ARCHAIC UPLAND ADAPTATIONS IN THE CENTRAL OREGON CASCADES

by

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The prehistory of the Oregon Cascades has remained until recently relatively unknown. Beginning in 1981, a series of four sites were excavated in the Upper Middle Fork of the Willamette River basin. Those site collections which form the basis for the present study proved to be unique to the Willamette Basin and brought into focus the question of the relationship of the Cascades to the surrounding areas.

The four sites consisted of nine components. These were seriated and with radiocarbon dates were used to develop a local sequence covering the past 2500 years. Augmented by data from other nearby sites this was extended to perhaps 6000 years ago. The timing of projectile point stylistic changes is unique in the Willamette Basin.

Using the chipped stone, ground stone and heavy tool collections, the sites were also characterized by site function. Analysis showed that site functions varied and

that some sites changed functions concurrently with changes in projectile point styles.

No ethnographic settlement-subsistence pattern was recorded for the Upper Middle Fork area. Based on the scant existing upland ethnographic materials and historic and ethnographic data extrapolated from environmentally similar areas, a general model was developed. That model was bolstered by a two part study of site locations in the Upper Middle Fork. The location of sites was compared to the major vegetation zones in the Willamette National Forest and then specific plant communities near sites were cross tabulated with ethnobotanical information. This allowed the assessment of available site resources. The settlement-subsistence pattern was found to be focused on the lowlands where the major plant resources were located, but it was punctuated in mid to late summer by numerous short term expeditions for hunting and berry picking in the uplands.

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CHAPTER ONE

INTRODUCTION

This dissertation examines four prehistoric archaeological sites located in the Upper Middle Fork of the Willamette River in the foothills of the Western Cascades of Oregon (Figure 1). Until recently the uplands of Oregon have been neglected by archaeologists. This study develops a local cultural chronology and attempts to understand the human adaptation in the Upper Middle Fork valley, as well as to understand the relationship of the uplands to the rest of the region. Specifically, four sites were analyzed for temporal and functional patterns, and a framework for understanding settlement/subsistence and material culture change through time as interpreted from this local sequence is developed. Inter-regional relationships are suggested based on comparisons with similar studies. This first study is in many ways preliminary, but it clearly shows the potential of the Oregon Cascades for answering questions concerning human adaptation, migration, and contact. The hypotheses generated by this study should provide a rich field of inquiry for future research.

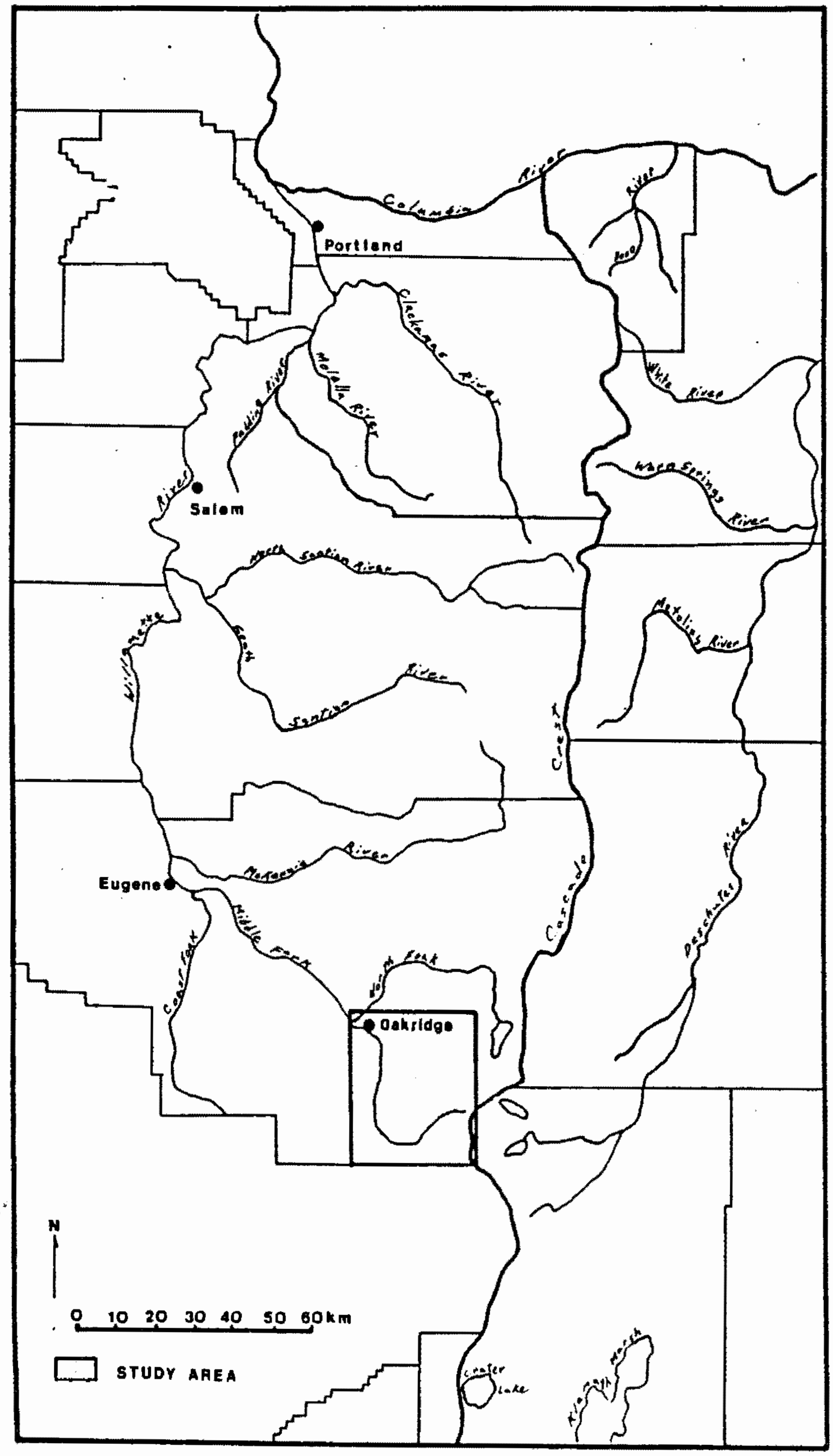

FIGURE 1. Overview of Western Oregon with the study area on the Upper Middle Fork outlined.

The Study Area

The Willamette Valley and, by extension, the Western Cascades have proven to be a prehistorically distinct area, difficult for anthropologists to categorize. Kroeber (1939) assigned the valley to the Northwest Coast culture area, albeit uneasily, because it is the only interior culture of that region. Collins (1951) compared ethnographic and archaeological data from the valley to that of surrounding regions and found it much more similar to the Columbia Plateau culture area than to the Northwest Coast culture area. Minor and Toepel agree with Collins, stating that subsequent work has shown

> that the Kalapuya and their ancestors were an interior, riverine-oriented people with cultural affiliations with the Columbia Plateau Culture Area rather than with the marine-oriented inhabitants of the Northwest Coast (1981:120).

Still, the lack of salmon exploitation, a major defining characteristic of the Columbia Plateau culture area, continues to distinguish the valley (Toepel 1985:2). Aikens succinctly and dramatically states the problem.

> The Willamette Valley is uniquely a grassland zone, a broad expanse of well-watered open country flanked by wooded hills, that has no ecological parallel elsewhere in the Northwest (1984:87).

Connolly (1985) has recently presented a new and quite reasonable approach. He believes that because of its uniqueness, the Willamette Valley, as well as other interior valleys, is consistently seen as peripheral to the traditional culture areas. This fact effectively leaves the archaeological manifestations in a theoretical void, even though archaeological work has established that the Willamette Valley has a long standing lifeway. Connolly proposes that the Willamette Valley and other interior valleys may well comprise a separate and unique archaeologically observable unit, different from those areas surrounding it because of the long term abundance, stability, and reliability of its resource base. The resource base was apparently not subject to major seasonal fluctuation such as the salmon runs of the Coast and Plateau, but provided a consistently available variety of foods, both plant and animal, which were only minimally subject to failure. Suttles describes the situation for the Coast Salish.

> It seems likely that farther north on the coast there were fewer types of resources but greater concentrations and thus possibly greater dangers in failure, through human error or natural calamity, of resources to appear at the right place at the right time. Farther south I would expect the opposite to hold (1968:58).

Thus while perhaps not providing the potential for population growth and social complexity which the Coast provided (Ames 1981), the Willamette Valley prairie environment was similar to, but safer than that of the Plateau. The valley was not nearly as subject to failure, at least partly because the people took an active hand in its production levels. The resource base was "managed" through annual burning for higher plant yields and to control game movements. This aspect of prairie life is well documented in California (Bean and Lawton 1973; Lewis 1973; Baumhoff 1978), where the burning schedule was very precise. Burning was done in both the spring and the fall because seedlings and bud producing plants are favored by the season of the burn. Game management was so complex that

> hunters commonly knew every deer in the territory and maintained a balance between herds and the available vegetation to keep the animals from straying (Aginsky 1967:210).

It is unknown whether ecological management in the Willamette Valley evolved to this level of complexity; however, burning and game management were documented by various early explorers and settlers (cf., Douglas 1959; Riddle 1953). Douglas states that burning was common,

> ...though the indians vary in their accounts of the reason for which it is done, some saying that it is in order to compel the deer to feed in the unburnt spots, where they are easily detected and killed; others, that the object is, to enable them to find wild honey and grasshoppers, both of which serve for their winter food (1959:157).

Some observed burning to process a major resource, tar-weed. Unwanted grasses and weeds were burned away, as was the sticky tar-like substance on the seed pod. The burning left the tall patches of tar-weed standing alone, their seeds parched, ready to be collected.

Connolly (1985:19) theorizes that the prairie lifeway was characteristic of a far reaching adaptation to the mesic prairies of the far west. This was the aboriginal adaptation practiced in the Upper Middle Fork Valley, the study area.

The Upper Middle Fork (Figure 2) is characterized by a constricted valley floor, with bottom lands widening and closing in a series of semi-isolated prairies. Openings in the forest are common on ridge tops and hillsides. These prairies vary from large openings, such as High Prairie near Oakridge, Oregon, to moderate ones such as Rigdon Meadows, to very small glades. Today these prairies amount to about 5% of the timbered areas of the Western Cascades, yet, their micro-environments support about 85% of the Western Cascades floral variation (Hickman 1976). This variety provides a rich habitat for game of all species. Between these oases lies a virtual desert of coniferous forest (Connolly 1985). Early explorers realized barrenness of the forest. Wood's 1856 exploration of northern California moved from prairie to prairie, feeding on the flora and fauna present there, and fasting for weeks at a time as they passed through the forest between (Wood 1975). Baumhoff notes that California prairies were "burned regularly to promote growth valuable to man and his game animals" (1978:23-24). That Indians preferred the valley edge ecotone and altered the forest/prairie environment to create more of it should come as no surprise. Humans have apparently always preferred it.

> Human civilization has so far reached its greatest development in what was originally forest and grassland in temperate regions. Man, in fact, tends to combine features of both grasslands and

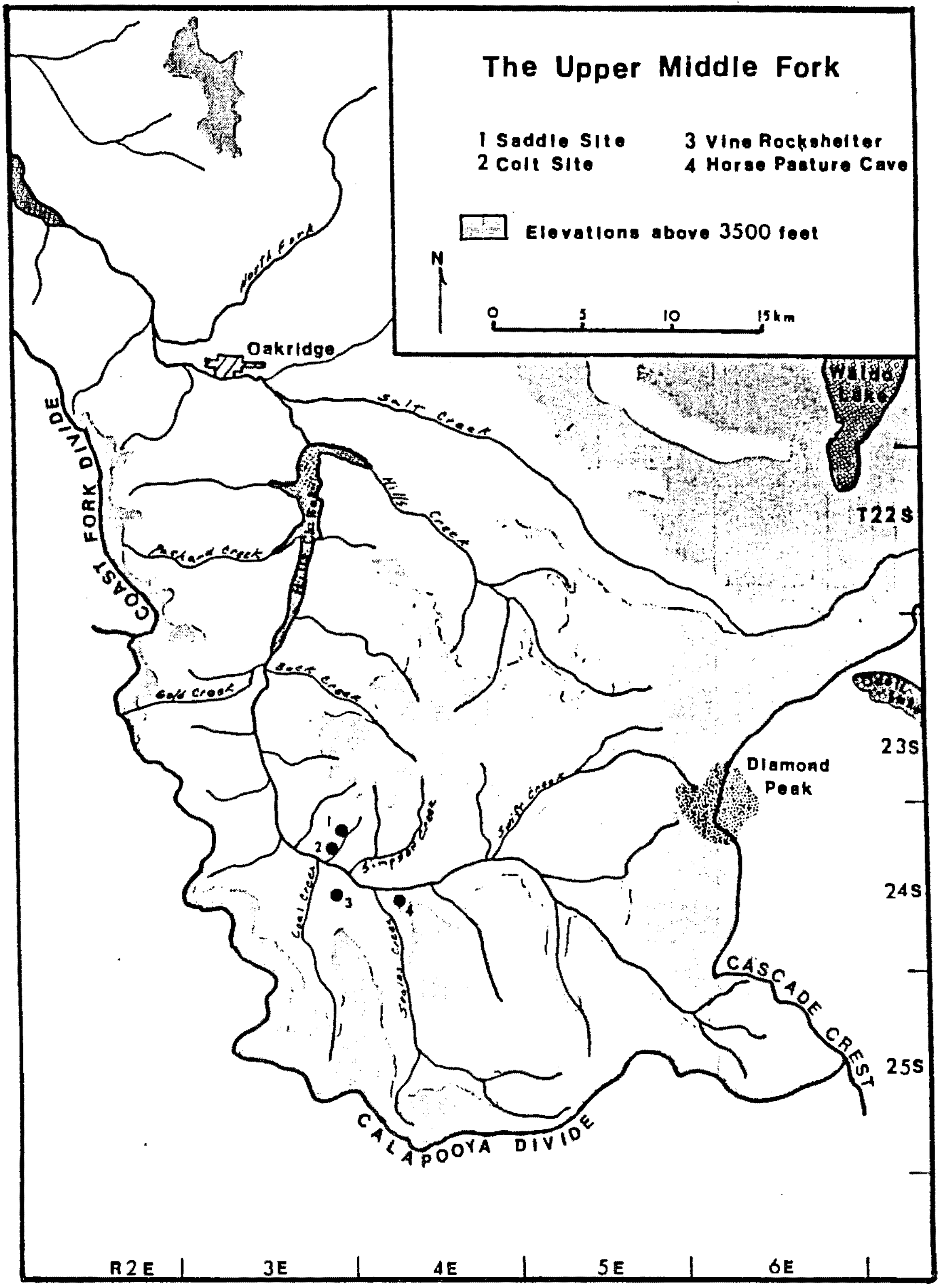

FIGURE 2. The study area in the Upper Middle Fork of the Willamette River, with the four excavated sites shown.

