrush bark or tule; rabbitskin robes; the atlatl and dart (early) and the bow and arrow (late); and a highly mobile, wide-ranging pattern of life, suited to the collecting of sparse and scattered resources over a vast territory. Dwellings included lightly built pole-and-brush wickiups, and more substantial pithouses. This way of life was not restricted to Oregon, but was practiced, with local variations, all over the Great Basin province of Oregon, Nevada, and Utah, and beyond into the deserts of northern Mexico.

In the Plateau portion of north-central Oregon, salmon fishing nearly 10,000 years ago at The Dalles prefigured a riverine adaptation of Archaic type that became characteristic of the entire Columbia River drainage. The uplands were exploited for game during hunting seasons, and several species of edible roots were gathered there at appropriate times of the year, but the main focus of human habitation came to be the banks of the big river and its tributaries. The late spring-early fall salmon runs became an economic mainstay, and the abundance they provided—which could be dried and stored for leaner seasons—supported many small villages of substantial pithouses. Here the community wintered, and many people lived and worked throughout the year. Here too task groups returned home after spending some weeks or months at nearby summer fish camps, or came back from briefer hunting and gathering forays into the uplands. The mortar and pestle, for pounding roots into meal, were characteristic tools. So were various items of fishing gear such as net weights, net floats, fish hooks, and fish spears. The atlatl and dart, and the bow and arrow, served as projectile weapons. Stone mauls and antler wedges, along with other tools, formed part of a well-developed woodworking complex. The Plateau pattern extended not only along the Middle Columbia in Oregon, but northward throughout trans-Cascadian Washington and into the Fraser Plateau of British Columbia.

The cultural tradition that developed along the Lower Columbia River and Pacific Coast embodied both riverine and marine adaptations. On the Lower Columbia between the Cascades and the Coast Range, settlements of large communal plank houses were established along the banks of the river. Along the sea coast, plank-house villages tended to be situated on bays, or on estuaries where rivers emerged from the interior. Fishing and woodworking were of great importance in all these societies, and related tools are common in the archaeological assemblages. The mortar and pestle for processing plant foods were also common. The atlatl and dart, and the bow and arrow, were both in use for hunting in earlier and later times respectively. At the mouth of the Columbia, and at places along the coast, seals and sea lions were hunted, using harpoons with bone points. The wooded mountains beyond the water's edge were exploited for plant and animal foods, but apparently, at least on present evidence, the interior forests were only lightly utilized by societies that harvested mainly the resources of watery environments. All these characteristics mark this traditional Oregon life way as part of the great Northwest Coast cultural pattern that stretched some 1800 miles from Yakutat Bay, Alaska, to Cape Mendocino, California.

Oregon's Willamette Valley cultures occupied a distinctive grassland/parkland setting, where people maintained a balanced economy based on diverse wild foods. River fishing, root and seed gathering, acorn harvesting, and the hunting of deer, elk, small mammals, and wildfowl were all important. There was no overriding focus on any one food source. Willamette Valley societies were quite mobile, ranging seasonally across territories which included riverine, gallery forest, grassland, and wooded foothills zones. Many sites known on the valley floor were spring and summer camps with large earth ovens, where roots of the camas lily were baked and preserved for storage. The Hurd Site, on slightly higher ground along the valley edge near Eugene, was a residential village where the remains of a large oval house with a slightly sunken floor were found. It may be typical of the more stable base settlements of the region, which have so far proven hard to find. In the adjacent mountains, especially the Cascades, small upland sites have been discovered. Some of these undoubtedly represent the hunting camps of valley groups, but others were probably occupied by prehistoric people who, like the historic Molala, occupied the mountains on a year-around basis. From various Willamette Valley sites there has been recovered a cultural inventory including the mortar and pestle for plant food grinding, large and small projectile points for hunting, and a variety of cutting and scraping tools for hide and woodworking. The Willamette Valley was a distinctive natural and cultural area in its own right, although it had close affinities to both the Plateau and Southwestern Mountains.

The Southwestern Mountains were rugged territory occupied by small groups oriented to the rivers—the Umpqua, Rogue, and others—which cut their way from the Cascades to the sea. In both environment and culture the region seems to have been a northern frontier of prehistoric California. Where the mountains touched the Pacific Coast, the local societies shared in the greater Northwest Coast cultural pattern. In the interior, salmon ran in the rivers, and a wide variety of game was to be found in the mountainous uplands that dominated the region. Acorns were available from extensive stands of oaks on the valley floors, and were probably more heavily relied upon here than they were farther north in the Willamette Valley. Stone bowl mortars, hopper mortar bases, and carefully shaped pestles—probably used principally in acorn processing—are common artifact types in the area. Hunting is well attested by an abundance of small and large projectile points, and by the bones of deer, elk, antelope, bighorn sheep, beaver, rabbit, and other creatures. Characteristic dwellings were substantial pithouses, usually built in small clusters in favorable streamside locations. In late times a pottery complex of distinctive character appeared, perhaps invented independently of other ceramic traditions in the west.

Connections and Convergences

As the preceding sketches show, within the territory of modern Oregon four native culture areas of vast scope came together. The Plateau, Northwest Coast, Great Basin, and California provinces extend far to the north and south of the state's boundaries, but each culture type is well represented by Oregon examples. The Willamette Valley harbored traditions of more localized cast that do not fit completely into any of the larger cultural patterns, but in a general way were intermediate between the Plateau and California. Because of these connections, the present account of Oregon prehistory may also serve as a general introduction to traditional lifeways once extant over much of western North America. More importantly, such similarities between ancient Oregon and other regions demonstrate far-flung networks of communication and the sharing of ideas and experience among prehistoric populations over many miles and many millennia.

Interesting parallels between early Oregon cultures and the lifeways of even more distant places may also be noted. These parallels are due not to any recently shared common heritage or communication, but to evolutionary convergence, fostered by the necessities of human existence in habitats of similar character. They further illustrate the power of adaptation to environment, much referred to in preceding pages as a dominant force in shaping human culture.

For example, native people of the Willamette Valley and Southwestern Mountains ranged widely in the course of a year, fishing in the rivers, hunting for deer and elk in the mountains, harvesting acorns in the oak groves, gathering seeds in the grassy parklands, and digging roots in the wetter low-lying areas. A very similar economic cycle characterized the pre-agricultural Archaic people of the eastern United States, where most of the same plants and animals were available and exploited. Farther afield, early Japanese of the Jomon period exploited a highly similar flora and fauna in highly similar ways between about 10,000 and 3000 years ago, before rice cultivation began. Close environmental and economic parallels can be found as well in the forest hunting-fishing-gathering cultures of Mesolithic period Europe between about 10,000 and 5000 years ago. In all these areas, similar though not identical hunting-fishing-gathering technologies included basic items such as the bow and arrow, the mortar and pestle, a range of stone tools for cutting, scraping, and woodworking, and basketry and cordage industries which served in catching and gathering (Aikens and Dumond 1986; Aikens, Ames, and Sanger 1986).

Comparable parallels may be drawn between the coastal peoples of Oregon and coastal folk from other parts of the world. The Northwest Coast culture pattern, in which western Oregon participated, extended from northern California up the coast through British Columbia to Alaska. The historic Ainu of Japan, and their archaeological predecessors, practiced a very similar littoral way of life. They built substantial villages along the seacoast and at the mouths of major rivers, from which they exploited the salmon, sea mammals, and shellfish of the ocean shore, and the deer, elk, bear, and other biota of the wooded hills behind. On the coast of Pacific Northeast Asia, ancestors of Koryak, Kamchadal, and other peoples practiced similar lifeways in similar settings. The deeply fjorded coasts and protected inland waters of northern Europe provided comparable habitats and resources for human use, as did the New England coast of eastern North America (Aikens and Rhee 1992).

Similarly, the Great Basin desert and the Plateau (the latter, like the Basin, generally arid but veined with rivers connecting to the sea) exemplify general habitat and cultural types found elsewhere. The Chacoan and Patagonian regions of southern South America include arid terrains remarkably similar to both the Great Basin and the Plateau, and the hunting-gathering cultures of these regions were comparable in their simplicity to those of the Great Basin and Plateau (Lynch 1983). The Kalahari Desert of southern Africa, and the interior desert of Australia, also harbored ancient desert cultures that were broadly like those of interior North America, though if anything adapted to even more rigorous conditions (Yellen 1977; Gould 1977).

Such similarities among cultures remote from one another give evidence that human beings, who have the same fundamental needs and potentials the world over, have tended to respond in similar ways to the task of making a living when faced with similar environments. Such evolutionary convergences are not mistaken for direct historical relationships, not only because of the distances involved, but because important aspects of social form, and of artifact styles, clearly differ from group to group. By contrast, many of the social and artifactual forms common to contiguous, historically related groups are often nearly identical, the product of direct face to face sharing of specific ideas and examples. In sum, both historical connections and evolutionary convergences have operated to create human societies in prehistoric Oregon that shared much in common with other societies across the continent and around the world.

Future Research

This narrative of Oregon prehistory has emphasized straightforward interpretations that are factually well supported and unlikely to be transformed by future discoveries in any radical way. But it has also been repeatedly mentioned that much remains unknown, and each chapter has closed with a section titled "future research." All the problems mentioned in these sections will demand attention, and additional questions will certainly occur to other investigators.

Because so much remains to be learned, it is appropriate to close this account with a warning that the precious cultural record of prehistoric Oregon—ancient sites and artifacts lying on and in the ground—is endangered. Construction activities, hobbyist artifact collecting, and outright pillaging of sites for objects to sell on the antiquities market are major and growing threats to a decidedly finite and non-renewable cultural resource. Archaeological interpretation depends on the analysis of artifacts and cultural features of known context, and many kinds of questions simply cannot be approached at all when objects have been improperly removed from their place of origin. Federal and state laws exist to protect our cultural resources, but the best protection will come from citizens who care about Oregon's rich prehistoric heritage and want to preserve the archaeological library from which it can be read studied. Precious pages are being torn out and scattered at an alarming rate.

References Cited

Aikens, C. Melvin
1990 From Asia to America: The First Peopling of the New World. Prehistoric Mongoloid Dispersals 7: 1-34. The University Museum, University of Tokyo.

