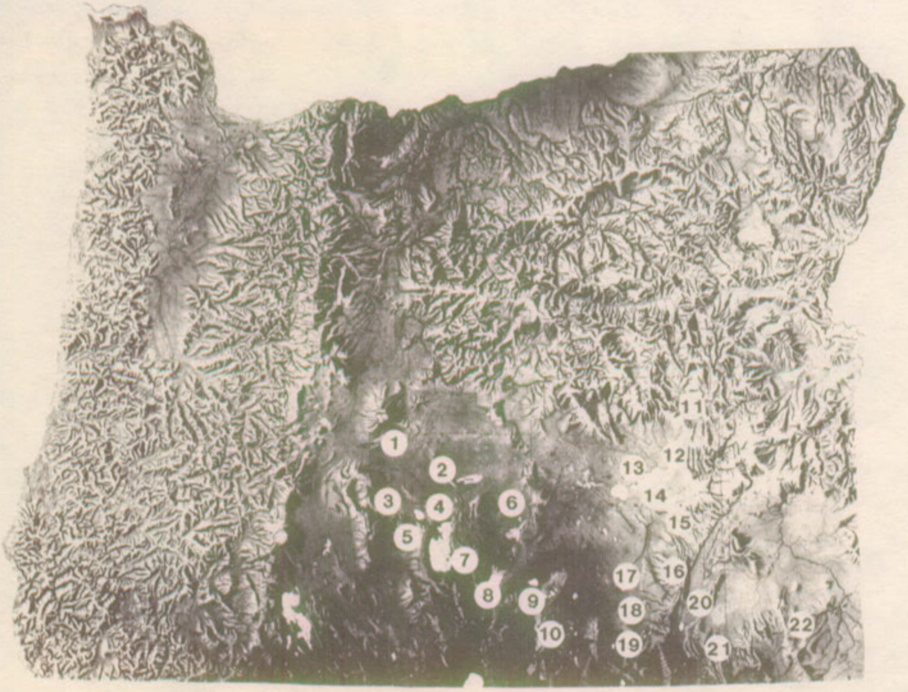
Chapter 2

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.

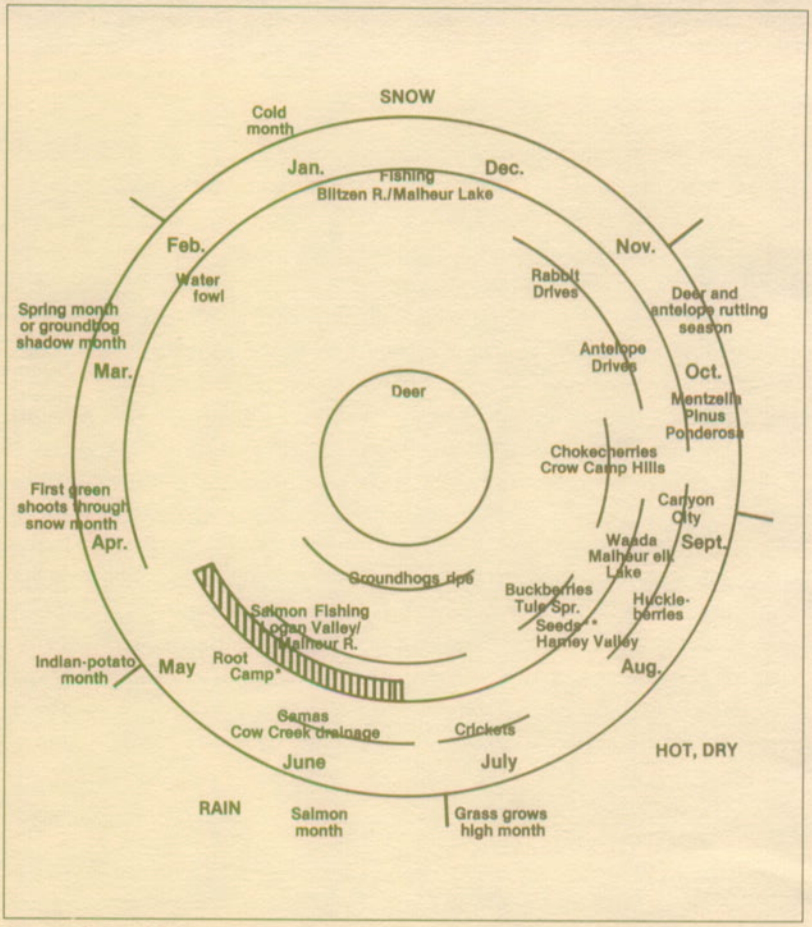
Hunting-gathering people, dependent on the free-living bounty of nature for their sustenance, perforce track the natural patterns and cycles of their environment. The annual round of eastern Oregon's historic Harney Valley Paiutes was broadly typical of many Great Basin groups (Figure 2.2).

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

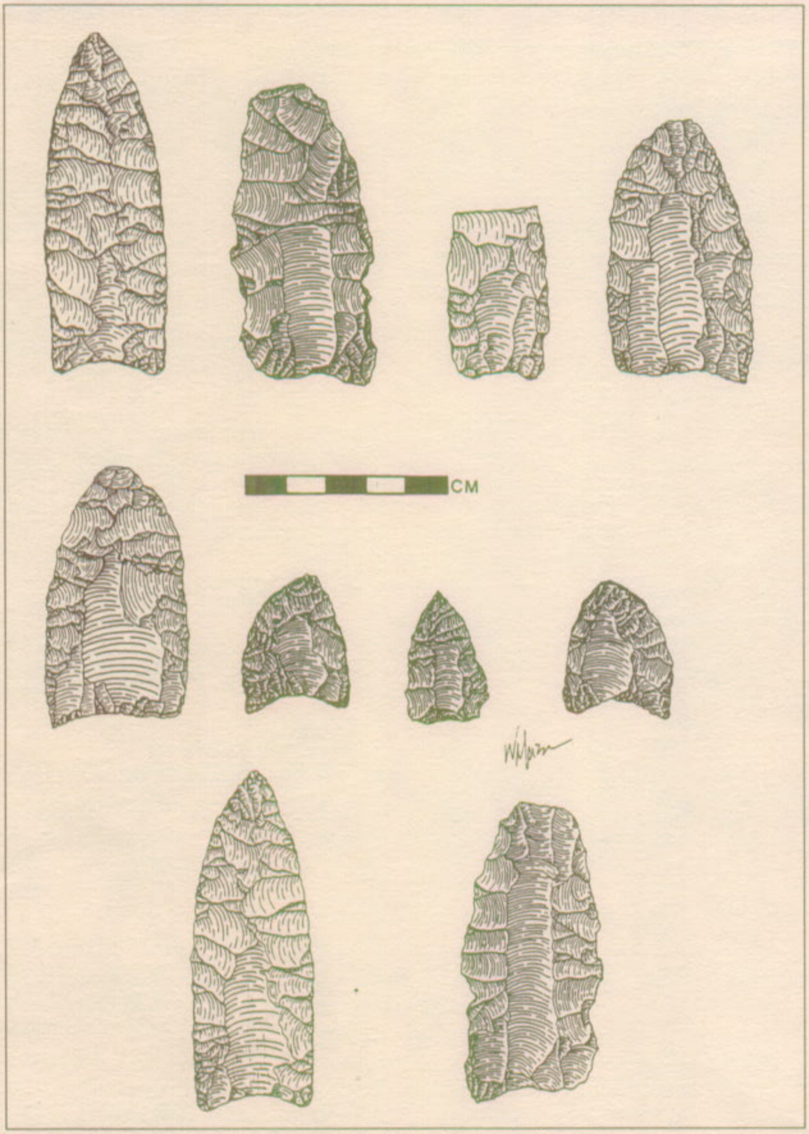


Figure 2.3 Clovis fluted points from the Dietz Site, central Oregon.

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.