> forests into a habitat for himself that might be called forest edge. When man settles in grassland regions he plants trees....Likewise, when man settles in the forest he replaces most of it with grasslands...(Odum 1963:135).

Aboriginal Inhabitants of the Upper Middle Fork

Historic accounts of the aboriginal inhabitants of the Upper Middle Fork attest to the presence of the Molala (Menefee and Tiller 1976; Jensen 1970).

> At Demijohn's Tower [near Lowell, west of Oakridge]...the Garrison party met the first Indians they had seen on the Middle Fork --one lodge of Molallas, four men, one woman and three children. The agent recorded that these Indians told them "that there were about twenty Molala and Klamaths, who have united and married and are in this vicinity. They say they live in the valley in the winter, but in the summer stay in the mountains" (Menefee and Tiller 78:55).

The Molala were long thought to have been divided into a northern band centered around Mount Hood and a southern band near Crater Lake (Jacobs et al. 1945). Recent work by Beckham (1976) and Farmer et al. (1973) places the entire Oregon Cascades from the upper Clackamas River to Crater Lake within the territory of the Molala (Figure 3). Initially grouped with Cayuse in the Waiilatpuan language family, recent work has shown that the Northern, Southern and Santiam bands of the Molala spoke an isolate language currently grouped with the Penutian phylum, but which has no very close linguistic ties within the grouping (Rigsby 1965, 1969). The Waiilatpuan language family was first proposed by Horatio Hale, who spent several weeks at Marcus Whitman's

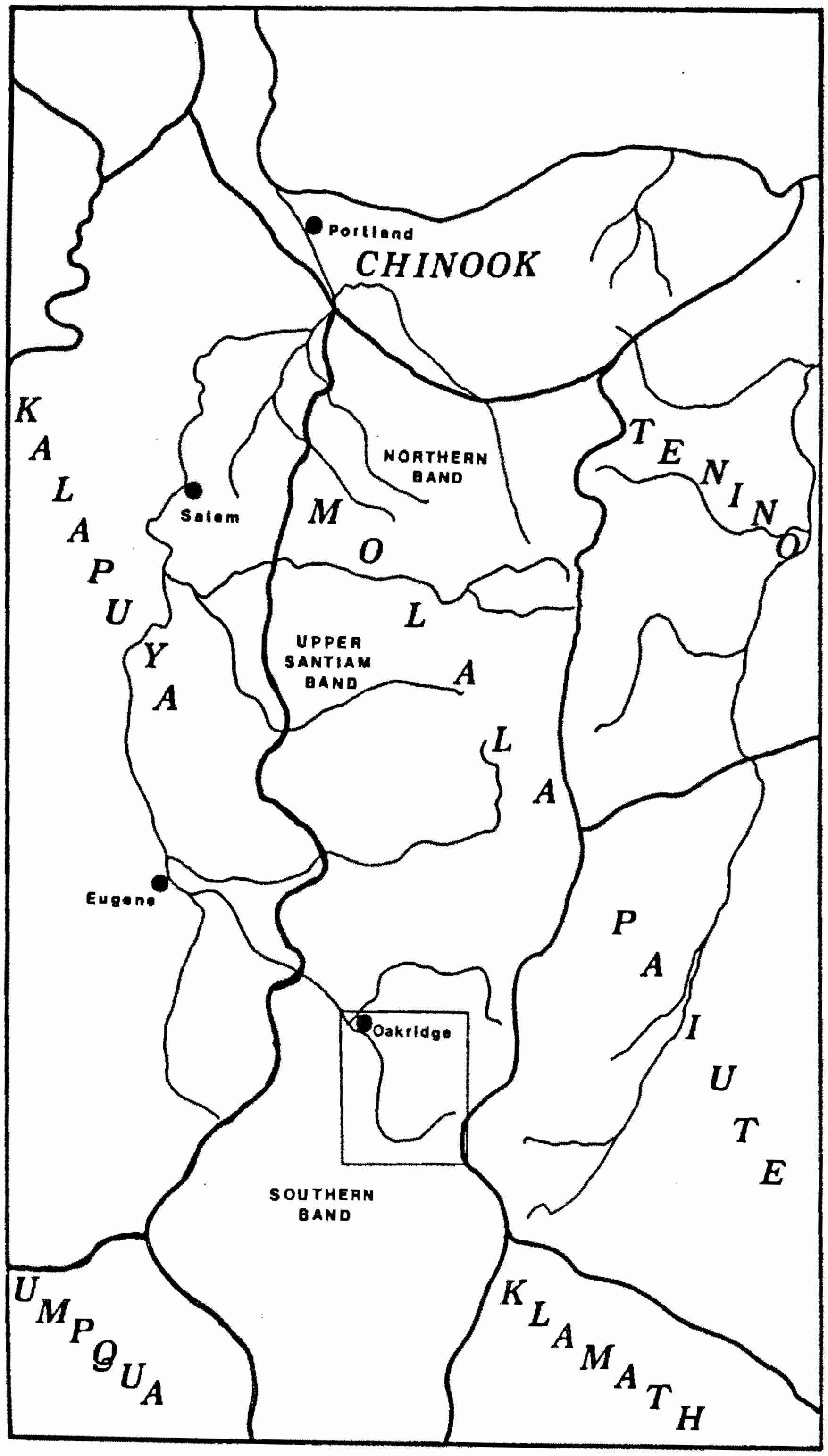

FIGURE 3. Tribal distributions in the Oregon Cascades (after Beckham 1976).

mission in Cayuse territory. Whitman stated in correspondence that the Molala and Cayuse, separated by a long running war with the Snakes, spoke the same language. Rigsby (1965:86-87) speculates that during Hale's tenure at the Waiilatpu mission, Whitman told him that the two languages were related. The northeastern Oregon Cayuse, who adopted the plains horse culture, apparently visited the Cascades during historic times to hunt, trade, and take Molala slaves. This furthered belief in the linguistic connection between the two peoples (cf., Menefee and Tiller 1976:55 quoted above). Hale's assumed language family, based on this purported connection became important in tribal distribution studies. Rigsby's more recent work refutes that connection.

Several maps of Oregon tribal distributions exist (cf., Berreman 1937; Farmer et al. 1973; Beckham 1976). Berreman placed the original Molala homeland in the Deschutes river drainage (Figure 4). He believed a Paiute incursion at the end of the 18th century divided them into a Northern and Southern band, which were pushed into the Cascades displacing some of the original inhabitants: the Kalapuya bands, the Upper Umpqua and the Upland Takelma. According to Berreman, the Calapuya band of the Kalapuyas and the Yoncalla continued to occupy the territory between the Northern and Southern Molala bands. In a rebuttal (Ray et al. 1938) to Berreman's scheme, Murdock reported the

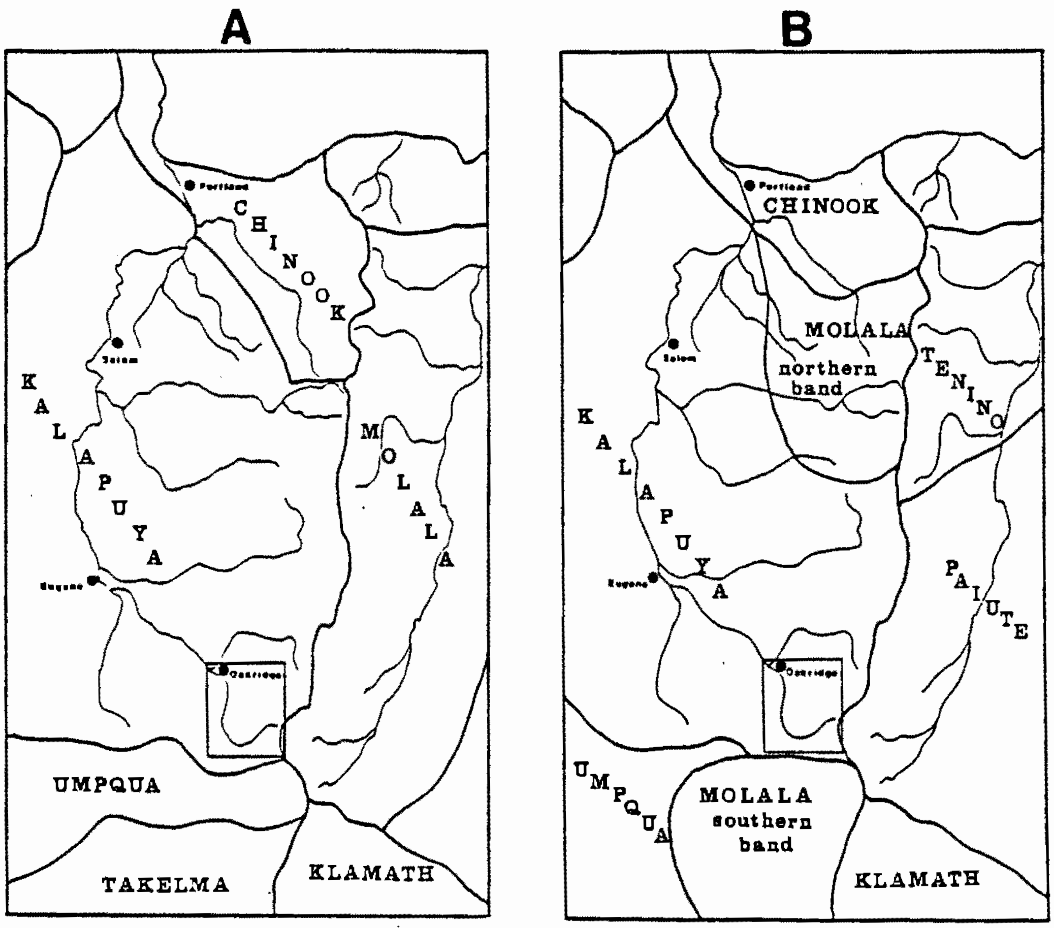

FIGURE 4. Tribal distributions before (A) and after (B) AD 1750 according to Berreman (1937). Berreman theorized the westward movement of the Molala and their split into Northern and Southern bands as due to a Paiute expansion.

statements of Tenino informants, who claimed that the Molala were driven from the Deschutes drainage, specifically from Tygh Valley, in the early 19th century by the Tenino, who continued up the Dechutes driving the Paiutes southward out of the valley. Rigsby's (1969) work suggests a longer period of Tenino occupation in Tygh Valley than just the past 100 years, but he does not rule out a Molala occupation at some earlier time. Thus, Berreman's Molala position is partially confirmed by Murdock and was not proven wrong by Rigsby. It is not difficult to accept that prior to the relatively late Paiute incursion (cf., Aikens 1978:163-164), the Molala may well have inhabited the entire drainage. Rigsby (1965:241) felt that linguistic evidence suggests the Molala occupied a geographic position intermediate between the Klamath, Kalapuya and Warm Springs Sahaptins. That position could have been in either the Deschutes River Valley or the Cascades. Recently Beckham (1976), Farmer et. al. (1973) and Rigsby (n.d.) have concluded that by historic times

> Molala territory and range were continuous from north to south along the western and eastern slopes of the Cascades including a portion of the Deschutes drainage system (Rigsby n.d.:2).

This distribution is supported by the mention of a Santiam band of the Molalas in the 1851 treaty map of Gibbs and Starling (Beckham and Toepel 1981).

The tenure of the Molala in the Cascades is a major question. The length of time neccessary for bifurcation of the Molala speech community into Northern and Southern dialects is unknown. It seems, however, that a Cascade-dwelling Molala would be prime candidates for development of regional dialects. Driver explains that in

> language groups spread over large territories or made up of isolated pockets of people, each of whom may be exposed to a different language of a neighboring people, considerable variation in speech is likely to exist, and conditions are right for separate dialects to emerge (1972:27).

That the relatively contiguous Kalapuya were separated into three distinct language families, each of which had several dialects, suggests some length of occupation. Rigsby (1965:74) thought that the Molala were separated at the dialect level based on the following informant statement:

> in Douglas County there lived people who understood his language but named everything different (Rigsby 1965:72 from Frachtenberg's unpublished notes).

In California, variation at the level of distinct languages has been assessed for the Athabaskan speaking Mattole and Hupa separated for 1000 to 1300 years, with only token contact for the past 900 years (Elsasser 1978:194). The Sierra Miwok language began separating into dialects some 800 years ago (Levy 1978:398). These examples suggest that the Northern and Southern Molala split, apparently only at the dialect level, may be well under 1000 years old. Only further work with Molala linguistic materials can provide the information needed to develop a glottochronological assessment of the Molala dialect variation.

Clearly, if such a short upland tenure were assessed for the Molala, it would have direct archaeological implications. It seems unlikely that a long tenure in the small upland valleys of the Cascades would result in only a dialect-level difference between the farthest separated Molala bands. On the other hand, it seems more likely that bands living in the single large Deschutes valley might interact much more frequently, thereby avoiding significant linguisic divergence.

Very little is known of the ethnographic lifeway of the Molala. They were studied by several noted ethnographers and linguists, but only after they had been removed to the reservation. No data were collected while they were actually practicing their aboriginal lifeway. In 1841 Horatio Hale collected several word lists from a small group of Molala living near Oregon City. In 1877, some 36 years later, Albert S. Gatschet collected linguistic data from a Molala informant living on the Grand Ronde reservation near Siletz, Oregon. Another 33 years passed before Leo J. Frachtenberg returned to Siletz to collect more linguistic information from Gatschet's informant. An additional twenty years passed before Melville Jacobs began salvage ethnography and liguistics with the last speakers of the language. His materials, as with Frachtenberg's, were never published. Bruce Rigsby's dissertation (1965), which examined the purported Waiilatpuan language family, provides the best general discussion of the Molala. Based on a lack of linguistic similarities, Rigsby concluded that rumors of an early split from the Cayuse and a westward movement of the Molala into the mountains were probably untrue.