1983a Environmental Archaeology in the Western United States. In Late Quaternary Environments of the United States, Volume 2, The Holocene. Edited by H.E. Wright, Jr, pp. 239-251. University of Minnesota Press.

1983b The Far West. In Ancient North Americans. Edited by Jesse D. Jennings, pp. 148-201. Freeman, Inc.

1982 Archaeology of the Northern Great Basin: An Overview. In Man and Environment in the Great Basin. Edited by David B. Madsen and James F. O'Connell. Special Memoirs of the Society for American Archaeology 2: 139-155.

1981 The Last 10,000 Years in Japan and Eastern North America: Parallels in Environment, Economic Adaptation, Growth of Societal Complexity, and the Spread of Agriculture. In Affluent Foragers: Pacific Coasts East and West. Edited by Shuzo Koyama and David Hurst Thomas. Senri Ethnological Studies, National Museum of Ethnology 9: 261-273.

1978 Great Basin Archaeology. In Annual Review of Anthropology. Edited by Bernard J. Siegel, pp. 71-87. Annual Reviews, Inc.

1975 Archaeological Studies in the Willamette Valley, Oregon. (Editor). University of Oregon Anthropological Papers 8.

Aikens, C. Melvin, Kenneth M. Ames, and David Sanger
1986 Affluent Collectors at the Edges of Eurasia and North America: Some Comparisons and Observations on the Evolution of Society Among North-Temperate Coastal Hunter-Gatherers. In Prehistoric Hunter-Gatherers in Japan: New Research Methods. Edited by Takeru Akazawa and C. Melvin Aikens, pp. 3-26. University of Tokyo Press.

Aikens, C. Melvin, and Don E. Dumond
1986 Convergence and Common Heritage: Some Parallels in the Archaeology of Japan and Western North America. In Windows on the Japanese Past: Studies in Archaeology and Prehistory. Edited by Richard J. Pearson, et. al., pp. 163-178. Center for Japanese Studies, The University of Michigan.

Aikens, C. Melvin, David L. Cole, and Robert Stuckenrath
1977 Excavations at Dirty Shame Rockshelter, Southeastern Oregon. Tebiwa: Miscellaneous Papers of the Idaho State University Museum 4.

Aikens, C. Melvin, Donald K. Grayson, and Peter J. Mehringer, Jr.
1982 Final Report to the National Science Foundation on the Steens Mountain Prehistory Project. Department of Anthropolcgy, University of Oregon.

Aikens, C. Melvin, and Ruth L. Greenspan
1988 Ancient Lakeside Culture in the Northern Great Basin: Malheur Lake, Oregon. Journal of California and Great Basin Anthropology 10: 32-61.

Aikens, C. Melvin, and Dennis L. Jenkins
1993 Desert Archaic Settlement Pattern and Environmental Change: 11,000 Years in the Fort Rock Basin, Oregon. In Archaeological Researches in the Northern Great Basin: Fort Rock Archaeology Since Cressman. Edited by C. Melvin Aikens and Dennis L. Jenkins. In preparation.

Aikens, C. Melvin, William G. Loy, Michael D. Southard, and Richard C. Hanes
1980 Remote Sensing Basic Manual Supplement: Oregon. Regional Supplement to Remote Sensing: A Handbook for Archaeologists and Cultural Resource Managers. Edited by T. Lyons. National Park Service, U.S. Government Printing Office.

Aikens, C. Melvin, and Rick Minor
1978 Obsidian Hydration Dates for Klamath Prehistory. Tebiwa: Miscellaneous Papers of the Idaho State University Museum 11.

Aikens, C. Melvin, and Song Nai Phee (editors)
1992 Pacific Northwest Asian Prehistory: Hunter - Fisher - Gatherers, Farmers, and Sociopolitical elites. Washington State University Press.

Aikens, C. Melvin, and Younger T. Witherspoon
1986 Great Basin Numic Prehistory: Linguistics, Archaeology, and Environment. In Anthropology of the Desert West: Essays in Honor of Jesse D. Jennings. Edited by Carol J. Condie and Don D. Fowler, pp. 7-20. University of Utah Press.

Allely, Steven
1975 A Clovis Point from the Mohawk River Valley, Western Oregon. In Archaeological Studies in the Willamette Valley, Oregon. Edited by C. Melvin Aikens. University of Oregon Anthropological Papers 8: 549-552.

Ames, Kenneth M., and Alan G. Marshall
1981 Villages, Demography, and Subsistence Intensification on the Southern Columbia Plateau. North American Archaeologist 2 (1): 25-52.

Ames, Kenneth M., Doria F. Raetz, Stephen Hamilton, and Christine McAffee
1992 Household Archaeology of a Southern Northwest Coast Plank House. Journal of Field Archaeology 19(3): 275-290.

Anastasio, Angelo
1972 The Southern Plateau: an Ecological Analysis of Intergroup Relations. Northwest Anthropological Research Notes 6: 109-229.

Andrews, R.L., J. M. Adovasio, and R. C. Carlisle
1986 Perishable Industries From Dirty Shame Rockshelter, Malheur County, Oregon. Issued jointly as Ethnology Monographs 9 and University of Oregon Anthropological Papers 34.

Antevs, Ernst
1948 Climatic Changes and Pre-White Man. In The Great Basin, With Emphasis on Glacial and Post-Glacial Times. Bulletin of the University of Utah 38:20, Biological Series 10(7): 168-191.

Antevs, Ernst
1955 Geologic-Climatic Dating in the West. American Antiquity 20: 317-335.

Atherton, John A., and Michael C. Houck
1976 An Introduction to the Natural History of Camp Hancock and the Clarno Basin, North-Central Oregon. The Oregon Museum of Science and Industry, Portland.

Atwater, Brian F.
1987 Evidence for Great Holocene Earthquakes Along the Outer Coast of Washington State. Science 236: 942-944.

Baldwin, Ewart M.
1976 Geology of Oregon. Kendall/Hunt Publishing Co.

Balster, C.A., and R.B. Parsons
1968 Geomorphology and Soils, Willamette Valley, Oregon. Agricultural Experiment Station, Oregon State University, Special Report 265.

Barner, Debra C.
1992 Molluscan Remains from the Palmrose and Avenue Q Sites. In Human Response to Change in Coastal Geomorphology and Fauna on the Southern Northwest Coast: Archaeological Investigations at Seaside, Oregon. By Thomas J. Connolly. University of Oregon Anthropological Papers 5: 105-122.

1986 Aboriginal Use of Molluscan Resources. In The Archaeology of the Tahkenitch Landing Site: Early Prehistoric Occupation on the Oregon Coast, by Rick Minor and Kathryn Anne Toepel. Heritage Research Associates Report 46: 43-56.

Baxter, Paul W.
1989 Limpy Rock Shelter: an Upland Hunting Camp in the North Umpqua Valley. In Contributions to the Archaeology of Oregon 1987-88. Edited by Rick Minor. Association of Oregon Archaeologists Occasional Papers 4: 55-75.

1986 Archaic Upland Adaptations in the Central Oregon Cascades. Ph.D. Dissertation, Department of Anthropology, University of Oregon.

Baxter, Paul W., Richard D. Cheatham, Thomas J. Connolly, and Judith A. Willig
1983 Rigdon's Horse Pasture Cave: an Upland Hunting Camp in the Western Cascades. University of Oregon Anthropological Papers 28.

Beals, Herbert K., and Harvey Steele
1981 Chinese Porcelains from Site 35 T-1, Netarts Sand Spit, Tillamook County, Oregon. University of Oregon Anthropological Papers 23.

Beck, Charlotte
1984 Steens Mountain Surface Archaeology: The Sites. Ph.D. Dissertation, Department of Anthropology, University of Washington.

Beckham, Stephen Dow
1977 The Indians of Western Oregon: This Land Was Theirs. Coos Bay, Oregon: Arago Books.

Beckham, Stephen Dow, and Rick Minor
1980 Cultural Resource Overview of the Coos Bay District, U.S. Bureau of Land Management, Oregon. Report to the BLM Coos Bay District.

Beckham, Stephen Dow, Rick Minor, and Kathryn Anne Toepel
1981 Prehistory and History of BLM Lands in West Central Oregon: A Cultural Resources Overview. University of Oregon Anthropological Papers 25.

Bedwell, Stephen F.
1973 Fort Rock Basin Prehistory and Environment. University of Oregon Books.

Berreman, Joel
1944 Chetco Archaeology. American Anthropological Association, General Series in Anthropology 11.

Bettinger, Robert L., and Martin A. Baumhoff
1982 The Numic Spread: Great Basin Cultures in Competition. American Antiquity 47(3): 485-503.

Blyth, Beatrice
1938 Northern Paiute Bands in Oregon. In Tribal Distribution in Eastern Oregon and Adjacent Regions, by Verne F. Ray and Others. American Anthropologist 40: 384-415.

Boyd, Robert
1986 Strategies of Indian Burning in the Willamette Valley. Canadian Journal of Anthropology 5(1): 65-86.

Brashear, Ann
1993 Assemblage Variation, Site Types, and Subsistance Activities in the Boulder Village Uplands, Fort Rock Basin, Oregon. In Archaeological Researches in the Northern Great Basin: Fort Rock Archaeology Since Cressman. Edited by C. Melvin Aikens and Dennis L. Jenkins. In preparation.

Brauner, David Ray
1985 Early Human Occupation in the Uplands of the Southern Plateau: Archaeological Excavations at the Pilcher Creek Site (35UN147), Union County, Oregon. Report of the Department of Anthropology, Oregon State University, to USDA Soil Conservation Service and the National Geographic Society.

1981 The Archaeological Recovery of Sites 35JA52 and 35JA53 in the Applegate Lake Project Area, Jackson County, Oregon. Report of the Department of Anthropology, Oregon State University, to the U.S. Army Corps of Engineers, Portland District.

Brauner, David R., and William Honey
1977 A Reevaluation of Cultural Resources in the Elk Creek Lake Project Area, Jackson County, Oregon. Report of the Department of Anthropology, Oregon State University, to the U.S. Army Corps of Engineers, Portland District.