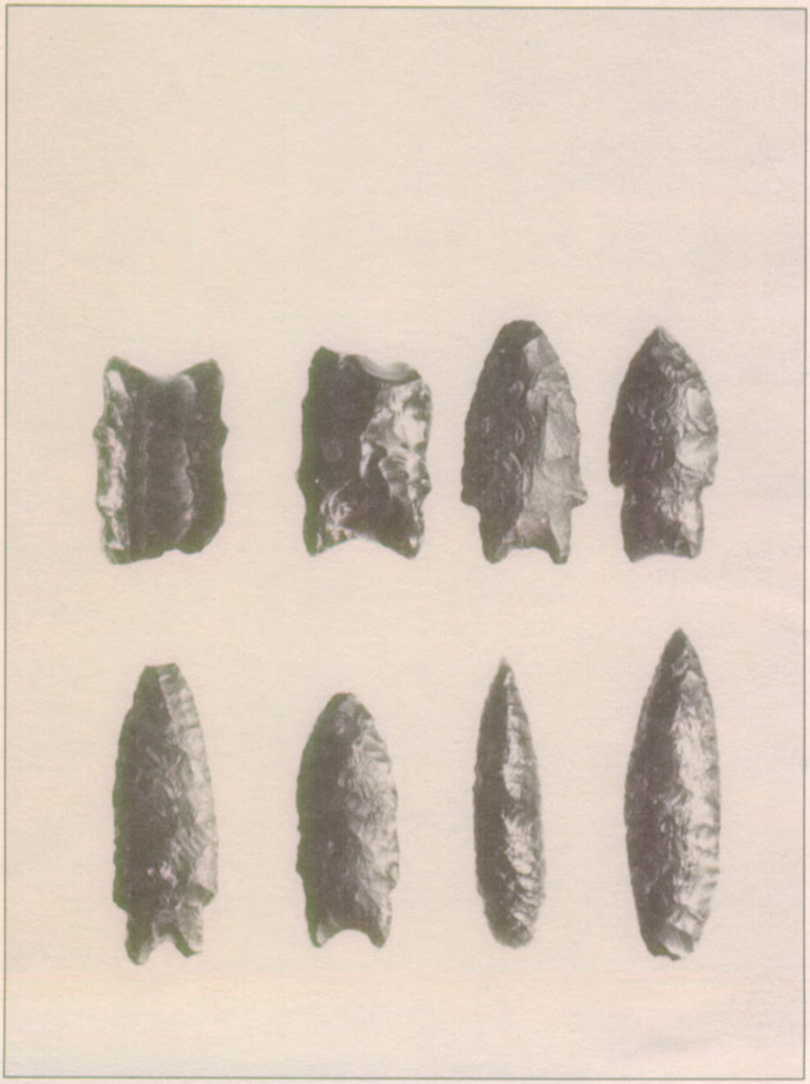


Figure 2.4 Projectile points from the Early period, Northern Great Basin, Oregon. At upper left is shown the fluted face and unfluted obverse face of a point from Glass Butte. Note the similarity between the unfluted face of this point and the accompanying stemmed Windust points. Large leaf-shaped points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

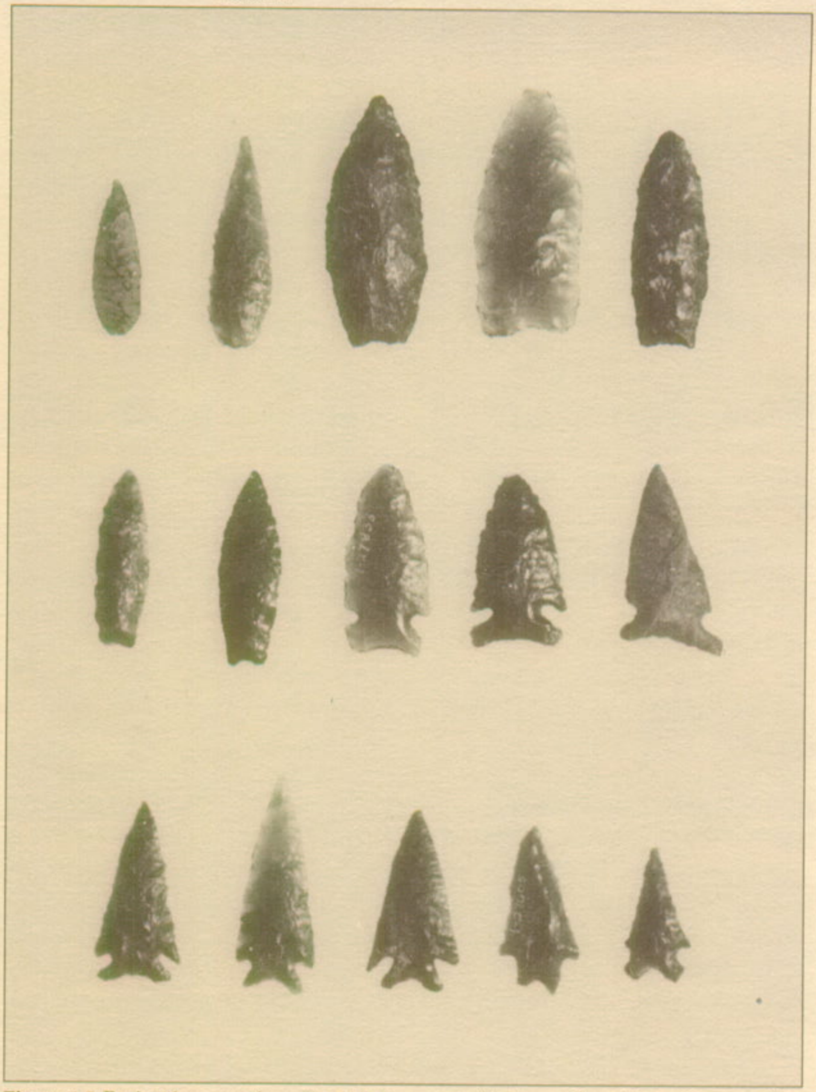


Figure 2.5 Projectile points from the Middle period, Northern Great Basin, Oregon. Top row: Cascade willowleaf (2), Black Rock Concave-base (3); Middle row: Humboldt Lanceolate (2); Northern Side-notched (3); Bottom row: Elko Eared (3), Pinto Indented base (2).