Toepel and Beckham (1981) summarize what is known of the lifeway of the Molala. The Molala apparently were adapted to the uplands through a lifeway that was of neccessity focused on the floral and faunal produce of the small prairies present in the western Cascades. In the winter the Molala lived in multiple family pit house villages (Rigsby 1969:80). In the spring these moderate sized groups broke into nuclear families which concentrated on exploitation of the slowly upward migrating deer and elk herds, and the ripening plant resources. Rigsby summarizes Frachtenberg's unpublished notes on the subject:

> ...they exploited the higher country for roots, berries and larger game (deer, elk, and bear).... They also fished for salmon, steelhead, trout, eels and other species in suitable streams and lakes (Rigsby n.d.:1).

The pure Molala lifeway abruptly ended in 1855 when the survivors of the Molala War (Stern 1966) and the Rogue Wars (Beckham 1971) were removed to the Grand Ronde reservation. They had been reduced by disease and war such that in the 1890's only about 40 Molala remained (Powell 1891:128). Today (Rigsby n.d.) only a few persons identify themselves as being at least partially of Molala descent. That any survived is itself a tribute to these people.

> In spite of vociferous opposition, Palmer began in late January to remove the Umpquas. By the second week in February, 480 people from the Umpqua, Mollalla, and Calapuya Indian bands had reached the Grande Rhonde Reservation on the Yamhill....In the mountains to the west along the canyon of the Rogue, were the confused and hostile survivors of the troubles in the valley. These broken families had not had time to collect acorns or preserve sufficient salmon from the fall runs (Beckham 1971:166-167).

Since so little ethnographic data are available for the Molala, and since the region inhabited by the Willamette Valley Kalapuya was relatively similar in the kinds, if not quantities, of available resources, information about the better documented Kalapuya seasonal round is presented here as a background to a postulated Molala seasonal round. This is not to say that the environment of the Upper Middle Fork is not different from the main Willamette Valley, only that the lifeway adapted to interior valleys as proposed by Connolly (1984) was, judging by the burning which took place and the available resources, also practiced to some extent by the peoples of the Upper Middle Fork. Therefore the Kalapuya seasonal round can serve as a point of departure, though not as a model.

The seasonal round of the Kalapuya began in the Spring with harvesting of the first camas, a staple which was gathered throughout the spring, summer and fall. Berries, seeds and various insects were collected throughout the summer until the acorn harvests in the fall. These harvests coincided with the beginning of communal deer and elk hunts, which continued until the Spring (Toepel and Beckham 1981:67; Zenk 1976).

While camas is found in the Upper Middle Fork, it is, and undoubtedly has always been, less plentiful than in the Willamette Valley's huge camas fields. It seems likely that acorn and hazel nuts may have had increased value for the Molala, and that elk and deer hunting were more likely to have characterized Molala subsistence. These thoughts are supported to some extent by an informant's observations that "All the Molala people did was hunt" (Zenk 1976:35-36). She added that smoke-dried meat and mountain huckleberries were the major Molala trade items at Oregon Falls on the Willamette River, while the Kalapuya traded camas cakes. Spier (1930:41) stated that the Molala traded buckskins to the Klamath for pond lily seeds and beads. This Molala-Klamath trade in buckskins is also described by a Molala from the Upper Middle Fork (Jensen 1970).

Fishing of any kind has yet to be archaeologically documented for the Molala. A recent suggestion to the contrary not withstanding (McKinney 1984), large scale anadromous fish runs were apparently blocked at Oregon Falls on the Willamette River. This belief is supported by the silence of Willamette Valley pioneers and explorers on the subject of salmon, as well as the lack of any archaeological evidence. Although this is only negative evidence, it should be noted that in the salmon bearing Umpqua River, even very limited archaeological investigations have recovered salmon bones and fishing gear, including net sinkers (Lyman, et al. 1985; Minor 1983). Further, the naturalist David Douglas does not mention salmon in his diary of his trip up the Willamette Valley, but soon after crossing into the Umpqua Valley he documented their presence.

> The chief, his son, and about twenty followers accompanied the messengers back in several large fine canoes similar to those used by the Columbian natives, and brought with them a large number of very fine salmon-trout...the same fish as is caught in the small branches of the Columbia in spring and autumn (1959:214).

If the Upper Middle Fork Molala did harvest salmon, they would apparently have had two choices, a relatively short move south to the Umpqua basin, or a move over the mountains to the Deschutes River. Neither of these possible movements have been documented. If salmon were found in the Upper Middle Fork, it appears they would have been a small part of the Molala resource base and would have been less than prime after travelling the length of the Willamette Basin. The spring run of lamprey eels is not blocked by the falls and may have played a part in Molala subsistence. Other fish are plentiful in all the streams and lakes and were no doubt used.

Archaeology of the Area

Until recently archaeological research in the Cascade uplands has been limited. The earliest work occurred at Cascadia Cave in the Santiam drainage. Cressman visited that large overhang and included a description of its numerous petroglyphs in his Petroglyphs of Oregon (1937).

In 1948, cultural materials were found below a deep deposit of 7000 year old Mazama volcanic ash in a test excavation at Odell Lake (Cressman 1948). No further excavations were conducted in the mountains for the next two decades, but several surveys were made in conjunction with the Reservoir Surveys program (cf., Fenanga 1947; Shiner 1949).

Eventually excavations at two of the upland reservoirs were undertaken. Cascadia Cave was excavated (Newman 1966) as a salvage effort. It was estimated that as much as two meters of fill had been mined by collectors prior to the scientific work. The deposit was characterized by an assemblage of leaf shaped projectile points and included edge ground cobbles, side and end scrapers, knives, utilized flakes and hammer/anvil stones. Charcoal collected from near the bottom of the deposit produced a radiocarbon date of 7910 +/- 280 years ago (Newman 1966:23). Stylistic cross dating of some side notched points from the top of the excavated deposit (this disturbed surface was some 2 meters below the actual surface) suggested a terminal date of 6000 years ago for the portion of the deposit which Newman excavated. Newman (1966:25) seems to suggest that the points may have been at least 2000 years more recent than this. The lack of quantified data and inadequate reporting leaves this earliest upland site both intriguing and frustrating to present day researchers. An attempted reanalysis of the materials by this author was paralyzed by a lack of excavation documentation, and by the loss at some point in the past of a good number (the exact count is unknown) of the artifacts.

Two sites have been excavated in the area which produced collections closely resembling the Cascadia Cave assemblage. These are the Geertz Site (Woodward 1972) and the Ripple Site (Lebow 1984), both on the Clackamas River. The Geertz Site produced 54 projectile points, all leaf shaped. The site also yielded hammerstones, one anvil and a chipped stone assemblage very similar to that recovered at Cascadia Cave. It was interpreted as a base camp due to the large amount of lithic debris. The Ripple Site produced 14 projectile points, nine of which were leaf shaped. Four of the others were broad necked and one was a basally indented lanceolate. The rest of the site assemblage consisted mainly of bifaces, but cores and hammerstones were also present, as were a few other chipped stone tools and ground stone pieces. The large number of unfinished bifaces suggested that the Ripple site functioned primarily as a lithic reduction area. No radiocarbon dates were procured from either site, but both authors suggested that their sites were 6000 to 8000 years old (Woodward 1972:58; Lebow 1984:188) based on stylistic cross dating with Cascadia Cave.

Another reservoir project was carried out at the Fall Creek Dam site near Lowell on the Middle Fork of the Willamette River. Nine sites were test excavated (Cole 1968), and only one, 35LA33, was extensively investigated. That site produced a small assemblage of chipped and ground stone materials which suggested to Cole that it represented an upland tradition, distinct from that found on the valley floor. Following Berreman (1937) he placed the Fall Creek area on the Yoncalla-Kalapuya border and speculated that differences between the Fall Creek and typical Willamette Valley types may have been due to Yoncalla occupation, or that of some other group occupying the area. It was obvious to him at that time that knowledge of upland cultural traditions and chronology were inadequate to allow full interpretation of the Fall Creek sites (1968:27).

In the late 1960's and early 1970's a survey (Grayson 1975) and several testing projects (Olsen 1975; Henn 1975) were carried out by the University of Oregon, Department of Anthropology. These produced corroborating evidence for the long period of upland habitation suggested by Cascadia Cave, and a concurring opinion of a separate upland tradition

(Grayson 1975). Henn suggested that two of the projectile point styles found at the Indian Ridge Site at the headwaters of the McKenzie River were not found in the Valley. Working under the mistaken notion that obsidian was not common to the Cascades (see Chapter 3 for a discussion of a similar mistake) and cognizant of historic accounts of Warm Springs Indians using the area, he suggested it had been used by peoples from the east side, not the west side, of the Cascades (1975:468).

Cole (1968) and Grayson (1975) suggested that the archaeological materials recovered in the Upper Middle Fork were different from those of the main-stem Willamette Valley, and that they might represent a "cultural sub-tradition" (Grayson 1975:500). This theory was based on a subjective comparison of Fall Creek artifacts to specimens from the upper levels of Cascadia Cave, those of the upper Umpqua Valley, and those from the Willamette Valley proper.

Since that time the implementation of cultural resource management legislation has caused a surge of archaeological work in the region (see Baxter and Connolly 1985; Baxter 1986 for summary). These remain for the most part small surveys and test excavations; however, a few larger scale excavations, such as the Ripple Site and the four discussed in this study have been done. The testing projects have produced evidence of the early occupations suggested by the Odell Lake and Cascadia Cave materials (cf., Snyder 1981), however, they produce such limited collections that it is difficult to project the data beyond site assessments for management purposes. Eventually, information about the uplands may be abundant enough to fit these small assemblages into a pattern.

Project Focus and Design

The present study focuses on the development of the first local sequence in the Cascades of Oregon. It is an initial step towards a cultural chronology for the uplands. The four sites used for this purpose are located in the Upper Middle Fork Valley of the Willamette River basin. How similar the prehistory of that area is to the rest of the Cascades Range is still unknown. The local sequence presented in this study is put forth as a model which future work in the Cascades can test, refine and expand.

Once the nine components of the four sites were organized within a temporal framework, the archaeological materials from those components were examined and characterized in terms of functional variation. This resulted in an incipient site typology for the Upper Middle Fork. Using ethnographic data from the Upland Molala, the Willamette Valley Kalapuya and California groups, a settlement-subsistence model was hypothesized. In order to test and refine that model and to more fully understand the functional aspect of the nine site components, a broader field of study was undertaken. Ethnobotanical lists for the Western Pacific Northwest were cross-referenced with those of plant association studies. This effort resulted in a characterization of the plant communities in the Upper Middle Fork by plant food resource and season of large game use. This distribution of "ethno-plant communities" was then referenced to prehistoric site locations in the Upper Middle Fork to generate further information about functional and seasonal land use which could refine the original model.

Finally, the four archaeological sites from the Upper Middle Fork Valley were placed in regional archaeological perspective. The various archaeological models developed from the Klamath Basin, southwest Oregon and the Willamette Valley were also examined in order to place the data in a regional prehistoric perspective.

CHAPTER TWO

THE ENVIRONMENTAL SETTING

The study area lies south of Oakridge, Oregon in the Upper Middle Fork Willamette River drainage. This branch of the Willamette River heads in the High Cascades physiographic province, and runs west through the Western Cascades province to the Eugene area where it combines with the Coast Fork and McKenzie Rivers to form the mainstem of the Willamette River. The Willamette then flows north some 180 miles through the Willamette Valley proper to the Columbia River at Portland.

The upper Middle Fork Willamette River drains about 260 square miles of the 11,556 square mile Willamette basin. This area is dominated by a mixed coniferous forest, but other settings offer a varied environment ranging from a riverine riparian environment at the water's edge, to rich prairie grasslands in the open oak savanna and less open oak woodlands, to the mixed conifer and subalpine forests.

Geography and Geomorphology

The broad lower Willamette Valley constricts near Eugene into the three major tributary valleys: the McKenzie, the Coast Fork and the combined Middle and North forks. The

Upper Middle Fork heads in the high Cascades at about 6000 feet near Sawtooth Mountain. Just to the south, separated by the Calapooya Mountains, is the North Umpqua River Valley. The Calapooya Mountains swing north to form the western side of the Upper Middle Fork Basin.

The sediments of the region are derived from two basic sources, eroded volcanic parent rock and decaying forest organics. Downward leaching of clay sized particles in the sediments has created an underlying waterproof stratum which provides a plane of slippage for land slides into the deep, steep-sided stream channels. The end of the Pleistocene brought flooding glacial melt waters which, as they slowed, deposited unsorted rounded and angular gravels, the source of the cryptocrystalline silicates used as tool stone by the native inhabitants. Floods somewhat smaller than these and occurring cyclically about every 100 years, have been shown to be the trigger mechanism for many of the landslides in the Upper Middle Fork Willamette River (Lyons and Beschta 1983). The rotating action of the slumping land can create flat areas, often in a series, down the course of the land slide. Site inventory data shows that these flat places were often exploited as campsites by the native inhabitants.

Until recently, obsidian was thought to have been due to cultural introduction; however trace element sourcing studies and further archaeological work (Sappington 1986) have determined that obsidian was locally obtained as pebbles and cobbles. The ultimate source of this obsidian remains unknown. Adding to the mystery has been the discovery of a volcanic pumice which chemically mimics Mazama ash, the well known 7000 year old horizon marker. This ash is believed to be younger than Mazama and may well be related to the local obsidian (Baxter and Connolly 1985).

Paleoclimate

Pollen cores from the Willamette Valley (Hansen 1947; Heusser 1960) reflect essentially the same picture of paleoclimatic conditions. Hansen's sequence begins with Period I in the late Pleistocene before 15,000 years ago, when it was cool and moist. Period II, the increasingly warm and dry Early Postglacial period, runs to about 8000 years ago when it is succeeded by Period III, with the maximum warmth and dryness of the Middle Postglacial. Finally, about 4000 years ago, Period IV, the Late Postglacial, began a cooler wetter phase. Heusser's (1960) later, supporting work proposed new break points and names for the same four periods. His Late Glacial lasts until 10,500 years ago, when it is replaced by the Early Postglacial, which becomes the Hypsithermal by 8500 years ago. This warm, dry maximum lasts until 3000 years ago when the Late Postglacial begins.

A climatic sequence with a somewhat sharper focus on the more recent past has been developed using Bristle-cone

Pine tree ring data from the White Mountains of California (LaMarche 1973; 1974; 1978). Two tree ring sequences were used; one 5400 years long from the lower forest border and the other 6000 years long from above the present tree line.