Brauner, David R., and Clayton G. Lebow
1983 A Re-evaluation of Cultural Resources Within the Proposed Elk Creek Lake Project Area, Jackson County, Oregon. Phase II: Site Evaluation. Report of the Department of Anthropology, Oregon State University, to the U.S. Army Corps of Engineers, Portland District.

Bryan, Alan Lyle (Editor)
1978 Early Man in America from a Circum-Pacific Perspective. Occasional Papers of the Department of Anthropology, University of Alberta 1.

Buam, Carolyn M., and Richard Lewis (editors)
1991 The Forst Oregonians. Oregon Council for the Humanities. Portland.

Budy, Elizabeth E., Michael P. Drews, and Robert G. Elston
1986 Test Excavations at Site 35JA59, Elk Creek Lake Project, Jackson County, Oregon. Report by Intermountain Research, Silver City, Nevada, to the U.S. Army Corps of Engineers, Portland District.

Budy, Elizabeth E., and Robert G. Elston
1986 Data Recovery at Sites 35JA102 and 35JA107, Elk Creek Lake Project, Jackson County, Oregon. Report by Intermountain Research, Silver City, Nevada, to the U.S. Army Corps of Engineers, Portland District.

Burnside, Carla D.
1987 Environmental and Ethnographic Background to Archaeological Research in the Gerber Reservoir, Klamath County, Oregon: The Problem of Upland Occupation, Mobility, and Sedentism. Master's Paper, Department of Anthropology, University of Oregon.

Butler, B. Robert
1959 Lower Columbia Valley Archaeology: a Survey and Appraisal of Some Major Archaeological Resources. Tebiwa 2(2): 6-24.

1957 The Art of the Lower Columbia Valley. Archaeology 10(3): 58-65.

Butler, Virginia L.
1990 Distinguishing Natural from Cultural Salmonid Deposits in Pacific Northwest North America. Ph.D. Dissertation, Department of Anthropology, University of Washington.

Byram, R. Scott
1993 Settlement Intensification in the Boulder Village Uplands. In Archaeological Researches in the Northern Great Basin: Fort Rock Archaeology Since Cressman. Edited by C. Melvin Aikens and Dennis L. Jenkins. In preparation.

Cannon, William J., Cliff Creger, Don Fowler, Eugene M. Hattori, and Mary F. Ricks
1990 A Wetlands and Uplands Settlement-Subsistence Model for Warner Valley, Oregon. In Wetlands Adaptations in the Great Basin. Edited by Joel C. Janetski and David B. Madsen. Museum of Peoples and Cultures Occasional Papers 1: 173-182.

Cannon, William J., and Mary F. Ricks
1986 The Lake County Rock Art Inventory: Implications for Prehistoric Settlement and Land Use Patterns. In Contributions to the Archaeology of Oregon 1983-1986. Edited by Kenneth M. Ames. Association of Oregon Archaeologists Occasional Papers 3: 1-23.

Cheatham, Richard D.
1991 Archaeological Investigations at the Williamson River Bridge Site (35KL677): a Riverside Fishing Camp in Klamath County, Oregon. Oregon State Museum of Anthropology, University of Oregon, OSMA Report 91-7.

1988 Late Archaic Settlement Pattern in the Long Tom Sub-Basin, Upper Willamete Valley, Oregon. University of Oregon Anthropological Papers 39.

Clark, Linda A.
1991 Archaeology of Seal Rock (35LNC14). In Prehistory of the Oregon Coast: the Effects of Excavation Strategies and Assemblage Size on Archaeological Inquiry, by R. Lee Lyman, pp. 175-240. Academic Press.

Cole, David L.
1969 1967 and 1968 Archaeological Excavations of the Mack Canyon Site. Report of the Museum of Natural History, University of Oregon, to the USDI Bureau of Land Management.

1968 Archaeological Excavations in Area 6 of Site 35GM9, the Wildcat Canyon Site. Report of the Museum of Natural History, University of Oregon, to the National Park Service.

1967 Archaeological Research of Site 35SH23, The Mack Canyon Site. Report of the Museum of Natural History, University of Oregon, to the Bureau of Land Management.

Connolly, Thomas J.
1992 Human Response to Change in Coastal Geomorphology and Fauna on the Southern Northwest Coast: Archaeological Investigations at Seaside, Oregon. University of Oregon Anthropological Papers 45.

1991 The Standley Site (35Do182): Investigations Into the Prehistory of Camas Valley, Southwest Oregon. University of Oregon Anthropological Papers 43.

1990 Cultural Stability and Change in Southwest Oregon and Northern California: An Approach to Identifying Assemblage Types. In Living With the Land: the Indians of Southwest Oregon, pp. 56-62. Edited by Nan Hannon and Richard K. Olmo. Medford: Southern Oregon Historical Society.

1988 A Culture-Historical Model for the Klamath Mountain Region of Southwest Oregon and Northern California. Journal of California and Great Basin Anthropology 10(2): 246-260.

1986 Cultural Stability and Change in the Prehistory of Southwest Oregon and Northern California. Ph.D. Dissertation, Department of Anthropology, University of Oregon.

1983 Modeling Prehistoric Cultural Systems in the Willamette Valley: A Demonstration of Regional Diversity. In Contributions to the Archaeology of Oregon 1981-1982. Edited by Don E. Dumond. Association of Oregon Archaeologists Occasional Papers 2: 27-39.

Connolly, Thomas J., and Paul W. Baxter
1986 New Evidence on a "Traditional" Topic in Pacific Northwest Prehistory. In Contributions to the Archaeology of Oregon 1983-1986. Edited by Kenneth M. Ames. Association of Oregon Archaeologists Occasional Papers 3: 129-146.

Connolly, Thomas J., Dennis L. Jenkins, and Jane Benjamin
1993 Archaeology of Mitchell Cave (35WH122): A Late Period Hunting Camp in the Ochoco Mountains, Wheeler County, Oregon. University of Oregon Anthropological Papers 46.

Couture, Marilyn D.
1978 Recent and Contemporary Foraging Practices of the Harney Valley Paiute. Master's Thesis, Department of Anthropology, Portland State University.

Couture, Marilyn D., Lucile Housley, and Mary F. Ricks
1982 New Perspectives on a Northern Great Basin Seasonal Round. Paper presented at the 18th biennial Great Basin Anthropological Conference, Reno, Nevada.

Couture, Marilyn D. Mary F. Ricks, and Lucile Housley
1986 Foraging Behavior of a Contemporary Northern Great Basin Population. Journal of California and Great Basin Anthropology 8(2): 150-160.

Cressman, Luther S.
1988 A Golden Journey: Memoirs of An Archaeologist. University of Utah Press.

1977 Prehistory of the Far West: Homes of Vanished People. University of Utah Press.

1956 Klamath Prehistory. American Philosophical Society Transactions, New Series 46(4).

1950 Archeological Research in the John Day Region of North Central Oregon. Proceedings of the American Philosophical Society 94(4): 369-385.

1947 Further Information on Projectile Points from Oregon. American Antiquity 13(2): 177-179.

1948 Odell Lake Site, a New Paleo-Indian Camp Site in Oregon. American Antiquity 14(1): 57-58.

1937 Petroglyphs of Oregon. University of Oregon Monographs, Studies in Anthropology 2.

1933a Aboriginal Burials in Southwestern Oregon. American Anthropologist 35:116-30.

1933b Contributions to the Archaeology of Oregon: Final Report on the Gold Hill Burial Site. University of Oregon Studies in Anthropology 1(1).

Cressman, Luther S., Frank C. Baker, Henry P. Hansen, Paul S. Conger, and Robert F. Heizer
1992 Archaeological Researches in the Northern Great Basin. Carnegie Institution of Washington Publication 538.

Cressman, Luther S., David L. Cole, Wilbur A. Davis, Thomas M. Newman, and Daniel J. Scheans
1960 Cultural Sequences at The Dalles, Oregon. American Philosophical Society Transactions, New Series 50(10).

Cressman, Luther S., and William S. Laughlin
1941 A Probable Association of Mammoth and Artifacts in the Willamette Valley, Oregon. American Antiquity 6:339-442.

Cressman, Luther S., Howell Williams, and Alex D. Krieger
1940 Early Man in Oregon: Archaeological Studies in the Northern Great Basin. University of Oregon Monographs, Studies in Archaeology 3.

Darienzo, Mark E., and Curt D. Peterson
1990 Episodic Subsidence of Late Holocene Salt Marshes, Northern Oregon Central Cascadia Margin. Tectonics 9(1): 1-22.

Davis, Carl M., and Sara A. Scott
n.d. The Lava Butte Site Revisited. Journal of California and Great Basin Anthropology. In press

Davis, Owen K., and Charles H. Miksicek
1987 Plant Remains from Archaeological Sites in the Elk Creek Drainage, Southern Oregon. In Data Recovery at Sites 35JA27, 35JA59, and 35JA100, Elk Creek Lake Project, Jackson County, Oregon, Volume 2, Appendices. Edited by Richard M. Pettigrew and Clayton G. Lebow, pp. B.1-B.11. Infotec Research Incorporated, Report No. PNW87-7. Eugene.

Davis, Wilbur A.
1983 Lost Creek Archaeology, Jackson County, Oregon, Contract CX 8099-2-0016, and 1974 Elk Creek Archaeology, Jackson County, Oregon, Contract CX 8099-2-0017. Reports of the Department of Anthropology, Oregon State University, to Interagency Archeological Services Division, Western Region, National Park Service.

1974 Lost Creek Archaeology, 1972 Final Report. Unpublished manuscript report, Oregon State University Department of Anthropology.

Deich, Lyman
1982 Aboriginal Clay Figurines from the Upper Rogue Valley in Southwestern Oregon. Master's Thesis, Department of Anthropology, Portland State University.

1977 Fluted Point Base from Western Oregon. Current Archaeological Happenings in Oregon 2(1).

Detling, Leroy E.
1968 Historical Background of the Flora of the Pacific Northwest. University of Oregon Museum of Natural History Bulletin 13.

Dorsey, J. Owen
1890 The Gentile System of the Siletz Tribes. Journal of American Folklore 3L 227-237.