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

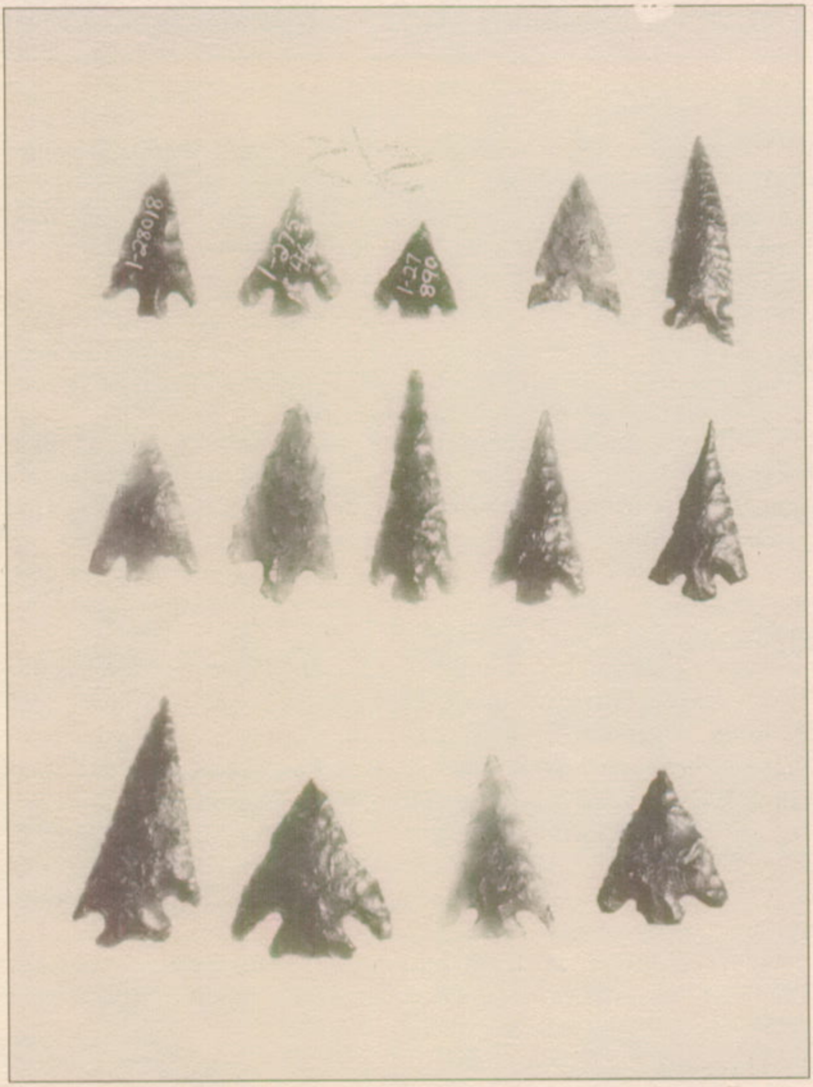


Figure 2.6 Projectile points from the Late period, Northern Great Basin, Oregon. Top row: Rose Spring (3), Desert Side-notched (2); Middle row: Rose Spring; Bottom row; Eastgate Expanding stem.

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

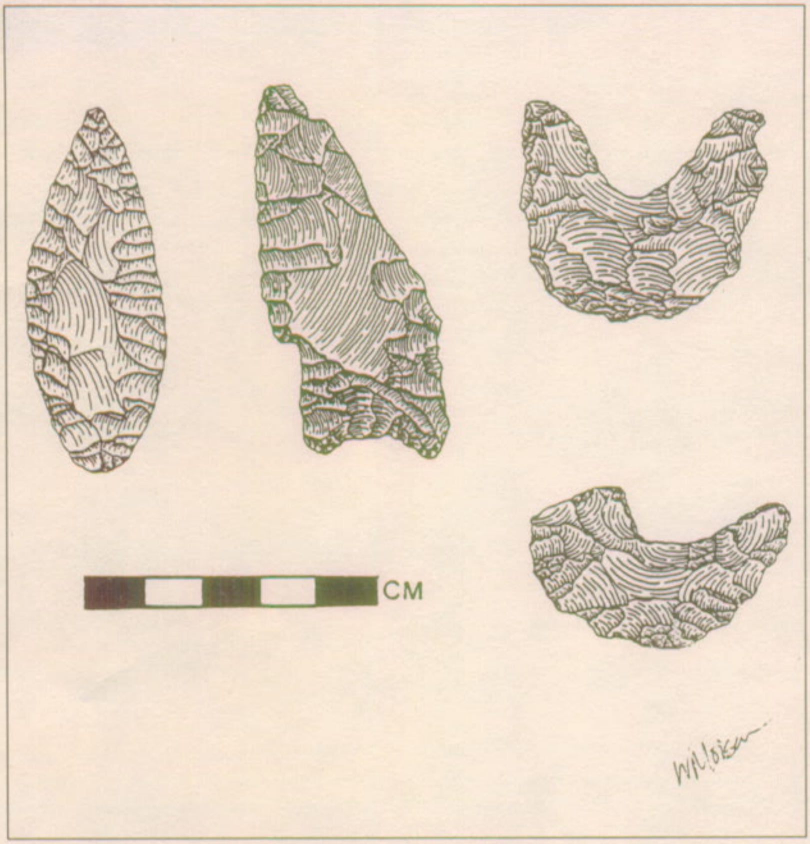


Figure 2.7 Paleo-Indian stone tools from the Dietz Site.

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

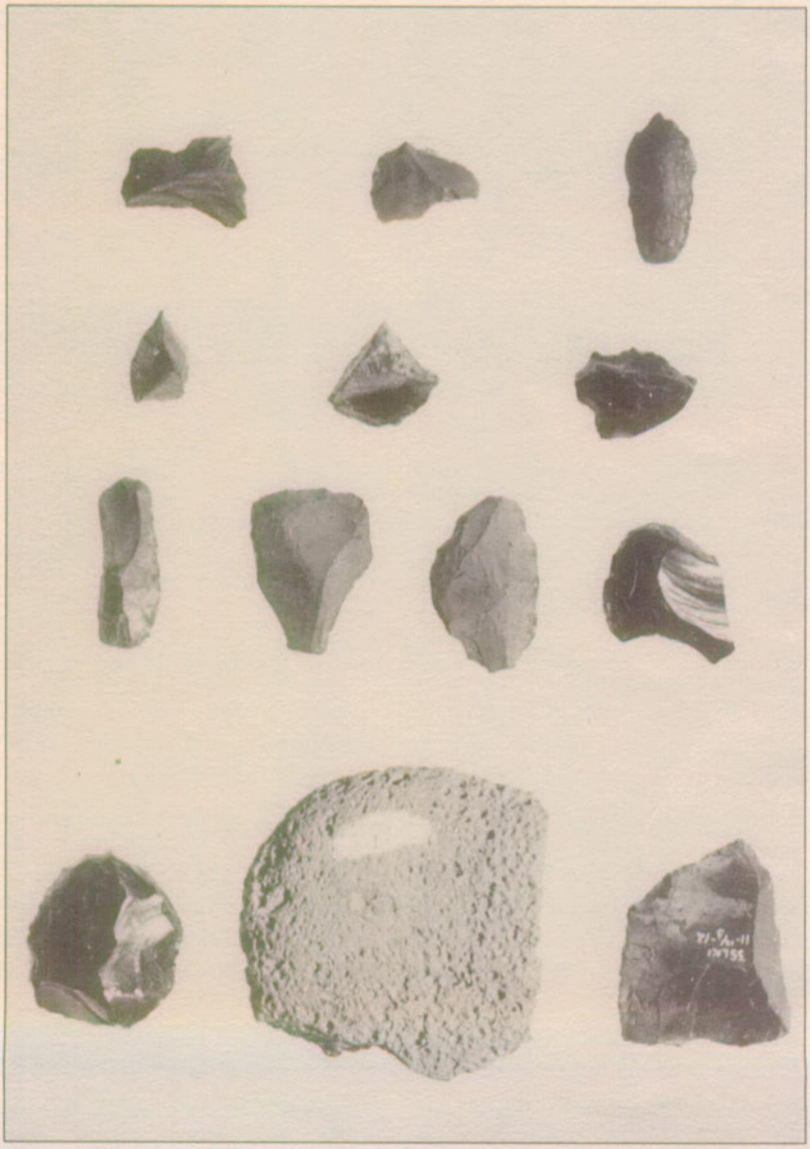


Figure 2.8 Early assemblage from above lake gravels at Fort Rock Cave. The projectile point at top right appears to be a much-resharpened Lake Mohave specimen.

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).

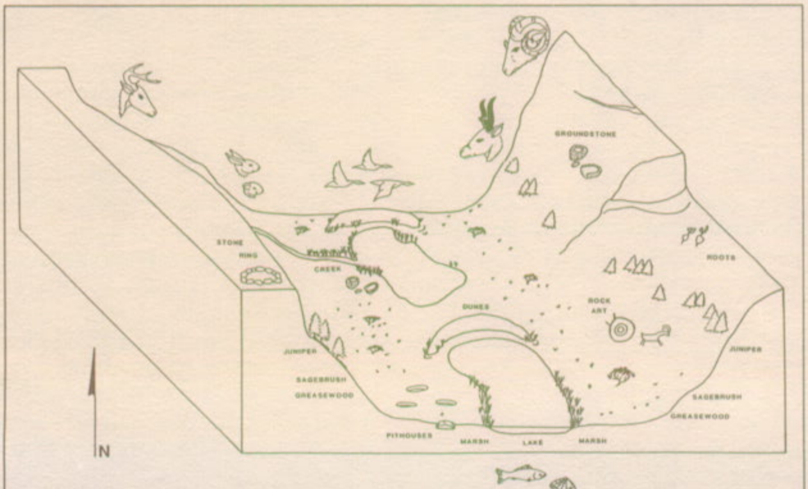


Figure 2. 9 Schematic model of prehistoric subsistence and settlement in the Warner Valley. From Cannon et al. (1990: Figure 2).