Because of the differences in the growth response of trees to climatic variations in the lower forest border and the upper tree line, comparison of their ring-width records yields paleoclimatic insight unobtainable from either record alone (LaMarche 1974:1043).

The sunlight on the upper tree line and the added moisture on the lower forest border were the major growth factors so that comparison of the two yields data on increases and decreases in moisture and temperature. This yields the dated climatic sequence seen in Figure 5. This sequence was shown to correlate to the cultural sequence at Night Fire Island (Sampson 1985) in the Klamath Basin. Since Night Fire Island is not too distant from the Upper Middle Fork Willamette area, the California climatic sequence may have relevance to the Central Oregon Cascades. At Night Fire Island, the rising and falling of the lake first inundated and then created rich marshlands which were the major resource base of the village. No such direct resource correlation is be expected in the Upper Middle Fork.

While the Bristle-cone Pine sequence may be applicable to the Upper Middle Fork, a similar study in Washington

YEARS BEFORE PRESENT X 100

Climatic Sequence	0–5	5–10	10–25	25–35	35–50	50–60
California Bristle-cone Pine	WARM	DRY	COOL DRY	COOL MOIST	WARM WET	WARM DRY

Figure 5. White Mountain Bristle-cone Pine Climatic Sequence

casts doubt. That study of a single sequence, not two sequences as with the upper and lower elevation sequences of the Bristle-cone Pine work, was made using Mountain Hemlock and Subalpine Larch in the Cascades of southern Washington (Graumlich 1985). The California and Washington growth sequences do not show much similarity over the last 350 years, suggesting that, as has been asserted for the Great Basin, local micro-climatic sequences may bear very little resemblance to one another (Aschmann 1958; Bryan and Gruhn 1964). In any case, one must assume that unless climatic change is drastic and sudden,

> the relative size and number of food-resource patches could grow or diminish with fluctuations in effective moisture, but the basic climatic and physiographic structure of the region guaranteed that the same general pattern of diverse and broadly distributed resource patches would persist (Aikens 1984:240).

This description seems likely for the uplands, where the relatively numerous resource patches are scattered, but fairly similar in content. Some might expand or contract, or appear and disappear, but the overall picture would likely remain stable.

Even so, the potential of a drastic change is suggested by Graumlich (1985) who states that the temperature between 1590 and 1900 was about 1 degree C. lower than it is at present. This may have shifted sensitive species dramatically downward in elevation. That this would have been a large change is shown by the fact that the mean winter temperature of the Willamette Valley varies from that of the upper slopes of the Cascades by only 2.5 degrees C. and the mean summer temperatures vary by only 2.0 degrees C. (Franklin and Dyrness 1973:40).

The present study is based on the assumed prehistoric presence in the Upper Middle Fork of an environment very similar to that reported at the time of contact. The veracity of this model of stability awaits local paleo-ecological testing. In the interim, a comparison with Californian data is intriguing.

In the Sierra-Nevada Mountains of Central California, several climatic sequences have been correlated and compared to cultural change (Moratto et al. 1978). That study outlines environmental trends which would probably have impact on human settlement-subsistence regimes. Increasing warmth and dryness may mean an adjustment of associated flora and fauna as old marshes dry and lakes become new marshes. A longer high altitude growing season would be accompanied by slow upward movement of certain species.

Increasing coolness and moisture, on the other hand, would mean a shorter growing season with the resultant downward shift of flora. New marshes and lakes would be created shifting food resource locations. To what extent the annual burning to maintain the prairie environment might ameliorate such change is unknown. Peoples constantly and consciously altering the environment to their advantage would perhaps be somewhat preadapted for such changes. The elevational range of the California study area (about 430-3300 feet) corresponds well with that of the Upper Middle Fork Willamette. In California the "coincidence of environmental and cultural changes in the Buchanan locality is striking" (Moratto et al. 1978: 155). The investigators assert that major cultural change in that area is climate-based.

Patterning in the archaeological data from the Upper Middle Fork Willamette River basin and perhaps the rest of the Cascades can be explained to a considerable degree by cultural movement, as will be shown below; however, the impact of local climatic/environmental conditions still remains unknown and cannot yet be taken into account. When adequate data are available, a similar cultural-climatic choreography may well be demonstrated.

Modern Climate

In the Upper Middle Fork area average temperatures range from 70 degrees F. (21 degrees C.) in the summer to 34 degrees F. (1 degree C.) in the winter. Precipitation peaks occur in the Cascades at the headwaters of the Molalla and McKenzie Rivers with as much as 140 inches of precipitation. Just to the south of the McKenzie peak, the Upper Middle Fork Willamette River basin lies in a local rain shadow created by the Calapooya Mountains. This results in a much drier climate with only about three of the area's annual 60 or fewer inches of precipitation coming during the summer. High elevation snowfall averages 42 inches per year, accumulating in a snow pack which melts from May to July (Hemstrom and Halverson 1982). Over a 17 year period, Oakridge, at 1310 feet in elevation, recorded snowfall only in January and it averaged less than an inch (US Soil Conservation Service 1964). This dry climate and relatively low precipitation is responsible for the presence of some of the local vegetation such as Ponderosa and Sugar pine. Just 35 miles to the north at McKenzie Bridge, only 60 feet higher in elevation, snow was recorded for January through March, with February accumulations averaging more than four inches.

Fauna

Large game of economic importance included Columbian White-tailed deer, Columbian Black-tailed deer and Roosevelt Elk. Also present in the area were Black bear, Grizzly bear and Cougar. Zenk (1976:19-21) offers a listing of plants and animals common to the Willamette Valley as observed by early white explorers and settlers (Table 1).

Columbian White-tailed deer (<u>Odocoileus virginianus leucurus</u>), originally noted by David Douglas, are small deer, not nearly as numerous as Black-tailed deer (Gavin 1978). This now endangered species once ranged from southern Puget Sound to Roseburg. Today the species is present in Oregon at only two preserves, one northwest of Portland near Scappoose and the other near Roseburg in the Cascade foothills. Primarily grazers, not browsers, these deer favor brush lands in river valleys and surrounding foot hills (Gavin 1978; 1984). It is likely that their numbers were controlled by constant aboriginal hunting. Especially effective were "surround" methods employed after the annual grass burning had concentrated the animals in isolated grazing pockets which were purposely avoided by the starters of the sweeping grass fires (Zenk 1976:23). White-tail deer populations were further reduced when the Euro-American pioneers stopped the annual burning, cleared and farmed the valley floors, and logged the surrounding foothills, effectively destroying the species' habitat. Today, the Roseburg herd has never been known to leave the refuge, which has an elevational range from 443 to 1656 feet above sea level. Year round, this species of deer remains in the lower elevations, not subject to the annual upward migration of the Cascade Range Black-tailed deer.

Columbian Black-tailed deer (Odocoileus hemionus columbianus) are present throughout the western part of the state from the coast to the summit of the Cascades where their range abuts that of the Mule deer. The most important year round browse of this species includes thimbleberry, salmonberry, red elderberry, fireweed, vine maple, fig wort, sword fern, trailing blackberry, red alder, willow salal, Oregon grape and huckleberry (Chatelain 1947). This list is at least partially duplicated by that of human plant resources, undoubtedly bringing the two competitors into contact, a situation exploitable by aboriginal hunters.

The deer inhabiting the eastern side of the valley slowly infiltrate the mountains, eventually gaining the summit of the Cascades as the summer lengthens. In contrast to this slow upward movement, the descent is a sudden migration triggered by the first heavy snow. In the Coast range, no such movement takes place (Lindzey 1943). The deer stay in family groups of three to four including mother does, fawns, yearling does and small bucks. During the winter two to three of these groups often bunch together to form a herd of perhaps nine to 12 deer (Rieck 1952). Rutting season lasts from October to the first of January, with the peak in November. During this period bucks collect harems of four to five does and keep them within an area of about one-half acre.

Roosevelt elk (Cervis canadensis roosevelti) herds were originally found throughout the Willamette Valley, each inhabiting a limited home range which they seldom left even when under intense hunting pressure. They are fewer in number in the uplands as there is less open grazing. They feed on a variety of grasses and forbs, and like the Black-tailed deer, migrate to the Cascade summit in the summer and are driven down by the first snows (Mace 1971). In the late nineteenth century, meat and hide hunters decimated the native herds. It has been estimated that in the Umpqua Valley 30,000 deer and elk were killed each year from the 1870's to the 1890's (Abdill 1968). Today small remnant herds reside in areas of the Cascades and Coast ranges, but in the 1920's Rocky Mountain elk were introduced and these compose the majority of the state's elk population.

Grizzly bears (Ursus klamathensis) were, and black bears (Ursus americanus) still are, numerous in the Cascades and were hunted by the early inhabitants. Human and bear must have been in very close contact as both placed berries among their major food resources. Stern phrased it as follows in a discussion of the Klamath subsistence round:

> In the mountains, only camas may now be ripe [late summer]; but fruits such as the huckleberries, serviceberries, chokecherries and wild plums especially draw them....The berry grounds,however, are attractive to others, and many a woman preoccupied with a berry bush, spends her last mortal seconds in the realization that a grizzly, and not another person, is feeding on the far side (Stern 1966:14).

Today, grizzly bears are extinct in Oregon. The last one in the Umpqua Valley was reported killed in 1877 (Abdill 1968). The Kalapuya and many other groups, hunted but would not eat the man-eating grizzly bear (Zenk 1976:31-32). Zenk suggests that this prohibition may well have extended to other carnivores and scavengers such as ravens, birds of prey, vultures, wolves, coyotes, foxes and the carnivorous cats. It is unknown to what extent bears or small mammals contributed to subsistence.

Flora

The flora of the Willamette Valley (Table 1) is varied, but the important economic plants include camas (*Camassa quamash*; *leichtlinii*), tarweed (*Madia spp.*), acorns (*Quercus garryana*) and hazelnuts (*Corylus cornuta*), as well as various berries, especially strawberries (*Fragaria spp.*), and huckleberries (*Vaccinium spp.*).

It has become clear that prehistoric burning was responsible for keeping the conifer climax vegetation from invading and taking over the valleys of the Willamette Basin. According to Johannessen et al. (1971) and Towle (1979), the prehistoric environment probably included a riparian strip of timber between one-quarter and three miles wide, many marshes and ponds, extensive oak savanna (prairies), small patches of oak woodland and conifer forest, bounded on all sides by the thick Douglas fir and Western Hemlock forests of the Coast and Cascade Ranges.

Table 1. Economically* Important Flora and Fauna of the Willamette Valley**

FLORA		FAUNA	
Common Name	Latin Name	Common Name	Latin Name
Oak	Quercus garryana	White-tailed Deer	Odocoileus virginianus leucurus
Douglas fir	Pseudotsuga menziesii	Black-tailed Deer	Odocoileus hemionus columbianus
Pine	Pinus ponderosa	Black or Brown Bear	Euarctos americanus
Western		Grizzley Bear	Ursus klamathensis
Hemlock	Tsuga heterophylla	Cougar	Felis concolor oregonensis
Western		Timber Wolf	Canis lupus
Red Cedar	Thuja plicata	Coyote	Canis latrans
Alder	Alnus oregana	Grey Fox	Urocyon cineroargenteus townsendii
Big Leaf		Rabbits	Sylvilagus spp.
Maple	Acer macrophyllum	Squirrels	Sciurus spp.
Vine Maple	Acer circinatum	Beaver	Castor canadensis pacificus
Oregon Ash	Fraxinus latiolia		
Hazel	Corylus cornuta	Other animals not mentioned by Zenk include:	
Wild Cherry	Prunuss spp.		
Madrone	Arbutus menziesii	Marten	Martes americanas
Willow	Salix spp.	Otter	Lutra cnadensis
Cascara	Rhamnus purshiana	Raccoon	Procyon lotor
Crabapple	Pyrus diversifolia	Bobcat	Lynx rufus
Dogwood	Cornus nuttallii	Wolverin	Gulo luscus
Elderberry	Sambucus spp.	Skunk	Mephitis mephitus;Spilogale gracilis
Ninebark	Physocarpus capitatus	Mountain Quail	Oreortyx pictus
Yew	Taxus brevifolia	Bobwhite Quail	Colinus virginianus
Wild Rose	Rosa spp.	Blue Grouse	Dendragrapus obscurus
Camas	Camassia spp.		
Bracken fern	Pteridium aquilinum	Avifauna, of major importance in the main valley, were	
Blackberry	Rubus vitifolius	also reported, however they would probably not have been	
Currants	Ribes spp.	a major resource in the Upper Middle Fork Willamette.	

* Not just food. **Zenk 1976:19-21 the major source.

The burning of the prairies killed the invading Douglas fir seedlings, leaving the more fire resistant oak. Aside from opening the forest to promote a more economically productive understory by maintaining a set of ecotones rich in flora and fauna, this practice provided direct assistance in harvesting the bounty. The burning restricted the range of the deer and elk that remained on the valley floor to the small patches of oak/conifer woodland and to the riparian strip. These "islands" were easily hunted, either singly or with others in a surround.

Burning was also practiced in the various tributaries of the Willamette. Towle (1979:15) remarks that "the name Oakridge was given ...as descriptive of vegetation and topography." Indeed, Oakridge had previously been referred to as Big Prairie and Hazeldell (Winkler 1984:9). The small patches of oak woodland which remain are confined to the driest sites in the Cascades, generally south facing slopes with grass, and to the larger valleys (Topik and Hemstrom 1982:13). Large, ancient "wolf" trees (trees with branches down the trunk to the ground, indicative of solitary growth in an open environment) on the ridge between Dead Horse Creek and Jim's Creek, the location of the Colt and Saddle sites, suggest that the area, now covered with a 100 year old stand of Douglas fir, was open, most likely as a result of burning. This prairie probably existed for some distance up the ridge, well beyond 3000 feet elevation. Extending the prairies by burning the small tributary draws along the mainstem would have facilitated travel and was probably not entirely preventable in any case.

Portions of the environment of the Upper Middle Fork were apparently similar to the Willamette Valley, with the prairies reduced in size to patches scattered throughout the forest. An 1852 explorer describes the Upper Middle Fork as he saw it when searching for a route through the mountains.