Draper, John Allen
1988 A Proposed Model of Late Prehistoric Settlement Systems on the Southern Northwest Coast, Coos and Curry Counties, Oregon. Ph.D. Dissertation, Department of Anthropology, Washington State University, Pullman.

Drucker, Philip
1943 Archaeological Survey on the Northern Northwest Coast. Bureau of American Ethnology Bulletin 133, Anthropological Papers 20.

1937 The Tolowa and Their Southwest Oregon Kin. University of California Publications in American Archaeology and Ethnology 36: 221-300.

Dumond, Don E.
1983 Alaska and the Northwest Coast. In Ancient North Americans. Edited by Jesse D. Jennings, pp. 69-113. Freeman, Inc.

Dumond, Don E., and Rick Minor
1983 Archaeology in the John Day Reservoir: The Wildcat Canyon Site, 35-GM-9. University of Oregon Anthropological Papers 30.

Dunnell, Robert C., and Charlotte Beck
1979 The Caples Site, 45-SA-5, Skamania County, Washington. University of Washington Reports in Archaeology 6.

Dunnell, Robert C., James C. Chatters, and L.V. Salo
1973 Archaeological Survey of the Vancouver Lake-Lake River Area, Clark County, Washington. U.S. Army Corps of Engineers, Portland District.

Dyck, John
1982 A Clovis Point From Southwestern Oregon. Ohio Archaeologist 32(2): 32.

Endzweig, Pamela
1991 Current Archaeological Investigations in the Pine Creek Basin, North Central Oregon. Current Archaeological Happenings in Oregon 16(1): 4-8.

1989 Of Pots, Pipes, and People: Prehistoric Ceramics of Oregon. In Contributions to the Archaeology of Oregon 1987-88. Edited by Rick Minor. Occasional Papers of the Association of Oregon Archaeologists 4: 157-177.

Fagan, Brian M.
1987 The Great Journey: the Peopling of Ancient America. Thames and Hudson.

Erlandson, Jon M.
1992a California's Coastal Prehistory: a Circum-Pacific Perspective. Paper presented in the Plenary Session of the Society for California Archaeology Annual Meeting, Pasadena.

1992b Early Hunter-Gatherers of the California Coast. New York: Plenum Press.

Fagan, John L.
1988 Clovis and Western Pluvial Lakes Tradition Lithic Technologies at the Dietz Site in South-central Oregon. In, Early Human Occupation in Far Western North America: the Clovis-Archaic Interface, edited by Judith A. Willig, C.Melvin Aikens, and John L. Fagan. Nevada State Museum Anthropological Papers 21: 389- 416. Carson City.

1974 Altithermal Occupation of Spring Sites in the Northern Great Basin. University of Oregon Anthropological Papers 6.

Fagan, John L., and Garry Sage
1974 New Windust Sites in Oregon. Tebiwa 16(2): 68-71.

Fladmark, Knut R.
1979 Routes: Alternate Migration Corridors for Early Man in North America. American Antiquity 44: 55-69.

Flint, Richard F.
1971 Glacial and Quaternary Geology. John Wiley and Sons.

Fowler, Catherine S.
1989 Perishables. In Times Square Rockshelter: a Stratified Dry Rockshelter in the Western Cascades, Douglas County, Oregon, by Lee F. Spencer. Lee Spencer Archaeology Paper 1989-4: 397-443. On file, Umpqua National Forest, Roseburg, Oregon.

1986 Subsistence. In Handbook of North American Indians, Vol. 11, Great Basin. Edited by Warren L. d'Azevedo, pp. 64-97. Smithsonian Institution.

Fowler, Catherine S. and Sven Liljeblad
1986 Northern Paiute. In Handbook of North American Indians, Vol. 11, Great Basin. Edited by Warren L. d'Azevedo, pp. 435-465. Smithsonian Institution.

Fowler, Don D. Eugene M. Hattori and C. Cliff Creger
1989 Summary Report of Archaeological Investigations in Warner Valley, Lake County, Oregon 1987-88. University of Nevada, Reno, Department of Anthropology Research Reports 89-1.

Franchere, Gabriel
1967 Adventure at Astoria, 1810-14. Edited and translated by Hoyt C. Franchere. University of Oklahoma Press.

Friedel, Dorothy E., Lynn Peterson, Patricia F. McDowell, and Thomas J. Connolly
1989 Alluvial Stratigraphy and Human Prehistory of the Veneta Area, Long Tom River Valley, Oregon: the Final Report of the Country Fair/Veneta Archaeological Project. Report to the National Park Service, U.S. Department of the Interior, and Oregon State Historic Preservation Office. Oregon State Museum of Anthropology and Department of Geography, University of Oregon.

Gehr, Keith D.
1980 Late Pleistocene and Recent Archaeology and Geomorphology of the South Shore of Harney Lake, Oregon. Master's Thesis, Portland State University.

Goddard, Linda
1974 Field notes on excavations at the Squaw Pit Site, MNWR-98, Malheur National Wildlife Refuge, July 16-18, 1974. On file at the Oregon State Museum of Anthropology, University of Oregon.

Gould, Richard A.
1977 Puntutjarpa Rockshelter and the Australian Desert Culture. Anthropological Papers of the American Museum of Natural History 54(1).

Gray, Dennis J.
1987 The Takelma and Their Athapascan Neighbors: A New Ethnographic Synthesis for the Upper Rogue River Area of Southwestern Oregon. University of Oregon Anthropological Papers 37.

Grayson, Donald K.
1979 Mount Mazama, Climatic Change, and Fort Rock Basin Archaeofaunus. In Volcanic Activity and Human Ecology. Edited by Payson D. Sheets and Donald K. Grayson, pp. 427-458. Academic Press.

1977 Paleoclimatic Implications of the Dirty Shame Rockshelter Mammalian Fauna. Tebiwa: Miscellaneous Papers of the Idaho State University Museum 9.

Greenspan, Ruth L.
1992 Recent Zooarchaeological Investigations in the Fort Rock Basin, Oregon. In Archaeological Researches in the Northern Great Basin: Fort Rock Archaeology Since Cressman. Edited by C. Melvin Aikens and Dennis L. Jenkins. In preparation.

1991 The Vertebrate Faunal Assemblage. In Archaeological Investigations at the McCoy Creek Site (35HA1263), Harney County, Oregon. By Robert R. Musil Heritage Research Associates Report 105: 143-162.

1990a Prehistoric Fishing in the Northern Great Basin. In Wetlands Adaptations in the Great Basin, edited by Joel C. Janetski and David B. Madsen. Museum of Peoples and Cultures Occasional Papers 1: 207-232.

1990b The Vertebrate Faunal Assemblage. In Archaeology of the Dunn Site (35HA1261), Harney County, Oregon, By Robert R. Musil Heritage Research Associates Report 95: 87-94.

1986 Aboriginal Exploitation of Vertebrate Fauna. In The Archaeology of the Tahkenitch Landing Site: Early Prehistoric Occupation on the Oregon Coast, by Rick Minor and Kathryn Anne Toepel. Heritage Research Associates Report 46: 57-72.

1985 Fish and Fishing in Northern Great Basin Prehistory. Ph.D. Dissertation, Department of Anthropology, University of Oregon.

Greenspan, Ruth L., and Susan Crockford
1992 Vertebrate Faunal Remains from the Palmrose and Avenue Q Sites. In Human Response to Change in Coastal Geomorphology and Fauna on the Southern Northwest Coast: Archaeological Investigations at Seaside, Oregon. By Thomas J. Connolly. University of Oregon Anthropological Papers 5: 123-165.

Greenspan, Ruth L. and Rebecca J. Wigen
1987 Vertebrate Faunal Remains. In Archaeological Investigations at Yaquina Head, Central Oregon Coast, by Rick Minor, Kathryn Anne Toepel, and Ruth L. Greenspan. USDI BLM Oregon State Office Cultural Resource Series 1: 54-66.

Griffin, Dennis
1983 Archaeological Investigation at the Marial Site, Rogue River Ranch, 35CU84. Report prepared for the Bureau of Land Management, Medford District, under a cooperative agreement with Oregon State University. Richard E. Ross, Principal Investigator.

Griffin, Dennis, and Crystal Schreindorfer
1984 Prehistory of Southwestern Oregon: an Analysis of Three Sites Along the Lower Rogue River. Department of Anthropology, Oregon State University. On file.

Gruhn, Ruth
1965 Two Early Radiocarbon Dates from the Lower Levels of Wilson Butte Cave. Tebiwa 8(2): 57.

Hall, Henry J.
1977 A Paleoscatological Study of Diet and Disease at Dirty Shame Rockshelter, Southeast Oregon. Tebiwa: Miscellaneous Papers of the Idaho State University Museum 8.

Hammatt, Hallett H.
1977 Late Quaternary Stratigraphy and Archaeological Chronology in the Lower Granite Reservoir Area, Lower Snake River. Ph.D. Dissertation, Department of Anthropology, Washington State University.

Hanes, Richard C.
1988 Lithic Assemblages of Dirty Shame Rockshelter: Changing Traditions in the Northern Intermontane. University of Oregon Anthropological Papers 40.

1977 Lithic Tools of the Dirty Shame Rockshelter: Typology and Distribution. Tebiwa: Miscellaneous Papers of the Idaho State Museum 6.

1978a Archaeological Survey of the Upper Umpqua Region-1978. Report on file, Roseburg District, Bureau of Land Management.

1978b Archaeological Investigations in Camas Valley, Oregon. Report on file, Roseburg District, Bureau of Land Management.

Hann, Don
1989 The Tsagaglalal Petroglyph of the Columbia River Gorge. Special problems research paper, Department of Anthropology, University of Oregon.

Hannon, Nan and Richard K. Olmo (Editors)
1990 Living With the Land: the Indians of Southwest Oregon. Southern Oregon Historical Society. Medford.

Hansen, Henry P.
1947 Postglacial Forest Succession, Climate, and Chronology in the Pacific Northwest. American Philosophical Society Transactions 37: 1-130.

1942 A Pollen Study of Lake Sediments in the Lower Willamette Valley of Western Oregon. Bulletin of the Torrey Botanical Club 69(4): 262-280.