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

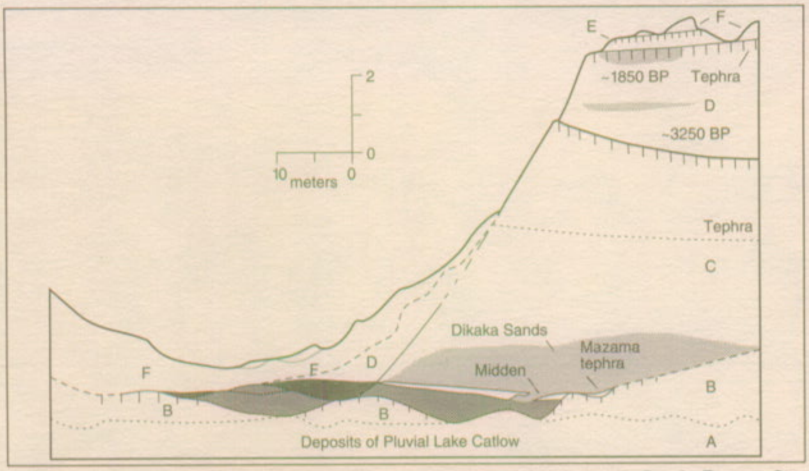


Figure 2.11 Generalized stratigraphic cross-section of the Skull Creek Dunes Site (Mehringer and Wigand 1986: Figure 5).

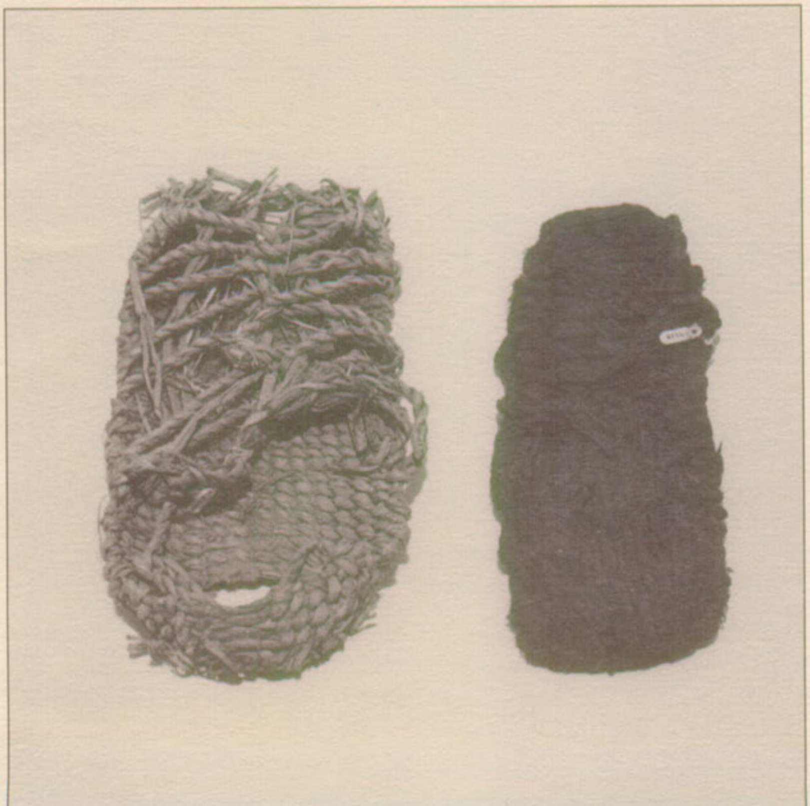


Figure 2.12 Woven sandals. Left, specimen of sagebrush bark from Fort Rock Cave; right, specimen of tule from Paisley Five Mile Point Cave.

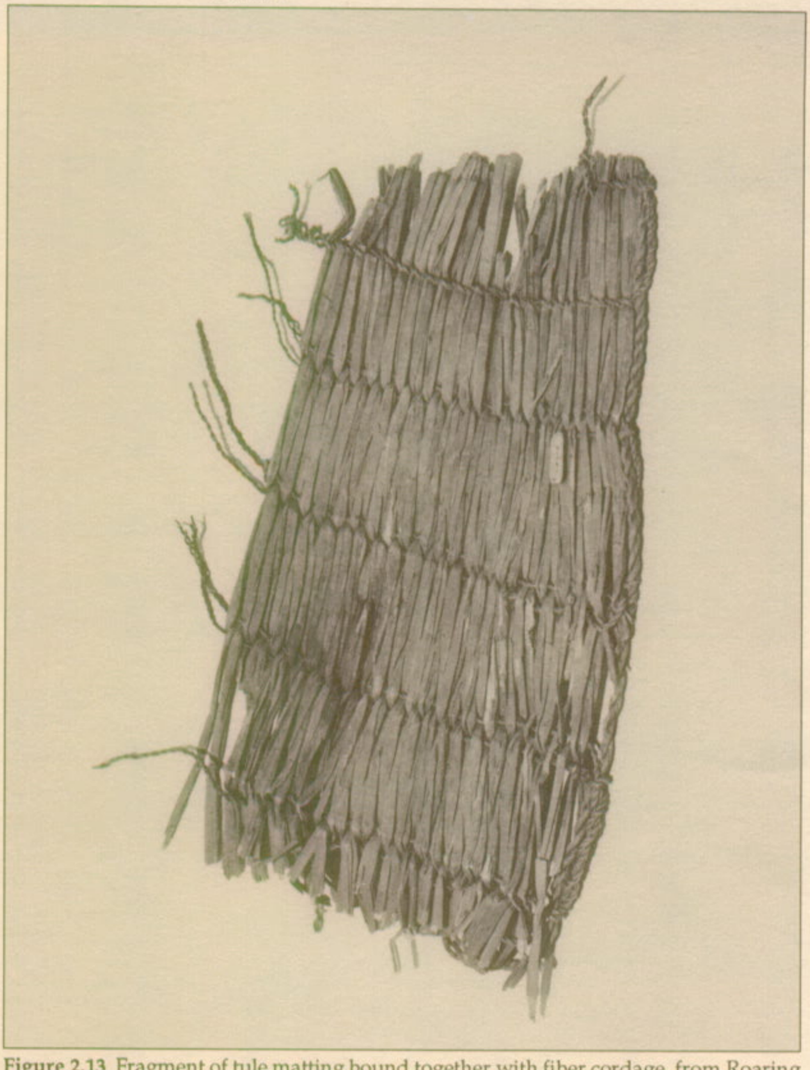


Figure 2.13 Fragment of tule matting bound together with fiber cordage, from Roaring Springs Cave.