> the timber is generally smal with the eception of a Hemlock flat of 8 miles. the timbers are navigated being Oak, Ash, Maple, Balm of Gilead, Aspen, Arborvita, Cedar, Alder and the Firs. The grass [is] good on the way as the hills are Bald in many places beside the valleys in places are prairie and prairie like the Grass is Bunch Grass ...The soil is good all the way to the Summit and som of the prairies will admit of setlement and if generally known will doubtless be filled in '53 (Menefee and Tiller 1976:328).

The area of the Upper Middle Fork is usually included in the Western Hemlock Climax zone or at the northern extent of the Mixed Conifer zone (Franklin and Dyrness 1973, Hemstrom et al. 1982). However, some remnant plant communities are reminiscent of the larger interior valleys of Oregon (Franklin and Dyrness 1973:110). In the upper Middle Fork drainage, Winkler has described an Oak Woodland-Prairie-Douglas fir Zone which exists between 600 and 2400 feet in elevation. Its limits are based on those of a remnant of a "distinctive sequence of plant communities" still present along the upper portion of the main stem of the Middle Fork river (Winkler 1984:9). These include

Doulgas fir, fir, incense cedar, Ponderosa pine, madrone, poison oak, hazelnut, rose, Oregon grape, snowberry, strawberry and various grasses.

Above the invaded prairie valley floor is the Western Hemlock zone characterized by the vegetation which is now dominant in the Upper Middle Fork valley: Douglas fir and Western hemlock with incense cedar, fir, Ponderosa pine and Sugar pine occurring in some of the drier locations. At about 35 feet this zone is replaced by the Pacific Silver fir zone which continues to 5500 feet. In that wetter and cooler zone, the conifers of the lower zone are joined by Lodge Pole pine, White pine, spruce, and larch, while mountain hemlock and Alaskan cedar may occur on the upper boundaries. The Mountain hemlock zone, the highest forest zone in the Cascades, lies between 5500 and 6500 feet. It has a subalpine wet cold climate. This zone consists of a lower elevation closed forest above which is a subalpine meadow-forest mosaic. It is in this zone that major huckleberry fields and summer deer and elk range are found.

The non-forested areas of the Western Cascades have been categorized by Hickman (1976) into 12 communities: bogs, seeps, snowbeds, talus, four types of meadows, cliff faces, savannas, lithosols, and gravels. A distinctive floral community is found in each, a fact undoubtedly important to prehistoric human land use. Hickman states that except for the wettest and driest of these, they are maintained by "frost, rodents, fires and mass wasting" (1976:145). Recently Hemstrom, Logan and Pavlat (1985) have defined 19 non-forested and 44 forested plant communities in the Willamette National Forest. The non-forested communities essentially follow those of Hickman, with some subdivision. Because of the lack of annual burning, much land that was prehistoric prairie has been colonized by Hemstrom, Logan and Pavlat's Douglas fir plant community.

The openings known as savannas are characteristic of "the hills and fields within the Willamette Valley and other major valleys of Western Oregon" (Hemstrom, Logan and Pavlat 1976:147). They are characterized by White oak, poison oak and grasses and are restricted to south facing slopes below 2000 feet. Annuals are abundant, especially grasses, as are forbes and perennial herbs.

High altitude bogs contain a mix of sedges, mosses, and a variety of grasses, with shrubs of bog huckleberry and willow. Bogs occur on gentle slopes or flats where snowmelt saturates the soil for the entire summer. Wet meadows occur on east or northwest facing slopes at mid- to high altitudes with a similar mix of grasses, mosses and perennials. Again, many of the prehistoric upland berry fields are now included in the Pacific Silver fir forested community.

The various meadows occur at all elevations. Fauna are attracted to the grasses, as well as to lilies, vetch, gooseberry, serviceberry, parsley, ocean spray, currants and others. Some of these are the location of large huckleberry fields visited seasonally by the Indians.

The plant communities of the other openings are closely related to specific moisture/soil type interactions, with abundance, variety and availability of the plants varying accordingly.

The relationship of the prairies to human ecology has been demonstrated through ethnographic data. Modern and historic information suggests that the coniferous forest is much less valuable to subsistence than are these openings. Further evidence will be presented in a later chapter.

Modeling Human Adaptation in the Upper Middle Fork Valley

One of the goals of this study was to build a model of the settlement/subsistence pattern followed in the Middle Fork Willamette Valley. That framework is grounded in ethnographic data collected from the Molala and supported by patterns extrapolated from the nearby Kalapuyan and California groups (see Chapter 1).

In the winter the Molala lived in pithouse villages of a few extended families. Ethnographers (Rigsby n.d.) have suggested a low Molala population which would probably have been reflected in aggregations of fewer than 30 to 40 people. Each house would have been large enough to hold a small extended family. Unlike the more populous Kalapuya, where villages were so important, social organization was centered in the family, with leadership based on ability and family status (Rigsby n.d.). The villages were located at lower elevations, and reoccupied annually. The houses were not described, but since the Molala and Klamath are known to have had extensive contact (Stern 1966:18), it is likely that their houses were similar. In any event, pithouse design seems to have been fairly standard throughout the region (cf., Leonhardy 1967).

> The earth lodges, frequently dismantled in the spring after becoming waterlogged by the melting snows, are rebuilt in the fall. They are semi-subterranean, built within a circular pit one to four feet in depth...and range in diameter from twelve feet for a single family to over thirty-five feet for the residence of a shaman. Four central posts support horizontal plates, with a split-log beam slanting down from each corner into the ground beyond the edge of the pit. Horizontal stringers between the beams in turn bear a layer of rafters, laid side by side around the house. Cracks are chinked with sticks and bark; and the surface is covered successively with rough matting, with grass laid along the lower edge, and finally with dirt. On top, rough planks are laid between the plates, leaving a hatchway that serves simultaneously as smoke hole and entrance (Stern 1966:7).

Occupied during the late fall, winter and early spring, these villages served to store the provisions collected and prepared during the rest of the year. The Kalapuya hunted year round, probably emphasizing the late fall and winter months when herds of deer and elk formed. At that time field burning forced game into small unburned areas of browse (Toepel and Beckham 1981:67). The lack of snow at lower elevations suggests that at least some plant resources were available year around, and if needed scavenging for uncollected plant foods could have been done.

No doubt the village was located near permanent water in a protected spot on the valley edge, where it was close to needed forest resources, such as firewood. That location also allowed easy access to the open valley bottom, the major winter range of the deer and elk. Activities at the main village would have included many of the endeavors undertaken during the rest of the year. In the spring the first plant harvesting would have been centered there, as well as constant hunting preparations and at least partial butchering and hide working. Production, use and discard of most kinds of stone tools was a matter of course at the winter village. In addition many activities which would not take place elsewhere occurred at the winter village. Some of these were probably associated with wood working, food storage and preparation, as well as ceremonial activities.

In the early spring, at least by late February or early March, women moved out from the village to collect the first greens, including camas and lilies. The amount of camas and other bulbs available in the Upper Willamette Valley is unknown; certainly the stands are less dense today than the huge fields of the Willamette Valley proper. They are, however, common at the lower elevations.

Soon after the women began their foraging, the winter village was abandoned as the small family groups moved afield, occupying base camps on the edges of the various prairies. As the season progressed these were relocated as new foods became available or desirable. It seems unlikely that elevation played a major part in this movement, since the narrow valley with close access to higher elevations would not have necessitated moving base camps to the uplands. The Tualatin Kalapuya spent at least six months in such summer camps (Zenk 1976:43-44), and it seems that the Molala logistics would have been similar. Unfortunately, even for the Kalapuya, "the extent and frequency of harvest-season movement is largely undocumented" (Zenk 1976:43).

From the summer base camps, task specific work groups ranged out for periods of time to exploit specific resources, or to carry out certain tasks. Hunting and gathering parties were no doubt the most common, but the collection of tool stone, reconnaissance of plant and animal resource availability, fishing, and vision quests were also important. During the summer months hunting was not a major Kalapuyan activity, but it is likely that the lesser plant resources of the smaller upland prairie environments placed more emphasis on hunting among the Molala.

Examination of samples at the University of Oregon Herbarium showed that harvesting of the high altitude berry fields must have taken place in late July and August. It is assumed that the slow upward migration of the Black-tailed deer and Roosevelt elk was closely monitored by the Molala.

Hazelnuts, probably a major staple, were also harvested at this time.

Prairie burning was done in the fall, also the time of acorn and seed harvesting. The fall is also when elk and deer form herds during the rutting season, becoming more susceptible to group hunting tactics.

The Molala subsistence round is intimately tied to the seasons. If temperature is replaced by elevation, the monthly temperature change for upland plant communities charts the time of seasonal movements (Figure 6).

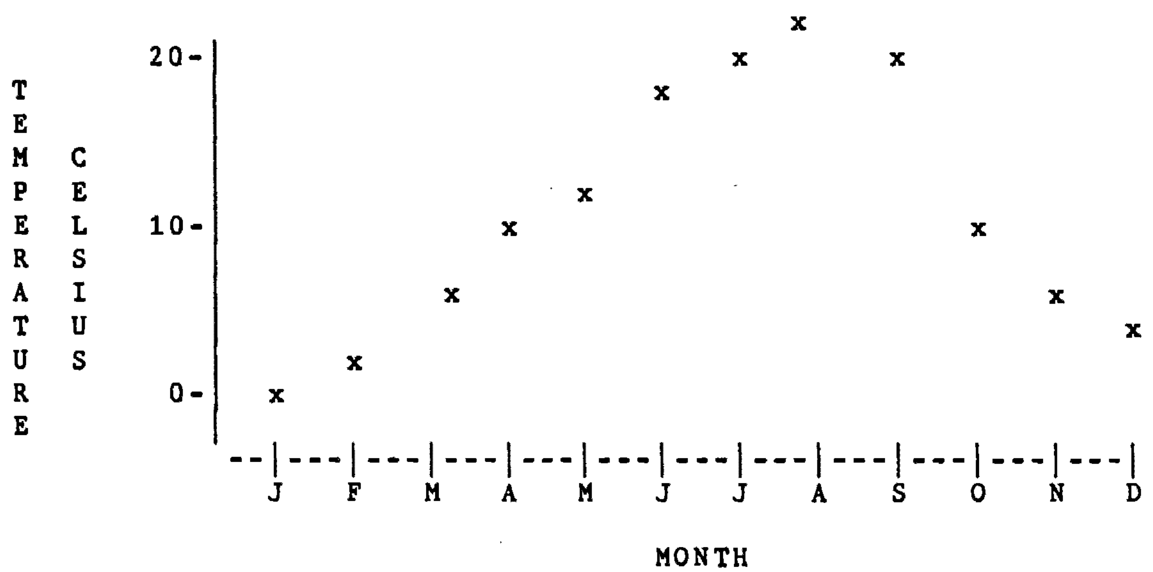

Figure 6. Temperature variation of the Western Hemlock/Oxalis association (after Hemstrom, Logan and Pavlat 1985)

It is likely that movement into the summer base camps took place with the temperature break in April, followed by opening of the upper elevations and slow movement of game until the cold of late September and October again focused attention on low elevation resources.

In summary, the model of prehistoric land use begins with a single relatively permanent winter village, seasonally occupied by the entire band. That village was abandoned during most of the spring, summer and fall, while the small band, broken into nuclear family groups, moved into the various drainages to exploit the relatively homogenious, but scattered, resources. During this time people created a series of base camps located for easy access to the faunal and floral resources of larger savanna and meadow areas, as well as other important resources. From these base camps task specific excursions were made for various lengths of time ranging from a day to several days. As the seasons passed and the deer and elk migrated upward and plant resources ripened at higher elevations, the base camps were moved. In the fall lower elevation resources such as acorns and grass seeds were harvested and group hunts were organized. People continued to occupy base camps until the late fall, when they returned to the village, probably at the onset of major rains.

CHAPTER THREE

THE ARCHAEOLOGY OF THE UPPER WILLAMETTE RIVER VALLEY

Four archaeological sites form the basis of this study. These include two open sites, Colt and Saddle, and two sites beneath overhangs, Vine Rockshelter and Rigdon's Horse Pasture Cave. Each of these was excavated and reported under contract to the Rigdon District of the Willamette National Forest as part of the Forest's Cultural Resource Management program. The two open sites are within the Colt Timber Sale and will eventually be disturbed by logging or road building, while the shelters are very near such developments and therefore are susceptible to vandalism and destruction. Vine Rockshelter was investigated and reported by Baxter and Connolly, Archaeological Data Consultants, and the other three sites were excavated by the Archaeological Field School of the Department of Anthropology, University of Oregon.

Rigdon's Horse Pasture Cave

Rigdon's Horse Pasture Cave (HPC)(35LA39), excavated in the summer of 1981 by the University of Oregon (Baxter et. al. 1983) is located at 3200 feet above sea level with Staley Creek to the west and the Middle Fork of the

Willamette River to the north. The rock shelter overlooks the confluence of these streams from the steeply sloping northern terminus of Cougar Ridge. Forming a natural access route to the east, this ridge is the location of Grassy Glade, an upland prairie which even today attracts large numbers of deer and elk.

The overhang which forms the shelter has eroded from a volcanic tuff exposed by the Staley Creek draw (Figure 7). It opens to a steep (>30 degrees) slope dominated by Douglas fir, Western hemlock, Ponderosa and Sugar pine, Pacific madrone and incense cedar. The understory includes serviceberry, Oregon grape, huckleberry, trailing blackberry, gooseberry, hazelnut and Golden Chinquapin.