Haynes, C. Vance
1971 Time, Environment, and Early Man. Arctic Anthropology 8(2): 3-14.

1969 The Earliest Americans. Science 166: 709-715.

Haynes, C. Vance
1980 The Clovis Culture. In The Ice-Free Corridor and Peopling of the New World, pp. 115-121. Edited by N.W. Rutter and C.E. Schweger. Canadian Journal of Anthropology, special AMQUA issue.

Heflin, Eugene
1966 The Pistol River Site of Southwest Oregon. Reports of the University of California Archaeolgical Survey 67: 151-206.

Heizer, Robert F., and Martin A. Baumhoff
1962 Prehistoric Rock Art of Nevada and Eastern California. University of California Press.

Heusser, Calvin J.
1960 Late Pleistocene Environments of North Pacific North America. American Geographical Society Special Publication 35.

Hibbs, Charles H., Brian L. Gannon, and Cynthia H. Willard
1976 Lower Deschutes River Cultural Resources Survey: Warm Springs Bridge to Mack Canyon, Sherman, Wasco, and Jefferson Counties. USDI BLM Prineville District, Oregon.

Housley, Lucile A.
1993 It's in the Roots: Plants and Plant Use in the Fort Rock Basin. In Archaeological Researches in the Northern Great Basin: Fort Rock Archaeology Since Cressman. Edited by C. Melvin Aikens and Dennis L. Jenkins. In preparation.

Hughes, Richard E.
1990 The Gold Hill Site: Evidence for a Prehistoric Socioceremonial System in Southwestern Oregon. In Living With the Land: the Indians of Southwest Oregon, pp. 48-55. Edited by Nan Hannon and Richard K. Olmo. Medford: Southern Oregon Historical Society.

1987 Obsidian Sourcing. In Data Recovery at Sites 35JA27, 35JA59, and 35JA100, Elk Creek Lake Project, Jackson County, Oregon, Volume 2, Appendices. Edited by Richard M. Pettigrew and Clayton G. Lebow, pp. E.1-E.16. Infotec Research Incorporated, Report No. PNW87-7. Eugene.

1985 Obsidian Sources. In Nightfire Island: Later Holocene Lakemarsh Adaptation on the Western edge of the Great Basin. By C. Garth Sampson. University of Oregon Anthropological Papers 33: 245-267.

1978 Aspects of Prehistoric Wiyot Exchange and Social Ranking. Journal of California Anthropology 5(1): 53-66.

Hunn, Eugene
1990 Nch'i Wana (The Big River): Mid-Columbia River River People and Their Land. University of Washington Press.

Jenkins, Dennis L.
1993a Settlement-Subsistence Patterns in the Fort Rock Basin: A Cultural-Ecological Perspective on Human Response to Fluctuating Wetlands Resources of the Last 5000 Years. In Archaeological Researches in the Northern Great Basin: Fort Rock Archaeology Since Cressman. Edited by C. Melvin Aikens and Dennis L. Jenkins. In preparation.

1993b Archaeological Investigations at Three Wetlands Sites in the Silver Lake Area of the Fort Rock Basin. In Archaeological Researches inthe Northern Great Basin; Fort Rock Archaeology since Cressman. Edited by C. Melvin Aikens and Dennis L. Jenkins. In preparation.

Jenkins, Dennis L., and Ann Brashear
1993 Excavations at Four Habitation Sites in the Boulder Village Uplands: a Preliminary Report. In Archaeological Researches in the Northern Great Basin: Fort Rock Archaeology Since Cressman. Edited by C. Melvin Aikens and Dennis L. Jenkins. In preparation.

Jenkins, Dennis L., and Thomas J. Connolly
1990 Archaeology of Indian Grade Spring: a Special Function Site on Stinkingwater Mountain, Harney County, Oregon. University of Oregon Anthropological Papers 42.

Johannessen, Carl L., W.A. Davenport, Artimus Millet, and S. McWilliams
1971 The Vegetation of the Willamette Valley. Annals of the Association of American Geographers 61: 286-302.

Jones, George Thomas
1984 Prehistoric Land Use in the Steens Mountain Area, Southeastern Oregon. Ph.D. Dissertation, Department of Anthropology, University of Washington.

Jones, George T., Charlotte Beck, and Donald K. Grayson
1989 Measures of Diversity and Expedient Lithic Technologies, pp. 69-78. In Quantifying Diversity in Archaeology. Edited by Robert D. Leonard and George T. Jones. Cambridge University Press.

Jones, George Thomas, Donald K. Grayson, and Charlotte Beck
1983 Artifact Class Richness and Sample Size in Archaeological Surface Assemblages. In Lulu Linear Punctated: Essays in Honor of George Irving Quimby. Edited by Robert C. Dunnell and Donald K. Grayson. Anthropological Papers, Museum of Anthropology, University of Michigan 72: 55-73.

Jorgensen, Joseph G.
1980 Western Indians: Comparative Environments, Languages, and Cultures of 172 Western American Indian Tribes. Freeman and Company. San Francisco.

Kelly, Isabel
1932 Ethnography of the Surprise Valley Paiute. University of California Publications in American Archaeology and Ethnology 31: 67-210.

Kiigemagi, Peter
1989 Testing the Root-Processing Hypothesis through Use-Wear Analysis of Basalt Flakes from Indian Grade Spring, East-Central Oregon. In Contributions to the Archaeology of Oregon 1987-88. Edited by Rick Minor. Association of Oregon Archaeologists Occasional Papers 4: 145-156.

Kittleman, Laurence R.
1973 Mineralogy, Correlation, and Grain-size Distributions of Mazama Tephra and other Postglacial Pyroclastic Layers, Pacific Northwest. Geological Society of America Bulletin 84: 2957-2980.

Kroeber, Alfred L.
1939 Cultural and Natural Areas of Native North America. University of California Publications in American Archaeology and Ethnology 38.

LaLande, Jeff
1990 The Indians of Southwestern Oregon: An Ethnohistorical Review. In Living With the Land: the Indians of Southwest Oregon, pp. 95-119. Edited by Nan Hannon and Richard K. Olmo. Southern Oregon Historical Society. Medford.

LaLande, Jeffrey M., and John L. Fagan
1982 Clovis Point: Possible Clovis Point Find - Butte Falls. Current Archaeological Happenings in Oregon 7(1): 10.

Laughlin, William S.
1943 Notes on the Archaeology of the Yamhill River, Willamette Valley, Oregon. American Antiquity 9: 220-229.

Lebow, Clayton G., Richard M. Pettigrew, Jon M. Silvermoon, David H. Chance, Robert Boyd, Yvonne Hajda, and Henry Zenk
1990 A Cultural Resource Overview for the 1990's, BLM Prineville District, Oregon. USDI BLM Oregon State Office Cultural Resource Series 5.

Leonhardy, Frank C.
1975 The Lower Snake River Culture Typology-1975: Leonhardy and Rice Revisited. Paper presented at the 28th Annual Meeting of the Northwest Anthropological Conference, Seattle, Washington.

Leonhardy, Frank C., and David G. Rice
1970 A Proposed Culture Typology for the Lower Snake River Region, Southeastern Washington. Northwest Anthropological Research Notes 4(1): 1-29.

Lewis, Henry T.
1990 Reconstructing Patterns of Indian Burning in Southwestern Oregon. In Living With the Land: Indians of Southwest Oregon, pp. 80-84. Edited by Nan Hannon and Richard K. Olmo. Medford: Southern Oregon Historical Society.

1973 Patterns of Indian Burning: Ecology and Ethnohistory. Ramona, California: Ballena Press.

Loring, J. Malcolm, and Louise Loring
1982 Pictographs and Petroglyphs of the Oregon Country, Part I: Columbia River and Northern Oregon. Institute of Archaeology, University of California, Los Angeles, Monograph 21.

1983 Pictographs and Petroglyphs of the Oregon Country, Part II: Southern Oregon. Institute of Archaeology, University of California, Los Angeles, Monograph 22.

Loud, Lewellyn L.
1918 Ethnogeography and Archaeology of the Wiyot Territory. University of California Publications in American Archaeology and Ethnology 14(3): 221-436.

Loy, Thomas H.
1987 Elk Creek Lake Project: Residue Analysis of 50 Artifacts from Three Sites. In Data Recovery at Sites 35JA27, 35JA59, and 35JA100, Elk Creek Lake Project, Jackson County, Oregon, Volume 2, Appendices. Edited by Richard M. Pettigrew and Clayton G. Lebow, pp. I.1-I.8. Infotec Research Incorporated, Report No. PNW87-7. Eugene.

Lundy, Doris
1976 Styles of Coastal Rock Art. In Indian Art Traditions of the Northwest Coast. Edited by Roy L. Carlson, pp. 89-97. Burnaby: Archaeology Press, Simon Frazer University.

Lyman, R. Lee
1991 Prehistory of the Oregon Coast: The Effects of Excavation Strategies and Assemblage Size on Archaeological Inquiry. San Diego: Academic Press.

1987 Elk Creek Zooarchaeology. In Data Recovery at Sites 35JA27, 35JA59, and 35JA100, Elk Creek Lake Project, Jackson County, Oregon, Volume 2, Appendices. Edited by Richard M. Pettigrew and Clayton G. Lebow, pp. D.1-D.38. Infotec Research Incorporated, Report No. PNW87-7. Eugene.

Mack, Joanne M.
1991 Ceramic Figurines of the Western Cascades of Southern Oregon and Northern California. In The New World Figurine Project, Volume 1, pp. 99-110. Edited by Terry Stocker. Provo: Research Press.

1990 Archaeology of the Upper Klamath River. In Living With the Land: The Indians of Southwest Oregon, pp. 10-25. Edited by Nan Hannon and Richard K. Olmo. Medford: Southern Oregon Historical Society.

1989 Pottery and Figurines from Elk Creek, Southwestern Oregon. In Contributions to the Archaeology of Oregon 1987-88. Edited by Rick Minor. Association of Oregon Archaeologists Occasional Papers 4: 37-53.