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

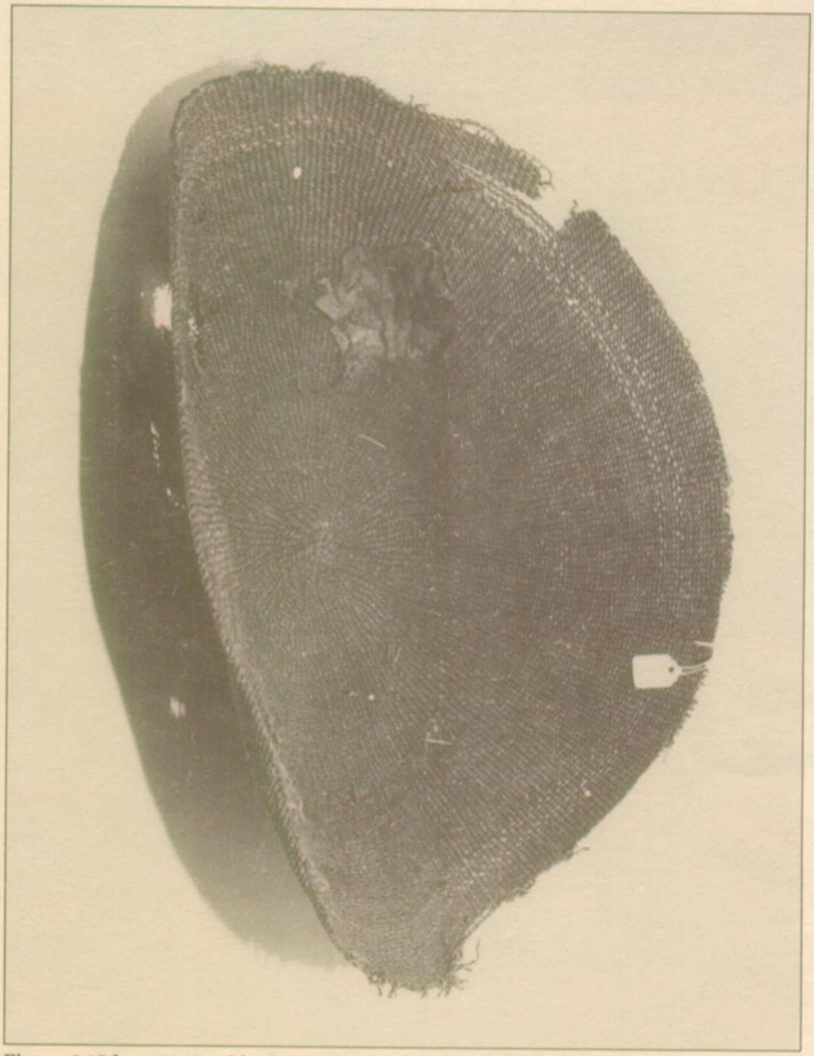


Figure 2.15 Large twined basketry tray from Chewaucan Cave.

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

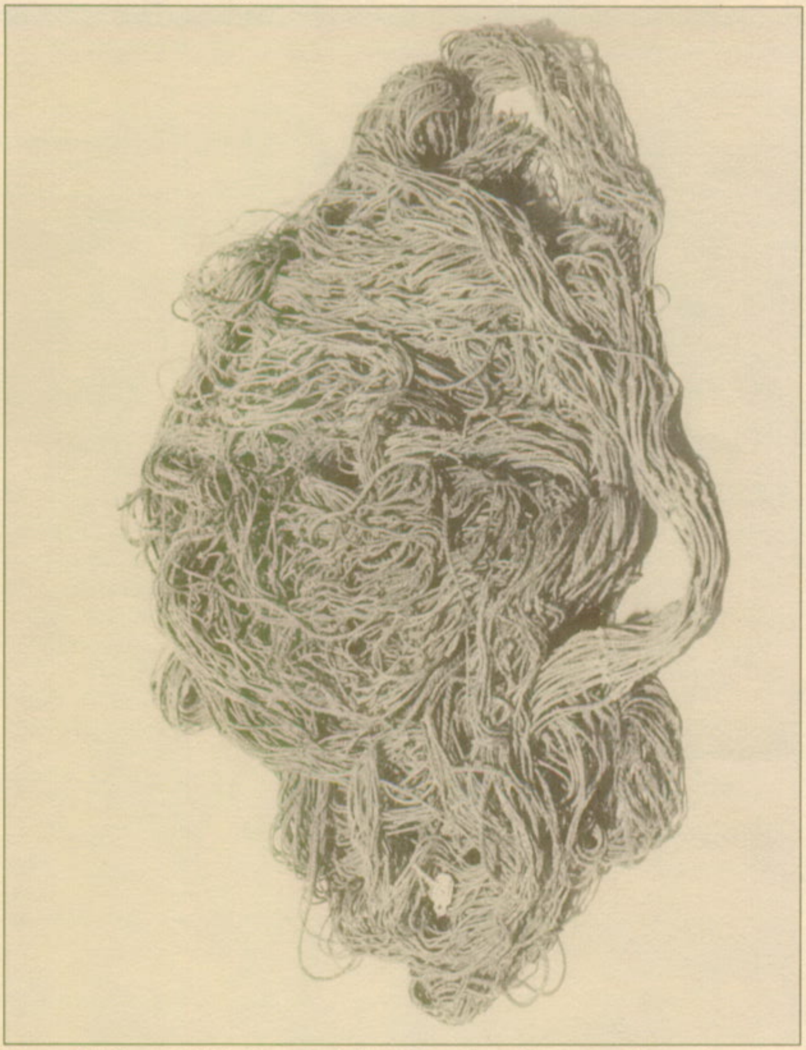


Figure 2.19 Large rabbit net made of plant fibers, from Chewaucan Cave.

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.

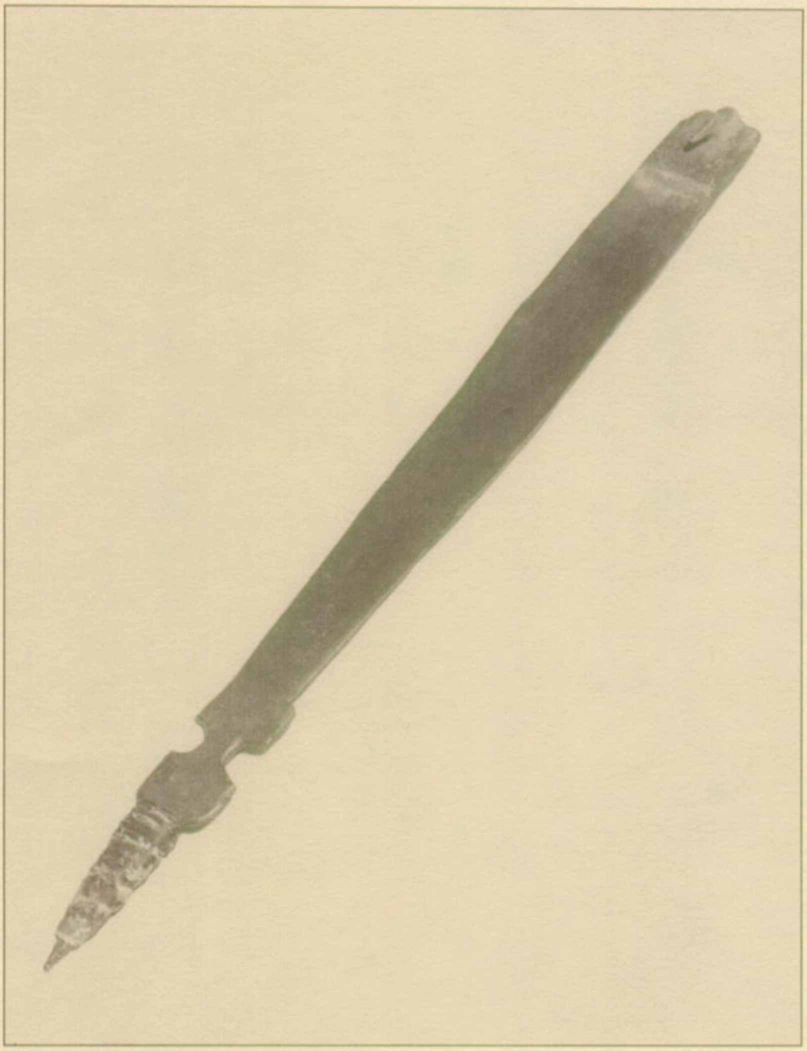


Figure 2.20 Atlatl from Roaring Springs Cave.