Field Procedures

Investigations were conducted over an eight week period between June and August, 1981. Just over twenty-five cubic meters of the interior fill of the rockshelter were excavated. All fill was passed through 1/4 inch mesh, and a 25% sample was also screened through 1/8 inch mesh. Only two natural strata were visible: a 20 cm upper layer of loose organic materials brought in as wood rat nesting material, and a lower stratum of fine red sand and silt deposited through colluvial, alluvial and aeolian processes (Figure 8). A north/east oriented grid was laid out in the 10 m long by 5 m deep shelter, dividing it into 2 m by 2 m

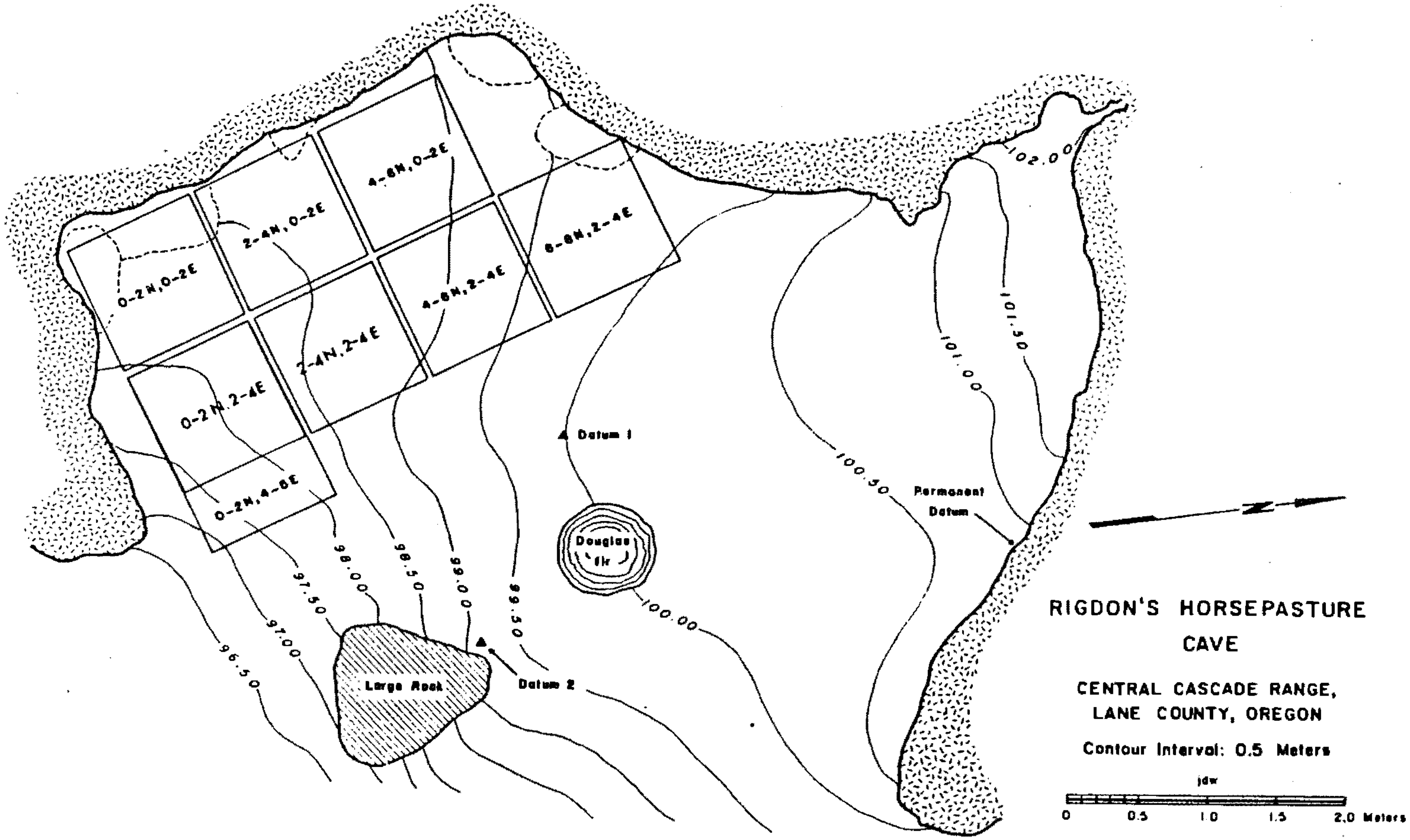

FIGURE 7. A contour map of Rigdon's Horse Pasture Cave.

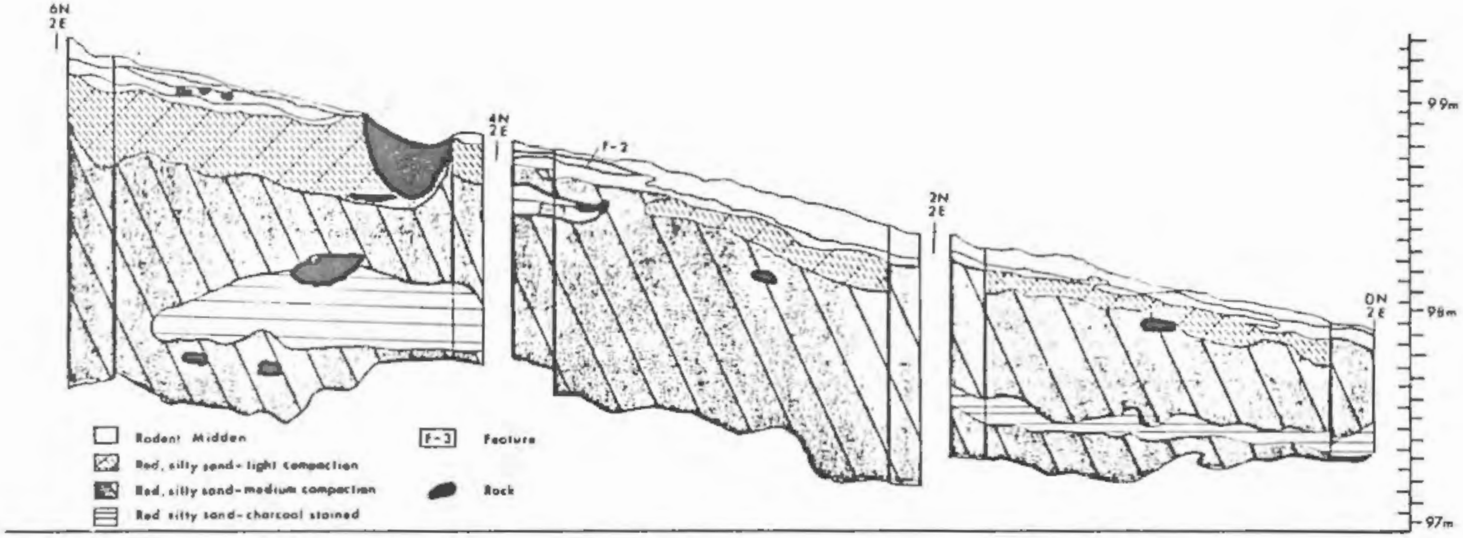

FIGURE 8. Stratigraphic profile of the north-south axis of Rigdon's Horse Pasture Cave.

units which were excavated in 10 cm levels. Those excavations were subsequently reported in various preliminary and final forms (Baxter, Cheatham, Connolly and Willig 1982; 1983), and have provided a firm base of comparison for the interpretation of various other collections (cf., Baxter 1986) from the area.

The Deposit

Although the shelter offered no visible cultural stratigraphy, analysis of the extremely plentiful lithic debris provided a means for the development of six analytical units (cultural strata) which correlated well to cultural diagnostics. These strata (Connolly 1983:16) were derived by plotting the frequency of obsidian in each of the arbitrary 10 cm excavation levels and correlatating these counts across excavation units (Figure 9). Strata were divided on the basis of relatively dramatic shifts in obsidian frequency. At the time, obsidian was assumed to be an exotic which would be sensitive to cultural fluctuations. The 213 classifiable projectile points from the site were grouped into 22 types based on morphological attributes. When the projectile point provenience data was plotted by strata, the 22 point types formed classic battleship curves, strongly suggesting the legitimacy of the debitage frequency derived strata. Not only did this demonstrate that the site was stratified, but showed that it was also essentially

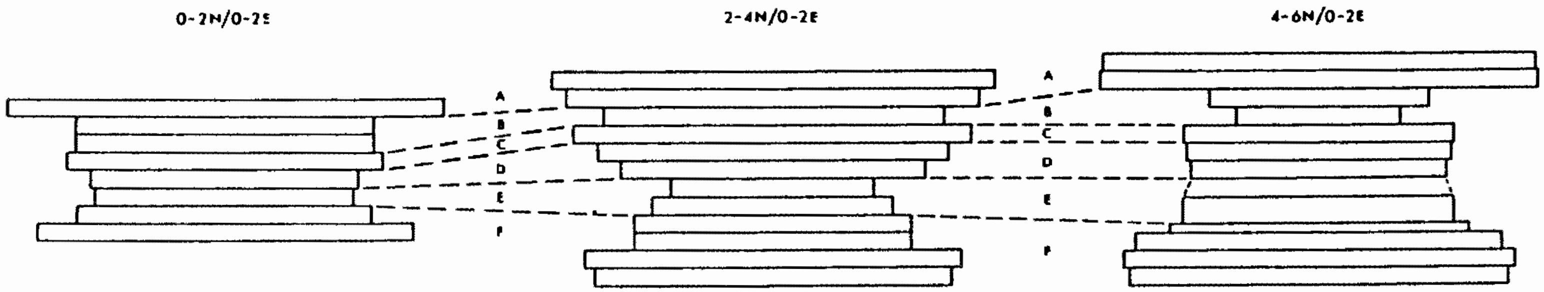

FIGURE 9. Correlation of the frequency of obsidian debitage by artibrary 10 cm levels into cultural strata.

undisturbed.

In subsequent work (Baxter and Connolly 1985; Sappington 1986) local sources of obsidian were discovered and total debitage frequency, rather than merely obsidian was shown to be a better indicator of occupation levels. Pursuant to that discovery, the Horse Pasture Cave collections were once again examined and the strata redefined. Since the data will be presented using these new strata, the methods of their reassignment and interpretation are discussed here.

Reanalysis of the Horse Pasture Cave Collection

Using the total debitage from each 10 cm level of six 2m by 2m excavation units, frequency curves were plotted (Figure 10). Each curve consisted of a series of peaks and valleys which are presumed to represent the waxing and waning of human occupation at the site. When this method was first developed divisions were made at all dramatic shifts in frequencies, so that breaks were made at the peaks as well as the valleys. Since those initial efforts, it has been decided to limit the divisions to the valleys, since that will define the waxing and waning of an occupational period, rather than defining the waxing as one event and the waning as another. In most cases during this reanalysis, the strata were divided at the point of debitage increase. In a few instances the divisions were made at more arbitrary points, but only when comparison of the six curves clearly showed a better overall fit. This method resulted in regrouping the six original Horse Pasture Cave strata (A - F) into four strata: 1,2,3,and 4 (Figure 11).

The new consolidation of the old strata is as follows: Stratum 1 consists of HPC-A, and three levels of HPC-B. Stratum 2 subsumes the rest of HPC-B, all of HPC-C, and two levels of HPC-D. Stratum 3 consists of the rest of HPC-D, all of HPC-E which lay along the back wall of the cave, as well as two levels of HPC-F. Stratum 4 holds the portion of HPC-E which lay in the front three units, as well as the rest of HPC-F (Refer to Baxter et al. 1983).

These new strata accomplish the grouping of HPC-B with C and HPC-D with E. During previous analyses these always clustered very closely with one another and their separation never appeared to be a completely satisfactory representation of the actual relationships.

Using the new strata the artifacts were reanalysed for vertical variation in order to discern any temporally significant changes. The frequencies of the 22 projectile point types were plotted for each of the new strata. Four periods of occupation are suggested. Stratum 1 corresponds for the most part to the original Stratum A, which was dominated by small obsidian Desert side notched points and which contained glass and copper beads. Stratum 2 is dominated by the Narrow Neck projectile point series, and

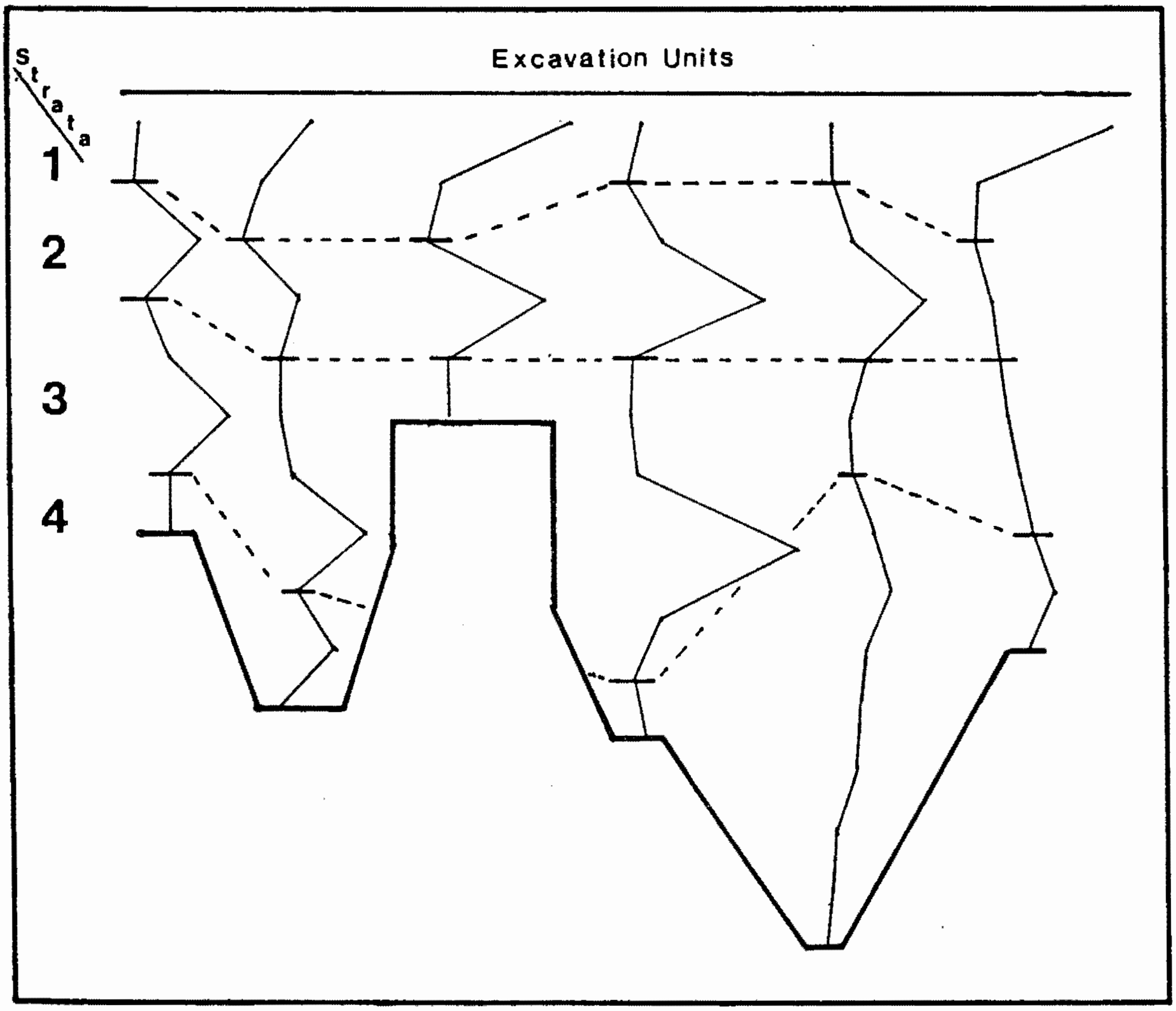

FIGURE 10. The new cultural strata defined for Rigdon's Horse Pasture Cave. Vertical axis corresponds to depth below surface, by excavation level. Horizontal axis represents percentage of unit debitage. The peaks in debitage frequency can be correlated from excavation unit to excavation unit across the site to form meaningful cultural strata.