1987 Elk Creek Ceramics. In Data Recovery at Sites 35JA27, 35JA59, and 35JA100, Elk Creek Lake Project, Jackson County, Oregon, Volume 2, Appendices. Edited by Richard M. Pettigrew and Clayton G. Lebow, pp. J.1-J.25. Infotec Research Incorporated, Report No. PNW87-7. Eugene.

1983 Archaeological Investigations in the Salt Cave Locality: Subsistence Uniformity and Cultural Diversity on the Klamath River, Oregon. University of Oregon Anthropological Papers 29.

1975 Cultural Resources Inventory of the Potential Glass Buttes Geothermal Lease Area, Lake, Harney, and Deschutes Counties, Oregon. Final Report of the Department of Anthropology, University of Oregon, to the U.S. Bureau of Land Management.

Mackey, Harold (Editor)
1974 The Kalapuyans: A Source book on the Indians of the Willamette Valley. Mission-Mill Museum, Salem, Oregon.

Mann, Teri Paul
1993 FarView Butte: In Archaeological Researches in the Northern Great Basin: Fort Rock Archaeology Since Cressman. Edited by C. Melvin Aikens and Dennis L. Jenkins. In preparation.

Marchesini, Regina C.
1993 Seven Mile Ridge Cave: a Late Archaic Site in Christmas Lake Valley, Lake County, Oregon. In Archaeological ... see previous Mann reference.

Mazany, Terry
1980 Contributions to Oregon Archaeology. Oregon Museum of Science and Industry. On file.

McDowell, Patricia F.
1986 Reconstructing the Setting of the Tahkenitch Landing Site. In The Archaeology of the Tahkenitch Landing Site: Early Prehistoric Occupation on the Oregon Coast. By Rick Minor and Kathryne Anne Toepel. Heritage Research Associates Report 46: 91-103.

1987 Soil Chemistry at Sites 35JA100, 35JA59, 35JA27A, and 35JA27B: Pedogenic and Cultural Influences. In Data Recovery at Sites 35JA27, 35JA59, and 35JA100, Elk Creek Lake Project, Jackson County, Oregon, Volume 2, Appendices. Edited by Richard M. Pettigrew and Clayton G. Lebow, pp. A.35-A.52. Infotec Research Incorporated, Report No. PNW87-7. Eugene.

McDowell, Patricia F. and Jane Benjamin
1987 Geomorphic Setting and Stratigraphy of Sites 35JA100, 35JA59, 35JA27A, and 35JA27B, Elk Creek Lake Archaeological Project, Jackson County, Oregon. In Data Recovery at Sites 35JA27, 35JA59, and 35JA100, Elk Creek Lake Project, Jackson County, Oregon, Volume 2, Appendices. Edited by Richard M. Pettigrew and Clayton G. Lebow, pp. A.1-A.34. Infotec Research Incorporated, Report No. PNW87-7. Eugene.

McClure, Richard H., Jr.
1984 Rock Art of The Dalles-Deschutes Region: A Chronological Perspective. Master's thesis, Department of Anthropology, Washington State University.

McKinney, F. Ann
1984 Kalapuyan Subssistence: Reeaxamining the Willamette Falls Salmon Barrier. Northwest Anthropological Research Notes 18 (1):23-33.

McPherson, Penny, David Hall, Vince McGlone, and Nancy Nachtwey
1981 Archaeological Excavations in the Blue Mountains: Mitigation of Sites 35UN52, 35UN74, and 35UN95 in the Vicinity of Ladd Canyon, Union County, Oregon. Volume II: Site Specific Analysis and Intersite Comparisons. Western Cultural Resource Management, Inc., Boulder, Colorado.

Mehringer, Peter J. Jr.
1990 Volcanic Ash Dating of the Clovis Cache at East Wenatchee, Washington. National Geographic Research 6(4): 495-503.

1988 Clovis Cache Found: Weapons of Ancient Americans. National Geographic 174(4): 500-503.

1986 Prehistoric Environments. In Handbook of North American Indians, Vol. 11, Great Basin. Edited by Warren L. d'Azevedo, pp. 31-50. Smithsonian Institution.

1985 Late-Quaternary Pollen Records From the Interior Pacific Northwest and Northern Great Basin of the United States. In Pollen Records of Late-Quaternary North American Sediments. Edited by V.A. Bryant and R.G. Holloway, pp. 167-189. American Association of Stratigraphic Palynologists.

1977 Great Basin Late Quaternary Environments and Chronology. In Models in Great Basin Prehistory. Edited by Don D. Fowler. Desert Research Institute Publications in the Social Sciences 12: 113-167.

Mehringer, Peter J., Jr., and Peter E. Wigand
1990 Comparison of Late Holocene Environments From Woodrat Middens and Pollen: Diamond Craters, Oregon. In Packrat Middens: the Last 40,000 Years of Biotic Change. Edited by Julio Betancourt, Thomas R. Van Devender, and Paul S. Martin, pp. 295-325. University of Arizona Press.

1986 Holocene History of Skull Creek Dunes, Catlow Valley, Southeastern Oregon, U.S.A. Journal of Arid Environments 11: 117-138.

Mierendort, Robert R.
1983 Fluvial Processes and Prehistoric Settlement Patterns Along the Rocky Reach of the Columbia River. In Project Report Number 1: Cultural Resources of the Rocky Reach of the Columbia River. Edited by Randall F. Schalk and Robert R. Mierendorf, pp. 633-647. Center for Northwest Anthropology, Washington State University.

Miller, Floyd Eugene
1975 The Benjamin Sites, 35 LA 41, 42. In Archaeological Studies in the Willamette Valley, Oregon. Edited by C. Melvin Aikens. University of Oregon Anthropological Papers 8: 309-348.

Minor, Rick
1991 Yaquina Head: a Middle Archaic Settlement on the North-Central Oregon Coast. USDI BLM Oregon State Office Cultural Resource Series 6.

1989a An Outline of Southern Northwest Coast Prehistory. Preprint Series, Circum-Pacific Prehistory Conference, Seattle, Washington, 1989. Washington State University Press.

1989b Archaeology of the North Yaquina Head Shell Middens, Central Oregon Coast. USDI BLM Oregon State Office Cultural Resource Series 3.

1989c The Ede Site and its Importance in Lower Columbia Valley Prehistory. In Contributions to the Archaeology of Oregon 1987-88. Edited by Rick Minor. Association of Oregon Archaeologists Occasional Papers 4: 113-144.

1987 Archaeology of the South Umpqua Falls Rockshelters, Douglas County, Oregon. Heritage Research Associates Report 64. Eugene.

1983 Aboriginal Settlement and Subsistence at the Mouth of the Columbia River. Ph.D. Dissertation, Department of Anthropology, University of Oregon.

Minor, Rick, Stephen Dow Beckham, Phillis E. Lancefield-Steeves, and Kathryn Anne Toepel 1980 Cultural Resource Overview of the BLM Salem District, Northwestern Oregon: Archaeology, Ethnography, History. University of Oregon Anthropological Papers 20.

Minor, Rick, and Lee F. Spencer
1977 Site of a Probable Camelid Kill at Fossil Lake, Oregon: an Archaeological Evaluation. Report of the Department of Anthropology, University of Oregon, to the Bureau of Land Management, Lakeview District.

Minor, Rick, and Kathryn Anne Toepel
1989 Exchange Items or Hunter's Tools? Another Look at Lanceolate Biface Caches in Central Oregon. Journal of California and Great Basin Anthropology 11(1): 99-107.

1986 The Archaeology of the Tahkenitch Landing Site: Early Prehistoric Occupation on the Oregon Coast. Heritage Research Associates Report 46. Eugene.

1984 Lava Island Rockshelter: an Early Hunting Camp in Central Oregon. Idaho Museum of Natural History Occasional Papers 34.

1983 Patterns of Aboriginal Land Use in the Southern Oregon Coastal Region. In Prehistoric Places on the Southern Northwest Coast, pp. 225-253. Edited by Robert S. Greengo. Seattle: Thomas Burke Memorial Washington State Museum.

Minor, Rick, Kathryn Anne Toepel, and Stephen Dow Beckham
1986 An Overview of Investigations at 45SA11: Archaeology in the Columbia River Gorge. Heritage Research Associates Report 39.

Minor, Rick, Kathryn Anne Toepel, and Ruth L. Greenspan
1987 Archaeological Investigations at Yaquina Head, Central Oregon Coast. USDI BLM Oregon State Office Cultural Resource Series 1.

Moore, Earl
1977 Silent Arrows: Indian Lore and Artifact Hunting. Paul Tremaine Publishing, Klamath Falls, Oregon.

Morgan, Lewis Henry
1971 Systems of Consanguinity and Affinity of the Human Family. Smithsonian Contributions to Knowledge 218. Smithsonian Institution.

Moratto, Michael J.
1984 California Archaeology. Academic Press.

Murdock, George Peter
1980 The Tenino Indians. Ethnology 19(2): 129-149.

Murdy, Carson N., and Walter J. Wentz
1975 Artifacts from Fanning Mound, Willamette Valley, Oregon. In Archaeological Studies in the Willamette Valley, Oregon. Edited by C. Melvin Aikens. University of Oregon Anthropological Papers 8: 349-374.

Musil, Robert R.
1991 Archaeological Investigations at the McCoy Creek Site (35HA1263), Harney County, Oregon. Heritage Research Associates Report 105.

Musil, Robert R.
1990 Archaeology of the Dunn Site (35HA1261), Harney County, Oregon. Heritage Research Associates Report 95.

Newman, Thomas M.
1966 Cascadia Cave. Occasional Papers of the Idaho State University Museum 18.

1959 Tillamook Prehistory and its Relation to the Northwest Coast Culture Area. Ph.D. Dissertation, Department of Anthropology, University of Oregon.

Nilsson, Elena, and Michael S. Kelly
1991 Prehistory of the Upper Rogue River Region: Archaeological Inventory and Evaluation Within the Elk Creek Lake and Lost Creek Lake Project Areas, Jackson County, Southwest Oregon. Prepared for the U.S. Army Corps of Engineers, Portland District. Chico, California: Mountain Anthropological Research.

Nisbet, Robert A., Jr.
1981 The Lanceolate Projectile Point in Southwestern Oregon: A Perspective from the Applegate River. Master's Paper, Interdisciplinary Studies Program, Oregon State University.