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

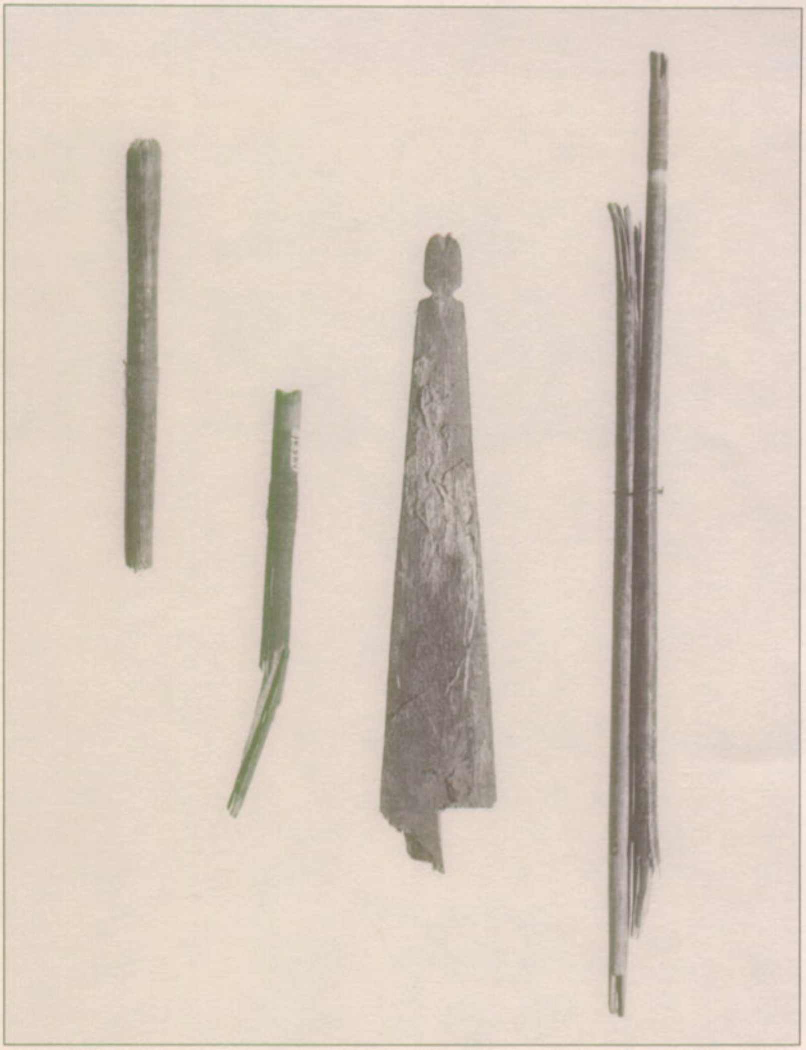


Figure 2.21 Bow fragment and parts of arrows from Roaring Springs Cave. Note notched and sinew-wrapped end for attachment of bowstring.

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

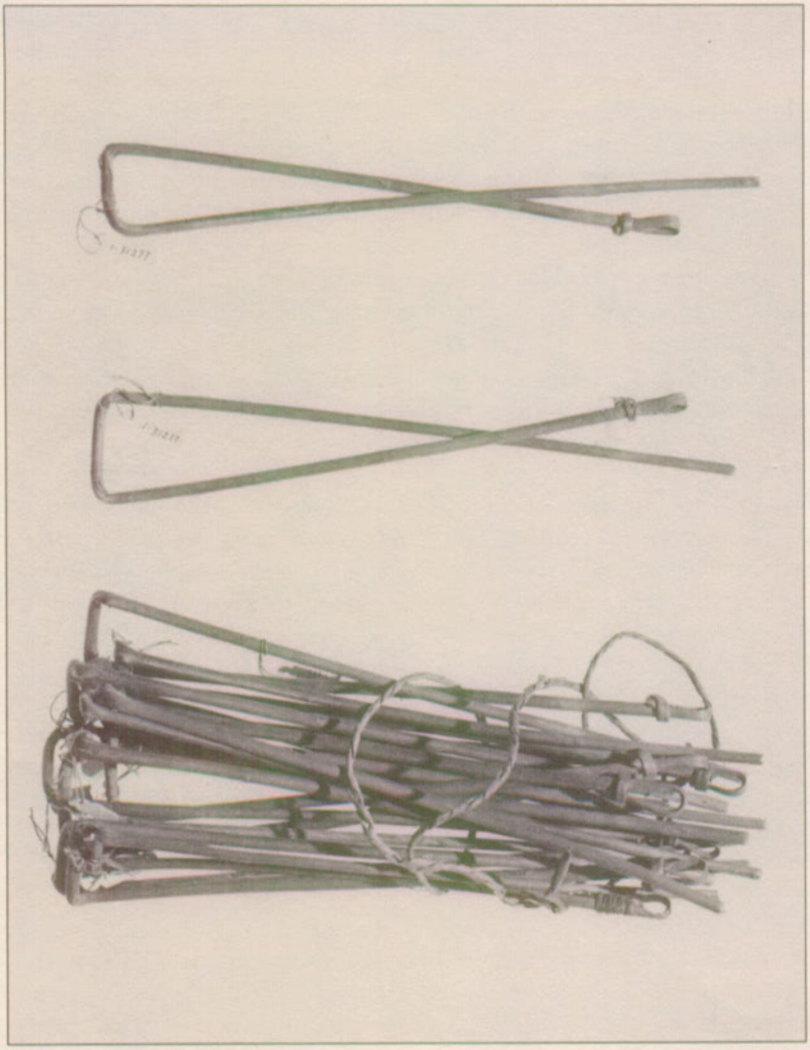


Figure 2.22 Wooden snares from Chewaucan Cave. These snare parts were originally found in a skin bag.

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).

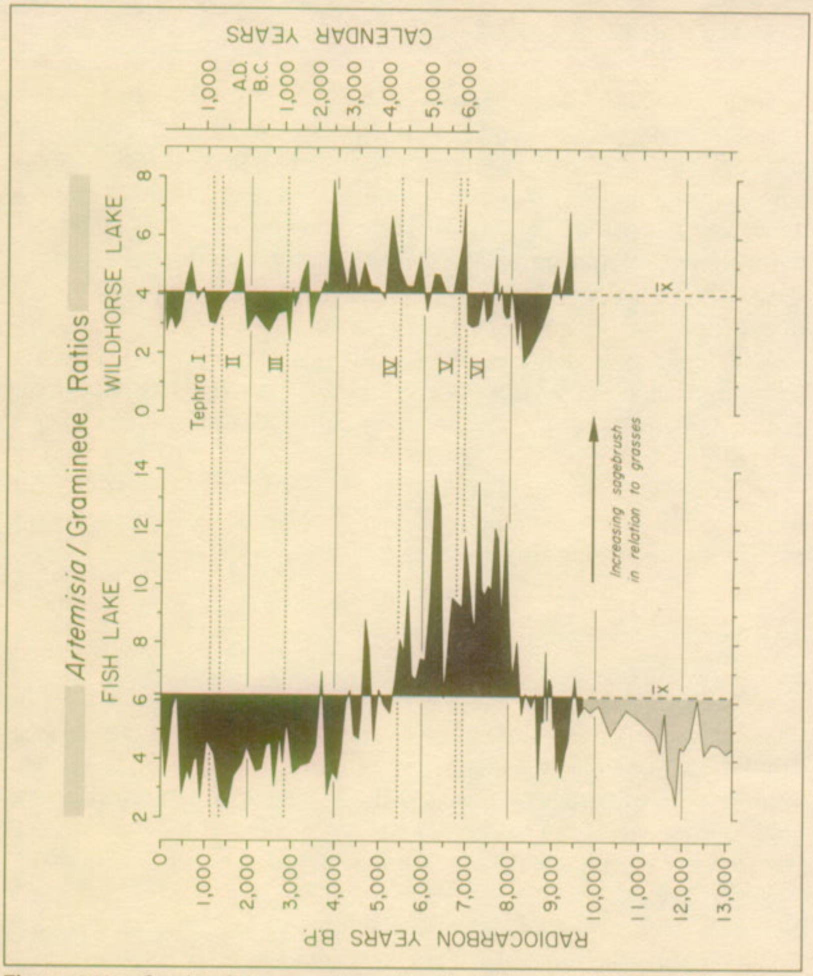


Figure 2.23 Sagebrush/grass pollen ratios for Fish and Wildhorse lakes, Steens Mountain (Mehringer 1985). The prevalence of sagebrush between about 8000 and 4000 BP indicates relative aridity; the prevalence of grasses before and after this interval indicates relatively greater effective moisture. The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