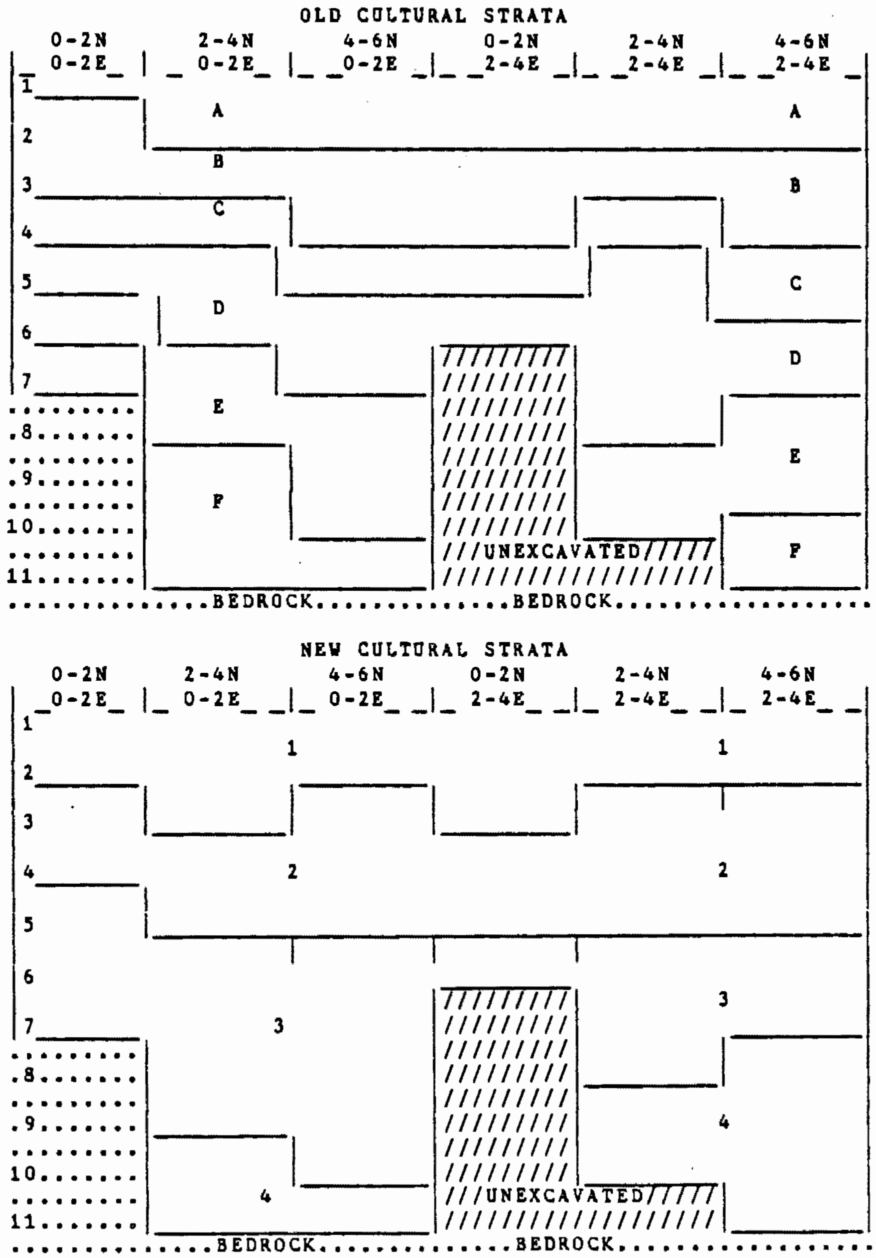

Figure 11. Comparison of Old and New HPC Cultural Strata. (Numbers down left side are levels, Numbers inside figure are Stratum designations)

correspond to the original Strata B and C. Strata 3 and 4 correspond to D, E and F and are dominated by the Broad Neck point series. Some changes in the frequencies of point styles suggest that a period of little occupation may have occurred between Strata 3 and 4. This possibility is supported by an uncorrected radiocarbon date of 500 bc from stratum 4, and one of ad 1400 from the top of stratum 3.

The Horse Pasture Cave point assemblage has been combined with those of the three other sites from the Upper Middle Fork area to create a new typology consisting of 15 types. The projectile point assemblages from each stratum are not very similar to one another. However, strata 3 and 4 are somewhat similar due to broad neck point styles included in each, and strata 1 and 2 share some narrow neck point styles.

In contrast, the non-projectile point chipped stone assemblages are very similar in all the strata suggesting that the chipped stone tool kit remained very stable throughout the occupation of the site.

The ground stone and heavy tools industry from strata 3 and 4 are very similar, but strata 1 and 2 contain very few of these artifact types.

Altogether, the collections from strata 3 and 4 are the most similar, and these are less similar to stratum 2 and even less so with stratum 1. This confirms three of the four periods of occupation observed in the debitage frequencies, and the similarity between strata 3 and 4 is not so great as to argue against the possible occupation break between them.

The Cultural Assemblage

The assemblage (Table 2;3) from Rigdon's Horse Pasture Cave consisted primarily of chipped stone materials (Figure 12;13) with projectile points the most numerous tool (419 whole and fragmentary specimens), followed by utilized flakes (228), unifaces (122), biface fragments (105), drills (35), and cores (13). In addition to the chipped stone assemblage, a small ground stone assemblage consisting of grinding slabs (2), hand stones (2), a pestle (1), an edge ground cobble (1) and fragments (13) was present, as was a heavy tool industry represented by anvils (4), hammerstones (8), and choppers (4). Two of the anvils exhibited edge grinding, as did one of the grinding slabs.

Two fragments of basketry were recovered from the surface of the shelter in the same stratum as rolled copper beads (4), a copper pendant, white glaze beads (9), a royal blue bead and a lopped spire olivella shell bead. An abalone shell pendant was also collected from the shelter's surface (Minor 1976).

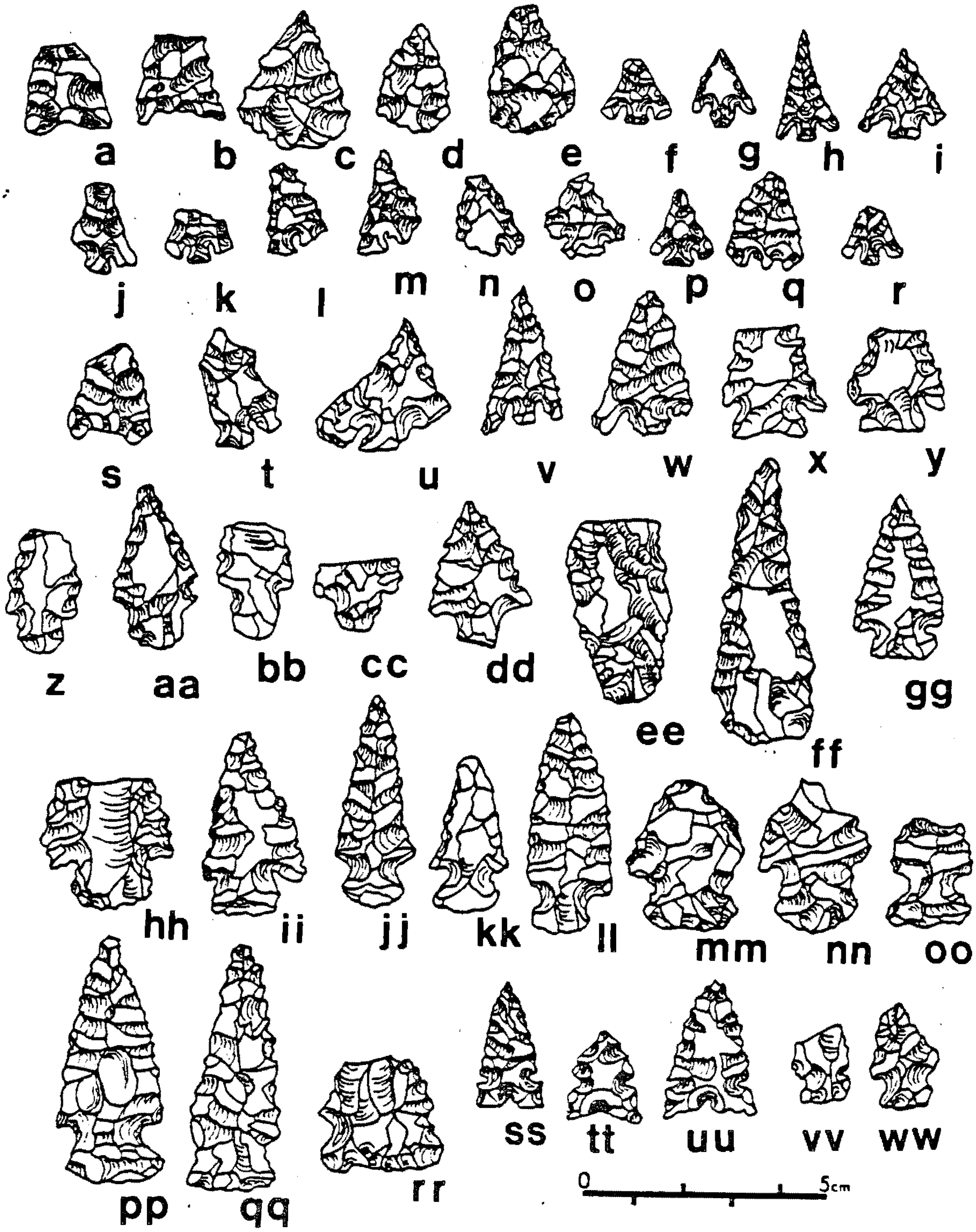

FIGURE 12. Projectile points from Rigdon's Horse Pasture Cave. Type 1:0; 2:A-B 3:C-E; 4:0; 5:F-U; 6:V-W; 7:X-Y; 8:Z-DD; 9:0; 10:EE-FF; 11:GG-II; 12:JJ-NN; 13:OO-RR; 14:SS-UU; 15:VV-WW.

Table 2. Artifact Inventory from Horse Pasture Cave

Artifact Class	Strata 1	2	3	4	Total
CHIPPED STONE INDUSTRY					
Projectile Points					
Type 1	-	-	-	-	-
Type 2	11	-	-	-	11
Type 3	4	1	-	-	5
Type 4	-	-	-	-	-
Type 5	16	39	3	-	58
Type 6	2	-	-	-	2
Type 7	-	2	-	-	2
Type 8	2	-	3	1	6
Type 9	-	-	-	-	-
Type 10	-	-	1	1	2
Type 11	-	1	13	-	14
Type 12	-	-	5	3	8
Type 13	-	-	7	5	12
Type 14	65	-	-	-	65
Type 15	-	-	3	-	3
Total	100	43	35	10	188
Unifaces					
Type 1	14	2	5	1	22
Type 2	1	-	3	2	6
Type 3	12	3	14	4	33
Type 4	4	1	1	-	6
Type 5	3	-	-	-	3
Type 6	5	-	2	-	7
Total	39	6	25	7	77
Bifaces (Knives)	26	22	32	13	93
Drills/Perforators	4	5	6	2	17
Utilized Flakes	69	37	81	21	208
Cores	2	6	4	1	13
HEAVY TOOL INDUSTRY					
Hammerstones	-	-	2	6	8
Anvils**	-	-	2	2	4
Choppers	-	1	2	1	4
GROUND STONE INDUSTRY					
Grinding Slabs	2	-	-	-	2
Hand Stones	-	-	2	-	2
Pestles	-	-	1	-	1
Fragments**	2	6	3	3	14

* For definitions of types see Appendix 1

** 2 anvils, 1 each in HPC-3 and 4 exhibited an edge battered facet;1 fragment from HPC-2 was edge ground

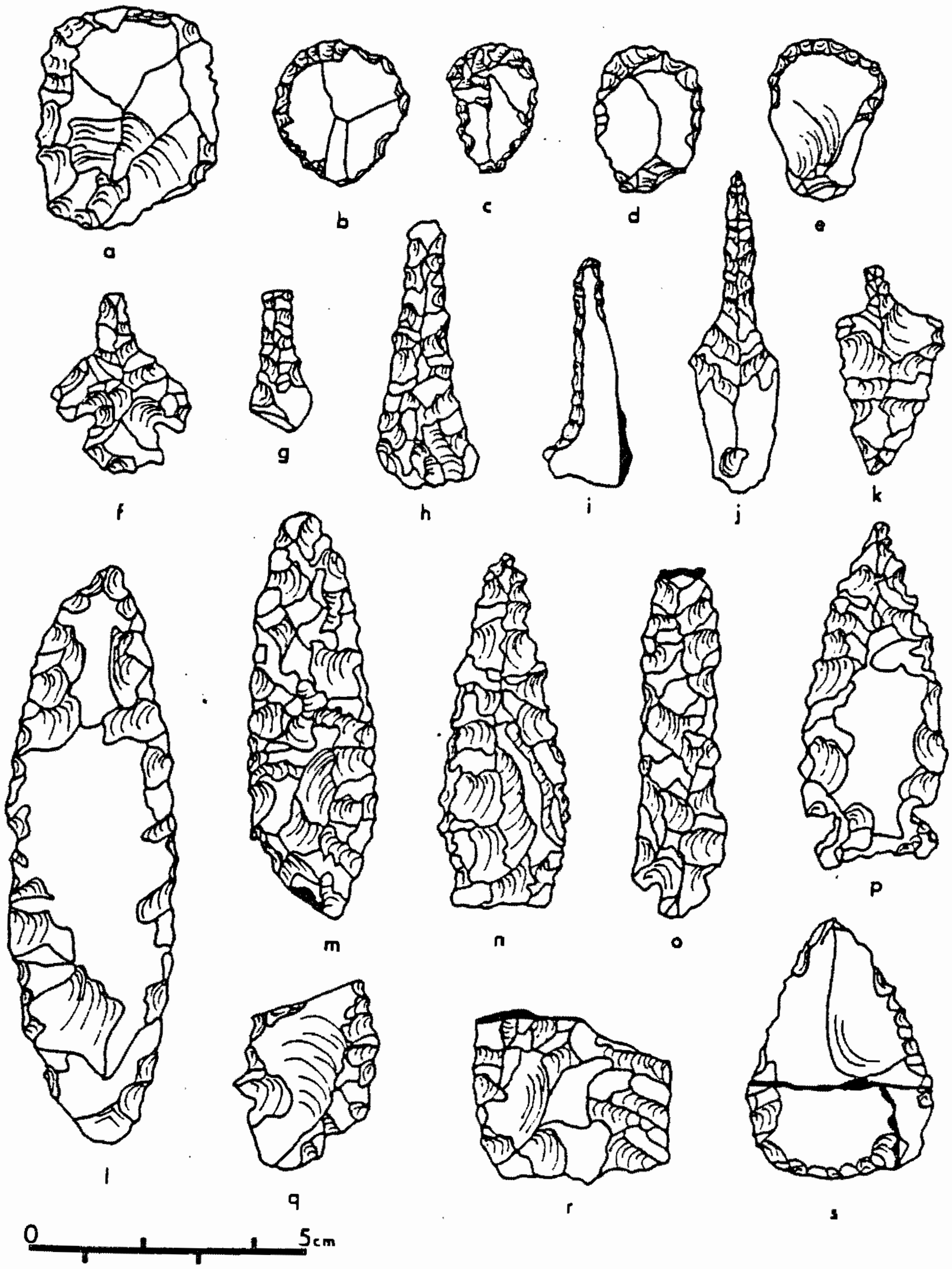

FIGURE 13. Other chipped stone artifacts from Rigdon's Horse Pasture cave. Unifaces: A-E; Drills/Perforators: F-K; Bifaces: L-S.