Oetting, Albert C.
1993 Prehistoric Land Use Patterns on Buffalo Flat, Christmas Lake Valley, Oregon. In Archaeological Researches in the Northern Great Basin: Fort Rock Archaeology Since Cressman. Edited by C. Melvin Aikens and Dennis L. Jenkins. In preparation.

1991 Recent Archaeological Surveys Around Malheur Lake, Harney County, Oregon. Current Archaeological Happenings in Oregon 16(1): 9-13.

1990 Aboriginal Settlement in the Lake Abert-Chewaucan Marsh Basin, Lake County, Oregon. In Wetlands Adaptations in the Great Basin. Edited by Joel C. Janetski and David B. Madsen. Museum of Peoples and Cultures Occasional Papers 1: 183-205.

1989 Villages and Wetlands Adaptations in the Northern Great Basin: Chronology and Land Use in the Lake Abert-Chewaucan Marsh Basin, Lake County, Oregon. University of Oregon Anthropological Papers 41.

Olsen, Thomas L.
1975 Baby Rock Shelter. In Archaeological Studies in the Willamette Valley, Oregon. Edited by C. Melvin Aikens. University of Oregon Anthropological Papers 8: 469-494.

O'Neill, Brian L.
1989 Archaeological Investigations at the Narrows and Martin Creek Sites, Douglas County, Oregon. USDI BLM Oregon State Office Cultural Resource Series 4.

1990 Toward a Definition of Middle and Late Archaic Phases in the Umpqua Basin of Southwest Oregon. In Living With the Land: The Indians of Southwest Oregon, pp. 26-36. Edited by Nan Hannon and Richard K. Olmo. Medford: Southern Oregon Historical Society.

OSU Department of Anthropology
1981 A Reevaluation of Cultural Resources within the Proposed Elk Creek Lake Project Area, Jackson County, Oregon. U.S. Army Corps of Engineers, Portland District.

Peterson, Curt D., Mark E. Darienzo, and M. Parker
1988 Coastal Neotectonic Field Trip Guide for Netarts Bay, Oregon. Oregon Geology 50: 99-106.

Peterson, Curt D., Mark E. Darienzo, and M. Parker
1988 Coastal Neotectonic Field Trip Guide for Netarts Bay, Oregon. Oregon Geology 50: 99-106.

Peterson, Curt D., K.D. Scheidegger, and H.J. Schrader
1984 Holocene Depositional Evolution of a Small Active Margin Estuary of the Northwestern United States. Marine Geology 59: 51-83.

Pettigrew, Richard M.
1990 New Pathways for Research in Southwest Oregon Archaeology. In Living With the Land: the Indians of Southwest Oregon. Edited by Nan Hannon and Richard K. Olmo, pp. 63-69. Southern Oregon Historical Society, Medford.

1985 Archaeological Investigations on the East Shore of Lake Abert, Lake County, Oregon. University of Oregon Anthropological Papers 32.

1984 Prehistoric Human Land-Use Patterns in the Alvord Basin, Southeastern Oregon. Journal of California and Great Basin Anthropology 6(1): 61-90.

1981 A Prehistoric Culture Sequence in the Portland Basin of the Lower Columbia Valley. University of Oregon Anthropological Papers 22.

1980a The Ancient Chewaucanians: More on the Prehistoric Lake Dwellers of Lake Abert, Southwestern Oregon. In Proceedings of the First Annual Symposium of the Association of Oregon Archaeologists. Edited by Martin Rosenson. Association of Oregon Archaeologists Occasional Papers 1: 49-67.

1980b Archaeological Investigations at Hager's Grove, Salem, Oregon. University of Oregon Anthropological Papers 19.

1979 Archaeological Investigations at Stinkingwater Pass, Harney County, Oregon. University of Oregon Anthropological Papers 15.

Pettigrew, Richard M., and Clayton G. Lebow
1989 An Archaeological Survey of the Trout Creek-Oregon Canyon Uplands, Harney and Malheur Counties, Oregon. USDI BLM Oregon State Office Cultural Resource Series 2.

1987 Data Recovery at Sites 35JA27, 35JA59, and 35JA100, Elk Creek Lake Project, Jackson County, Oregon, Volume 2, Appendices. Infotec Research Incorporated, Report No. PNW87-7. Eugene.

Phebus, George E., and Robert M. Drucker
1973 Archaeological Investigations of the Northern Oregon Coast. Unpublished manuscript on file, Department of Anthropology, Smithsonian Institution.

1977 Archaeological Investigations at Seaside, Oregon. Privately printed, Seaside, Oregon.

Polk, Michael R.
1976 Cultural Resource Inventory of the John Day River Canyon. USDI BLM, Prineville District, Oregon.

Prouty, Guy
1989 Ancient Earth Ovens at the Saltsgaver Site, Southwestern Oregon. In Contributions to the Archaeology of Oregon 1987-88. Edited by Rick Minor. Association of Oregon Archaeologists Occasional Papers 4: 1-37

Pullen, Reg
1990 Stone Sculptures of Southwest Oregon: Mythological and Ceremonial Associations. In Living With the Land: the Indians of Southwest Oregon, pp. 120-124. Edited by Nan Hannon and Richard K. Olmo. Medford: Southern Oregon Historical Society.

Randle, Keith, Gordon G. Goles, and Laurence R. Kittleman
1971 Geochemical and Petrological Characterization of Ash Samples from Cascade Range Volcanoes. Quaternary Research 1:261-282.

Rankin, David K.
1983 Holocene Geologic History of the Clatsop Plains Foredune Ridge Complex. Master's thesis, Department of Geology, Portland State University.

Ray, Verne F.
1963 Primitive Pragmatists: the Modoc Indians of Northern California. University of Washington Press.

1939 Cultural Relations in the Plateau of Northwestern America. Publications of the Frederick Webb Hodge Anniversary Publication Fund 3. The Southwest Museum, Los Angeles.

1936 Native Villages and Groupings of the Columbia Basin. Pacific Northwest Quarterly 27:99-152.

Reid, Kenneth C., John A. Draper, and Peter E. Wigand
1989 Prehistory and Paleoenvironments of the Silvies Plateau, Harney Basin, Southeastern Oregon. Washington State University Center for Northwest Anthropology Project Report 8.

Rigsby, Bruce
1969 The Waiilatpuan Problem: More on Cayuse-Molala Relatability. Northwest Anthropological Research Notes 3(1):68-145.

1965 Linguistic Relations in the Southern Plateau. Ph.D. Dissertation, Department of Anthropology, University of Oregon.

Ross, Richard E.
1987 Marial. Research proposal submitted to the Bureau of Land Management, Medford District, by Oregon State University.

1963 Prehistory of the Round Butte Area, Jefferson County, Oregon. Master's Thesis, Department of Anthropology, University of Oregon.

Ross, Richard E., and Sandra L. Snyder
1979 Riverine Adaptation on the Central Oregon Coast: 35DO83-A Preliminary Report. Paper presented at the 44th Annual Meeting of the Society for American Archaeology, Vancouver, British Columbia.

1986 The Umpqua/Eden Site (35Do83): Exploitation of Marine Resources on the Central Oregon Coast. In Contributions ot the Archaeology of Oregon 1983-86. Association of Oregon Archaeologists Occasional Papers 3: 80-101.

Saleeby, Becky M.
1983a Zooarchaeological Indicators of Seasonality: Six Portland Basin Sites. In Contributions to the Archaeology of Oregon, 1981-82. Edited by Don E. Dumond. Association of Oregon Archaeologists Occasional Papers 2: 57-66.

1983b Prehistoric Settlement Patterns in the Portland Basin of the Lower Columbia River: Ethnohistoric, Archaeological, and Biogeographic Perspectives. Ph.D. Dissertation, Department of Anthropology, University of Oregon.

Sampson, C. Garth
1985 Nightfire Island: Later Holocene Lakemarsh Adaptation on the Western edge of the Great Basin. University of Oregon Anthropological Papers 33.

Sanford, Patricia Ruth
1983 An Analysis of Megascopic Plant Remains and Pollen from Dirty Shame Rockshelter, Southeastern Oregon. Ph.D. Dissertation, Department of Anthropology, University of Oregon.

Schalk, Randall F.
1987 Archaeology of the Morris Site (35GM91) on the John Day River, Gilliam County, Oregon. Prepared by the Office of Public Archaeology, University of Washington, for the U.S. Army Corps of Engineers, Portland District.

1980 Cultural Resource Investigations for the Second Powerhouse Project at McNary Dam, near Umatilla, Oregon. (Assembler) Laboratory of Archaeology and History Project Report 1. Washington State University.

1977 The Structure of an Anadromous Fish Resource. In For Theory Building in Archaeology: Essays on Faunal Remains, Aquatic Resources, Spatial Analysis, and Systematic Modeling. Edited by Lewis R. Binford, pp. 207-249. Academic Press.

Schmitt, Dave N.
1989 The Zooarchaeology of Times Square Shelter: Faunal Accumulations and Human Subsistence. In Times Square Rockshelter: a Stratified Dry Rockshelter in the Western Cascades, Douglas County, Oregon, by Lee F. Spencer. Lee Spencer Archaeology Paper 1989-4: 447-476. On file, Umpqua National Forest, Roseburg, Oregon.

Schreindorfer, Crystal
1985 Marial 1984: Archaeological Investigations at 35CU84. Report prepared for the Bureau of Land Management, Medford District, under a cooperative agreement with Oregon State University. Richard E. Ross, Principal Investigator.

Scott, Sara, Carl Davis, and J. Jeffrey Flenniken
1986 The Pahoehoe Site: A Lanceolate Biface Cache in Central Oregon. Journal of California and Great Basin Anthropology 8(1): 7-23.

Shipley, William
1978 Native Languages of California. In Handbook of North American Indians, Vol. 8, California. Edited by Robert F. Heizer, pp. 80-90. Smithsonian Institution.

Silvermoon, Jon M.
1989 Archaeological Investigations at the Peninsula Site, 35LK87, Gerber Reservoir, South-Central Oregon. Report of the Department of Anthropology, University of Oregon, to the Bureau of Land Management.