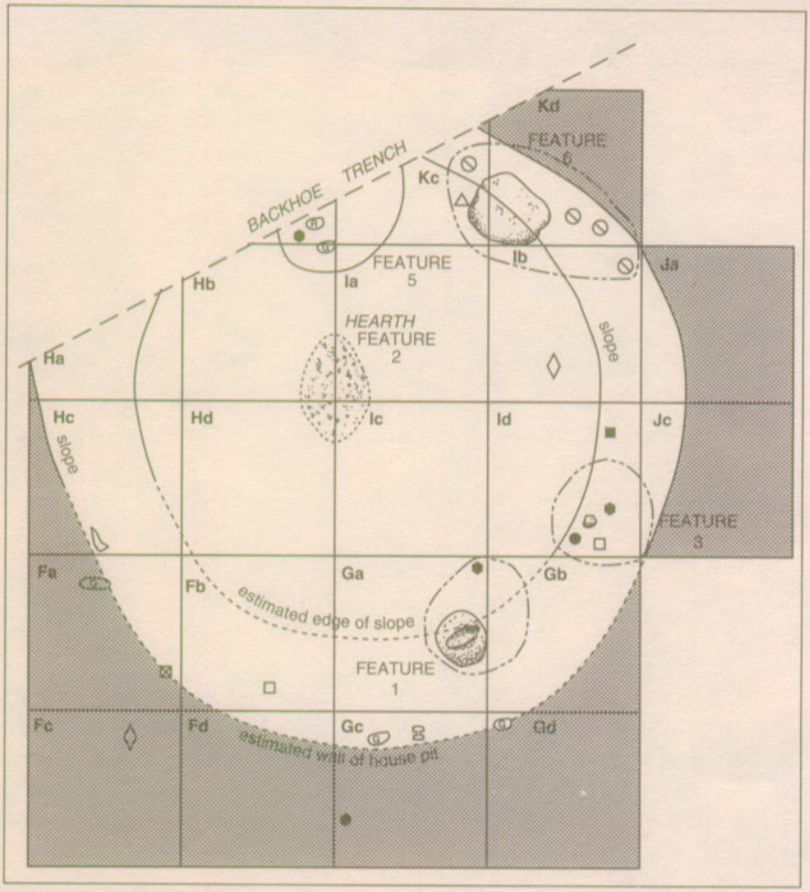


Figure 2.24 Late prehistoric wickiup floor from McCoy Creek (Musil 1992).

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.

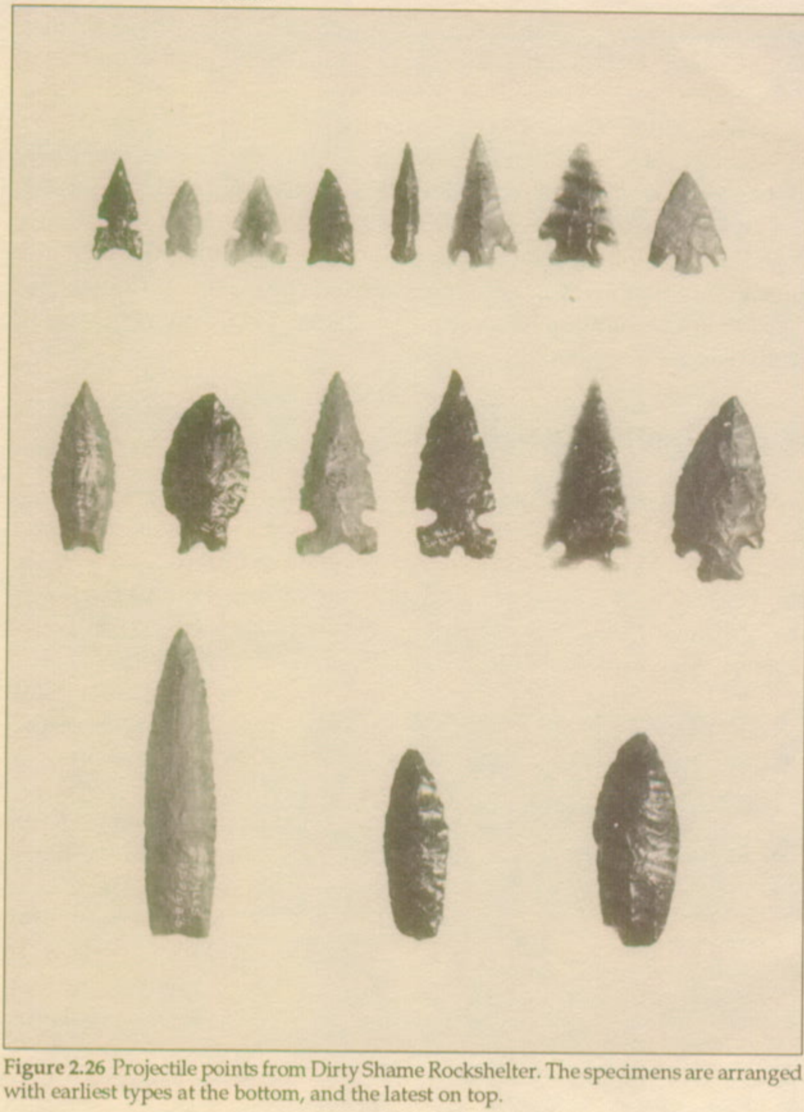


Figure 2.26 Projectile points from Dirty Shame Rockshelter. The specimens are arranged with earliest types at the bottom, and the latest on top.

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).

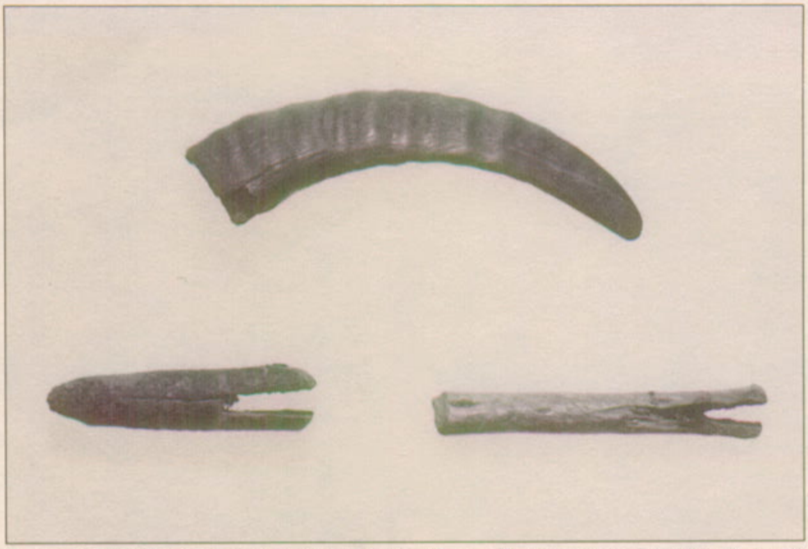


Figure 2.29 Hafts for stone knives from Catlow Cave. The mountain sheep horn (above) is hollowed at the broad end for insertion of a stone blade. The two wooden specimens (below) probably once had fiber or sinew lashings to hold stone blades in the notches.

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).