Skinner, Craig Eugene
1991 Obsidian at Inman Creek: Geoarchaeological Investigations of an Unexpected Geologic Source of Obsidian in the Southwestern Willamette Valley, Oregon. Master's Paper, Department of Anthropology, University of Oregon.

Snyder, Sandra L.
1987 Prehistoric Land Use Patterns in the Central Oregon Cascade Range. Ph.D. Dissertation, Department of Anthropology, University of Oregon.

1978 An Osteo-Archaeological Investigation of Pinniped Remains at Seal Rock, Oregon (35LNC14). Master's thesis, Department of Anthropology, Oregon State University.

Southard, Michael D.
1991 Archaeological Investigations on the Western Flank of the South-Central Cascades, Lane and Douglas Counties, Oregon. USDI BLM Oregon State Office Cultural Resource Series 7.

1970 A Study of Two Northwest Housepit Populations. Master's Thesis, Department of Anthropology, University of Oregon.

Spencer, Lee F.
1989 Times Square Rockshelter: a Stratified Dry Rockshelter in the Western Cascades, Douglas County, Oregon. Lee Spencer Archaeology Paper 1989-4. On file, Umpqua National Forest, Roseburg, Oregon.

1987 Archaeological Testing of the Horseshoe #6 Site (35D0400), a Middle Archaic Glade Tradition Site on the Steamboat District of the Umpqua National Forest. Lee Spencer Archaeology Paper 1987-4. On file, Umpqua National Forest, Roseburg, Oregon.

Spier, Leslie
1930 Klamath Ethnography. University of California Publications in American Archaeology and Ethnology 30.

Sprague, F. Leroy, and Henry P. Hansen
1946 Forest Succession in the McDonald Forest, Willamette Valley, Oregon. Northwest Science 20:89-98.

Steele, Harvey W.
n.d. The Marthaller Site: Preliminary Report on 35-J-16. Report on file, Oregon Archaeological Society, Portland.

Stenger, Alison T.
1991 Japanese-Influenced Ceramics in Precontact Washington State: a View of the Wares and Their Possible Origin. In The New World Figurine Project, Volume1. Edited by Terry Stocker, pp. 111-122. Research Press, Provo, Utah.

Stenholm, Nancy A.
1990 The Botanical Assemblage. In Archaeology of the Dunn Site (35HA1261), Harney County, Oregon, By Robert R. Musil Heritage Research Associates Report 95: 81-86.

1991 The Botanical Assemblage. In Archaeological Investigations at the McCoy Creek Site (35HA1263), Harney County, Oregon. By Robert R. Musil Heritage Research Associates Report 105: 132-142.

1993 Fort Rock Basin Botanical Analysis. In Archaeological Researches in the Northern Great Basin: Fort Rock Archaeology Since Cressman. Edited by C. Melvin Aikens and Dennis L. Jenkins. In preparation.

Stern, Theodore
1966 The Klamath Tribe: A People and Their Reservation. American Ethnological Society Monograph 41. University of Washington Press.

Steward, Julian H.
1938 Basin-Plateau Aboriginal Sociopolitical Groups. Bureau of American Ethnology Bulletin 120.

1933 Ethnography of the Owens Valley Paiute. University of California Publications in American Archaeology and Ethnology 33: 233-350.

1929 Petroglyphs of California and Adjoining States. University of California Publications in American Archaeology and Ethnology 24(2): 47-238.

1927 A New Type of Carving from the Columbia Valley. American Anthropologist 29(2): 255-261.

Stewart, Hilary
1977 Indian Fishing: Early Methods on the Northwest Coast. Seattle: University of Washington Press.

Strong, Emory
1969 Stone age in the Great Basin. Binfords and Mort, Portland.

Strong, William Duncan
1943 The Occurrence and Wider Implications of a "Ghost Cult" on the Columbia River, Suggested by Carvings on Wood, Bone, and Stone. American Anthropologist 47: 244-261.

Stuemke, Scott
1989 The Archaeology of the Peninsula I Site, 35-JE-53, a Central Oregon Rock Shelter. Master's Paper, Department of Anthropology, University of Oregon.

Taylor, R.E.
1987 Radiocarbon Dating: An Archaeological Perspective. Academic Press, New York.

Thomas, Scott, Jon Loring, and Andrew Goheen
1983 An Aboriginal Pottery Site in Southeastern Oregon. In Contributions to the Archaeology of Oregon 1981-1982. Edited by Don E. Dumond. Association of Oregon Archaeologists Occasional Papers 2: 82-98.

Todt, Donn L.
1990 Clues to Past Environments: Relict and Disjunct Plant Distributions Along the California- Oregon Border. In Living With the Land: Indians of Southwest Oregon, pp. 71-79. Edited by Nan Hannon and Richard K. Olmo. Medford: Southern Oregon Historical Society.

Toepel, Kathryn Anne
1985 The Flanagan Site: 6000 Years of Occupation in the Upper Willamette Valley, Oregon. Ph.D. Dissertation, Department of Anthropology, University of Oregon.

Toepel, Kathryn Anne, and Rick Minor
1980 Archaeological Investigations at the Flanagan Site (35LA218): the 1978 Season. Report of the Department of Anthropology, University of Oregon, to the Oregon State Historic Preservation Office.

Warren, Claude N.
1959 Housepits and Village Patterns in the Columbia Plateau and Southwestern Washington. Tebiwa 3: 25-28.

Weide, Margaret M.
1974 North Warner Subsistence Network: a Prehistoric Band Territory. Nevada Archaeological Survey Research Papers 5: 62-79.

White, John R.
1975 The Hurd Site. In Archaeological Studies in the Willamette Valley, Oregon. Edited by C. Melvin Aikens. University of Oregon Anthropological Papers 8: 141-225.

Whiting, Beatrice Blyth
1950 Paiute Sorcery. Viking Fund Publications in Anthropology 15.

Whitley, David S., and Ronald I. Dorn
1987 Rock Art Chronology in Eastern California. World Archaeology 19(2): 150-164.

Wigand, Peter E.
1987 Diamond Pond, Harney County, Oregon: Vegetation History and Water Table in the Eastern Oregon Desert. Great Basin Naturalist 47:3: 427-458.

Wilde, James D.
1985 Prehistoric Settlements in the Northern Great Basin: Excavations and Collections Analysis in the Steens Mountain Area, Southeastern Oregon. Ph.D. Dissertation, Department of Anthropology, University of Oregon.

Wilde, James D., Rinita Dalan, Steve Wilke, Ralph Keuler, and John Foss
1983 Cultural Resource Survey and Evaluations of Select Parcels in the John Day Reservoir, Oregon. Report of Geo-Recon International, Seattle, to the U.S. Army Corps of Engineers, Portland District.

Willig, Judith A.
1988 Paleo-Archaic Adaptations and Lakeside Settlement Patterns in the Northern Alkali Basin, Oregon. In Early Human Occupation in Far Western North America: the Clovis-Archaic Interface, edited by Judith A. Willig, C.Melvin Aikens, and John L. Fagan. Nevada State Museum Anthropological Papers 21: 417-482. Carson City.

1982 Pole-and-Thatch Structures in the Great Basin: Evidence From the Last 5,000 years. Master's Paper, Department of Anthropology, University of Oregon.

Willig, Judith A., and C. Melvin Aikens
1988 The Clovis-Archaic Interface in Far Western North America. In Early Human Occupation in Far Western North America: the Clovis-Archaic Interface, edited by Judith A. Willig, C. Melvin Aikens, and John L. Fagan. Nevada State Museum Anthropological Papers 21:1-40. Carson City.

Wilson, Bart McLean
1979 Salvage Archaeology of the Ritsch Site, 35JO4: A Late Prehistoric Village Site on the Central Rogue River, Oregon. Master of Arts Thesis in Interdisciplinary Studies, Oregon State University.

Womack, Bruce
1977 An Archaeological Investigation and Technological Analysis of the Stockhoff Basalt Quarry, Northeastern Oregon. Master's thesis, Department of Anthropology, Washington State University.

Wood, W. Raymond
1972 Contrastive Features of Native North American Trade Systems. In For the Chief: Essays in Honor of Luther S. Cressman. Edited by Fred W. Voget and Robert L. Stephenson. University of Oregon Anthropological Papers 4:153-169.

Woodward, John A.
1986 Prehistoric Shipwrecks on the Oregon Coast? Archaeological Evidence. In Contributions to the Archaeology of Oregon, 1983-1986. Edited by Kenneth M. Ames. Occasional Papers of the Association of Oregon Archaeologists 3: 219-264.

1974 Salmon, Slaves, and Grizzly Bears:The Prehistoric Antecedents and Ethnohistory of Clackamas Indian Culture. Ph.D. Dissertation, Department of Anthropology, University of Oregon.

Woodward, John A., Carson N. Murdy, and Franklin Young
1975 Artifacts from Fuller Mound, Willamette Valley, Oregon. In Archaeological Studies in the Willamette Valley, Oregon. Edited by C. Melvin Aikens. University of Oregon Anthropological Papers 8: 375-420.

Yellen, John E.
1977 Archaeological Approaches to the Present: Models for Reconstructing the Past. New York: Academic Press.

Zeier, Charles D.
1986 Obsidian Studies. In Data Recovery at Sites 36JA102 and 35JA107, Elk Creek Lake Project, Jackson County, Oregon, by Elizabeth E. Budy and Robert G. Elston, pp. 371-394. Report by Intermountain Research, Silver City, Nevada, to the U.S. Army Corps of Engineers, Portland District.

Zenk, Henry B.
1976 Contributions to Tualatin Ethnography: Subsistence and Ethnobiology. Master's Thesis, Department of Anthropology, Portland State University.

Zilverberg, Grace M.
1983 Building Subsistence Models in the Blue Mountain Region of Northeastern Oregon. In Contributions to the Archaeology of Oregon, 1981-1982. Edited by Don E. Dumond. Association of Oregon Archaeologists Occasional Paper 2: 123-136.

U.S. Department of the Interior
Bureau of Land Management
Oregon State Office
1300 N.E. 44th Avenu
Portland, Oregon 97213