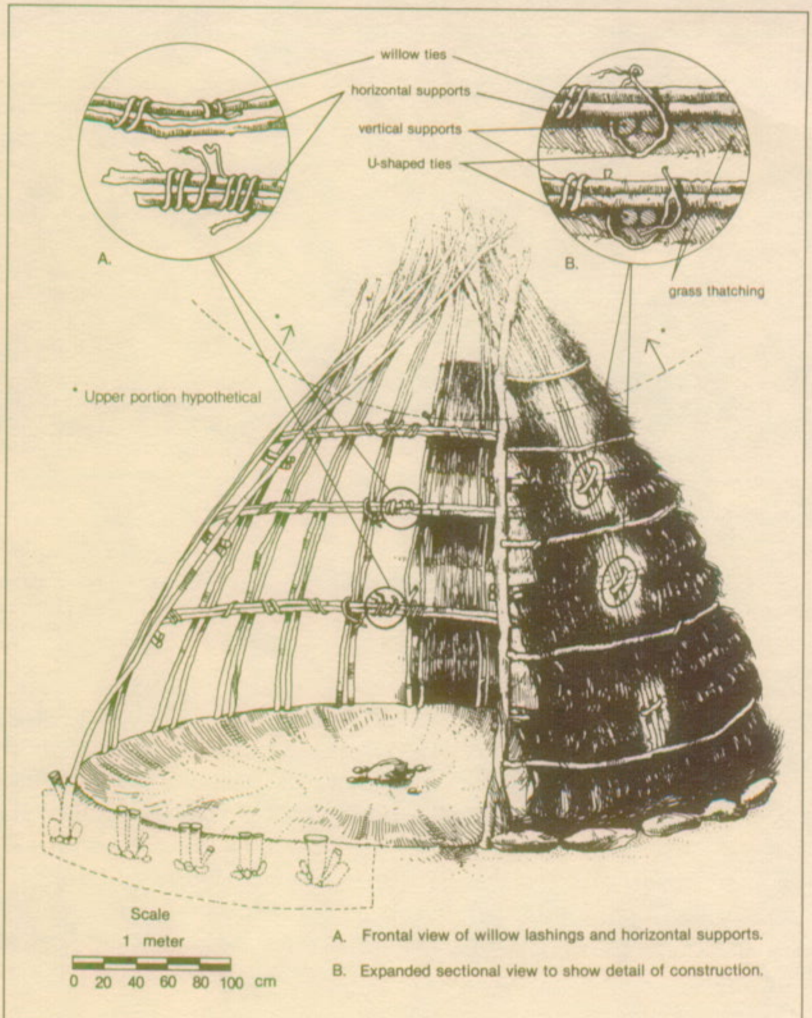


Figure 2.30 Reconstruction drawing of pole-and-thatch wickiup from Dirty Shame Rockshelter, based on data from excavation (Willig 1982).

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

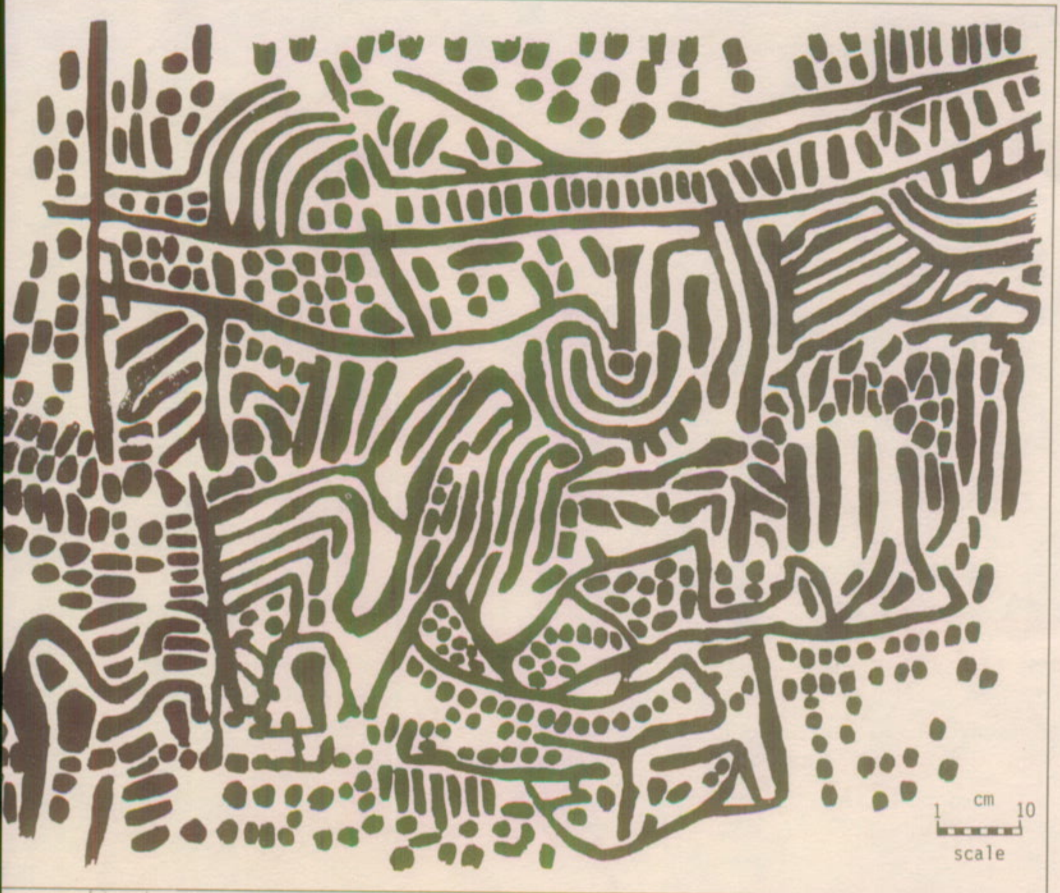


Figure 2. 31. Long Lake Carved Abstract rock art panel at Long Lake, Oregon (Cannon and Ricks 1986).

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).

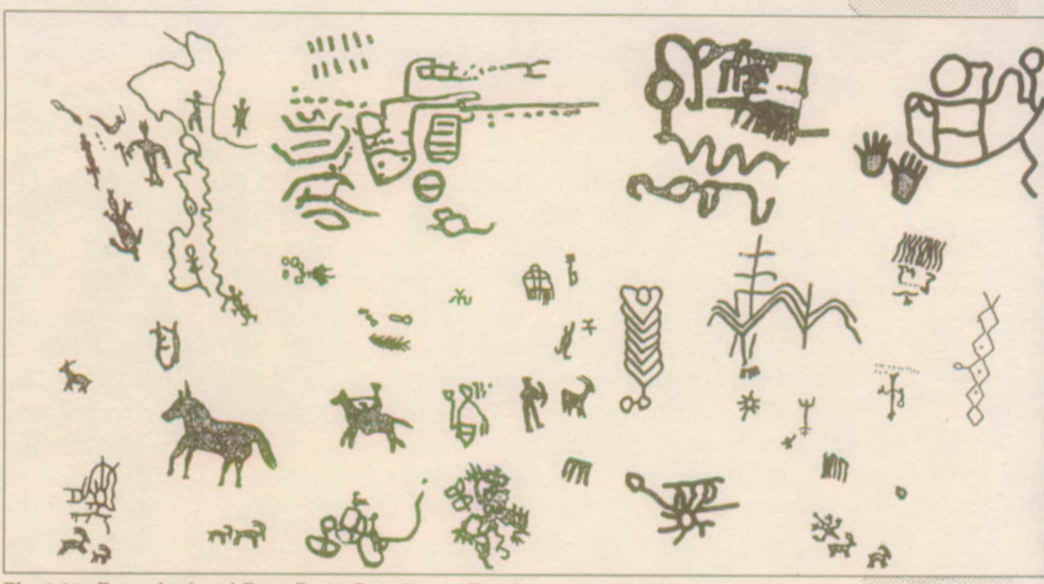


Fig. 2.32. Petroglyphs of Great Basin Curvilinear, Rectilinear, and Representational styles from Long Lake, Oregon (Cressman 1937: Figs. 26, 27).

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.