Table 3. Frequency of Artifact Classes at Horse Pasture Cave

Artifact Class	Strata 1	2	3	4	Class Total
Projectile Points	53 /42	23 /36	19 /19	5 /19	100
Unifaces	51 /16	8 / 5	32 /14	9 /13	100
Bifaces	28 /11	24 /18	34 /17	14 /24	100
Drills/Perforators	24 / 2	29 / 4	35 / 3	12 / 4	100
Utilized Flakes	33 /29	18 /31	39 /44	10 /39	100
Cores	15 / 1	46 / 5	31 / 2	8 / 2	100
Stratum Total*	101	99	99	101	
Heavy Tools	-- /--	6 /14	38 /50	56 /75	100
Ground Stone	21 /100	32 /86	32 /50	16 /25	101
Stratum Total	100	100	100	100	

*It was not possible to correlate all the units excavated to the debitage derived cultural strata, so these site totals are not reflected in the table.

Faunal Assemblage

The upper two strata of Rigdon's Horse Pasture Cave produced a very large faunal assemblage dominated by artiodactyl and deer bones. The remainder of the identifiable assemblage consists of various rodents and carnivores. The collection is currently being reanalyzed; however the listing now available is completely consistent with that expected from an upland hunting camp (Baxter et al. 1983:77-81).

Site Chronology and Function

Four radiocarbon dates were assayed for Rigdon's Horse Pasture Cave. Three charcoal dates were published in the original site report (Baxter et al. 1983:37), and a fourth assayed on bone was published in the Vine Rockshelter report (Baxter and Connolly 1985).

Two dates on charcoal from fire hearths 2 and 3, located at the division between strata 1 and 2, dated to about ad 1800. Given the presence of glass and copper trade beads in stratum 1, the dates seemed very reasonable. A date of ad 1400 was made on unidentifiable bone fragments from the boundary between stratum 2 and 3. Earliest was a determination on a composite charcoal sample from the top of stratum 4, dated to 500 bc.

The site was interpreted as a short term, seasonally occupied hunting camp with limited plant processing. This was based on the presence of a projectile point dominated assemblage with a deer dominated faunal collection. In addition, the chipped stone tool kit remained very stable throughout the site's use, and the total ground stone assemblage was small. A limited number of cores suggested that limited tool manufacture from blanks or tool resharpening was the main source of lithic debitage.

Vine Rockshelter

In the Fall of 1983, Vine Rockshelter (35LA304) was excavated and reported by Baxter and Connolly, Archaeological Data Consultants (1985). The 10 m long by 4.5 m deep shelter lies at 2500 feet in elevation, some 500 feet above Coal Creek and about one mile south of the confluence of that tributary and the Middle Fork Willamette River (Figure 14). Coal Creek, which drains from the Western side of the basin, eroded the end of Staley Ridge to expose the pink volcanic tuff in which the overhang has formed. This is quite likely the same volcanic tuff, or one of a series of related tuffs, in which Horse Pasture Cave lies, about two miles to the south east.

Field Procedures

The initial testing of Vine Rockshelter, done in the spring of 1983, consisted of two 1 m X 2 m test pits. The full excavation that fall consisted of ten 1 m X 1 m units, which with the test pits equaled a volume of 11.7 cubic meters. The excavation units were lettered A - L, with K and L being the two test units. The test pits had been excavated in 10 cm arbitrary units, but in light of the experience from Rigdon's Horse Pasture Cave, it was decided to excavate the shelter in 5 cm levels. Again, all fill was passed through 1/4 inch mesh with a 25% sample also screened through 1/8 inch mesh.

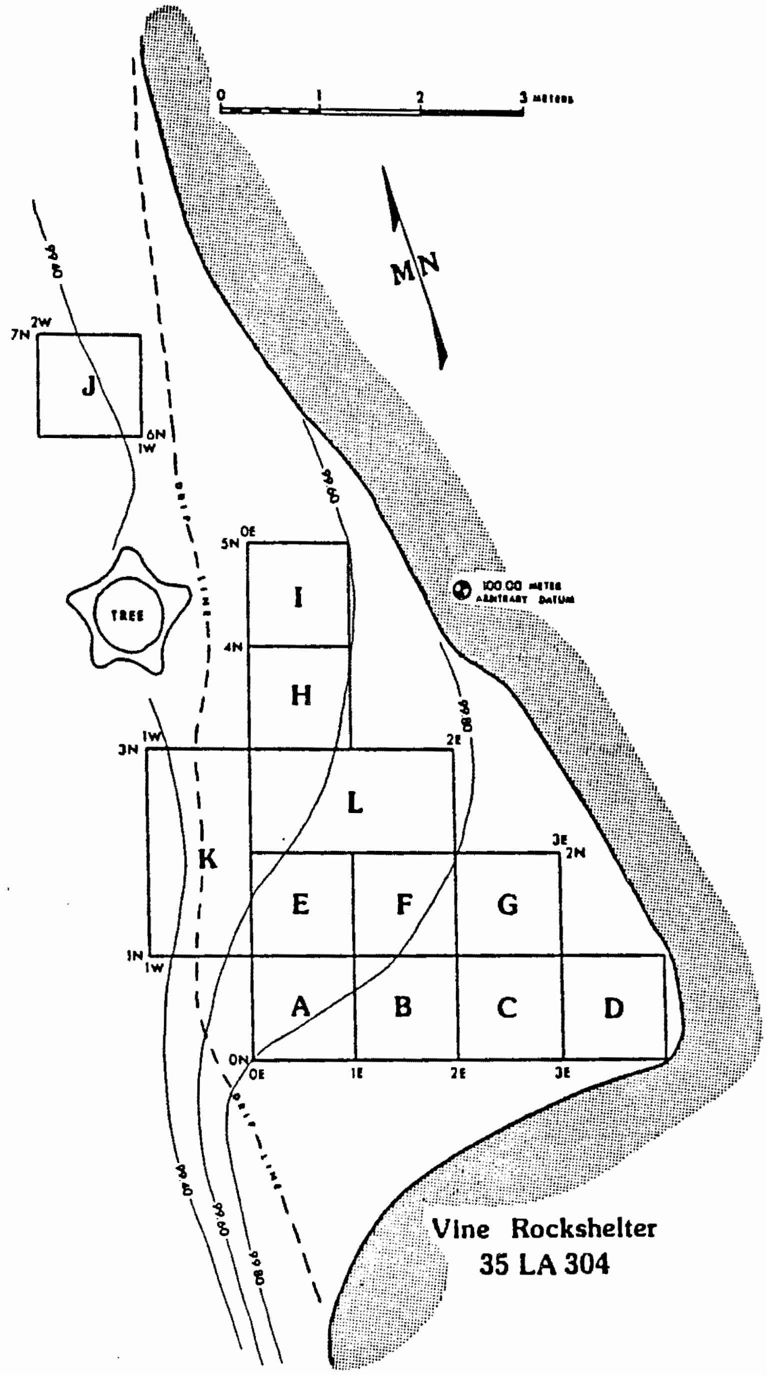

FIGURE 14. A contour map of Vine Rockshelter.

The Deposit

The principal natural stratigraphic unit was a grayish-red, fine sandy silt derived from the volcanic parent material (Figure 15). This unit underlay an unconsolidated rodent midden consisting of loose organic wood rat nesting materials. The rodent midden was mixed to a great extent with the main sandy silt unit along the back wall of the shelter. This mixing represents as much as 50% of the fill in units C, D, and G and was the reason for not including these units in the analysis of cultural materials.

At the bottom of Unit J, outside the shelter, a thick layer of yellow pumice was encountered. The location and unrounded, unweathered condition of the pumice suggested a primary deposit. Within the shelter small pumice pebbles were found throughout the deposit, no doubt related to the pumice at the bottom of Unit J, but redeposited. A sample of the pumice from Unit J, together with a sample from site 35LA51, located some 30 miles to the north, were submitted to Dr. Gordon Goles of the Department of Geology, University of Oregon, for neutron activation in an attempt to characterize them in terms of trace elements (Baxter and Connolly 1985:19-21). The study showed that the two samples were a product of the same volcanic eruption, but that eruption remains unidentified. The pumice color, clast size and crystalline structure are said to mimic that of the renowned 7000 year old Mount Mazama ash (Randle et al. 1971).

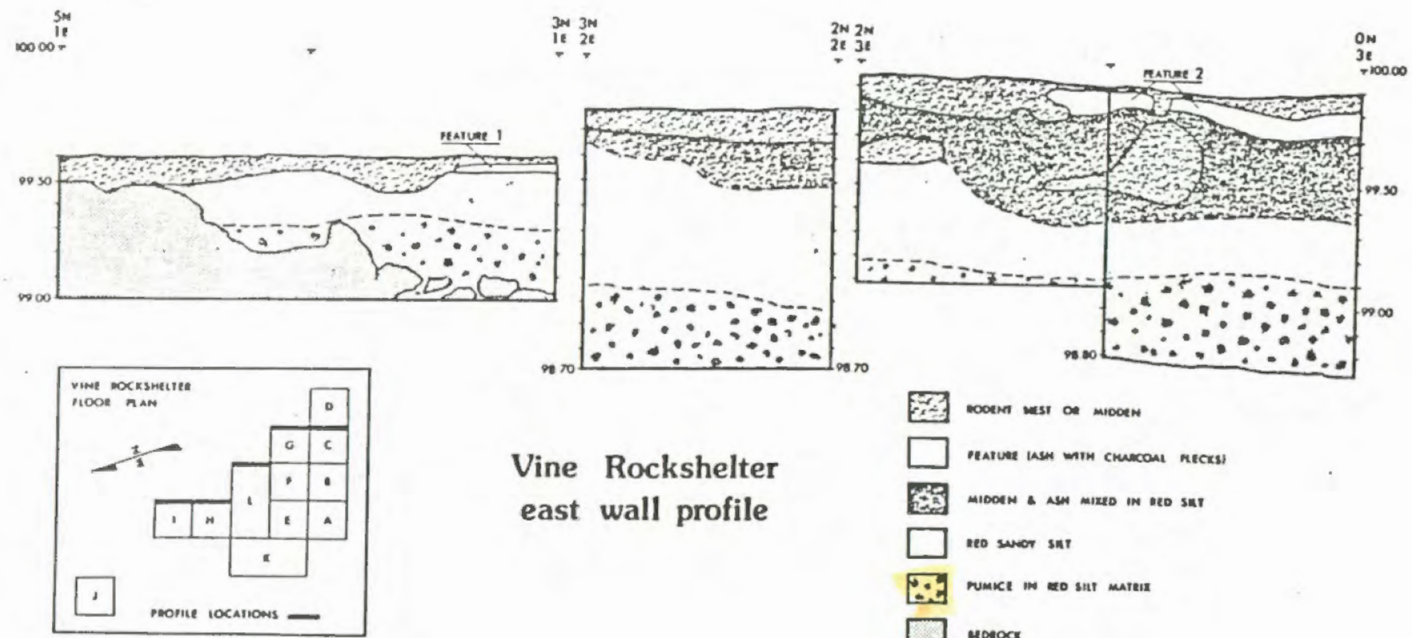

FIGURE 15. Stratigraphic profile of the north-south axis of Vine Rockshelter.

Based on the artifacts from Vine Rockshelter it is possible that the new pumice is several millennia younger than that eruption. Locally, Baby Rock Shelter, the Odell Lake site and the Medicine Creek site have been assigned Pre-Mazama age status based on the presence of pumice visually identified as Mazama and in view of this finding, these sites now seem to need reevaluation. Pursuant to this issue, Gordon Goles of the University of Oregon, Department of Geology is currently using neutron activation to characterize a sample of the ash, identified as Mazama, from Baby Rock Shelter. In addition, obsidian nodules recovered from the site have been subjected to X-ray fluorescence (Sappington 1986) and were determined to be a local source, perhaps related to this new found pumice. If the age of the pumice can be discovered, it may provide a new local horizon marker.

The lack of visible cultural strata presented a problem for analysis, so the method devised for Rigdon's Horse Pasture Cave, that of grouping arbitrary levels by debitage frequency, was refined and applied to Vine Rockshelter (Figure 16). Two principal peaks, which correspond to an upper and a lower stratum, occur in the graph. Each is associated with a lesser peak. These four peaks were used to define cultural strata Ia, Ib, IIa and IIb. Unfortunately diagnostic artifacts are too few in strata Ia and IIb to provide satisfactory sample sizes for comparative

CULTURAL STRATA DEFINED BY DEBITAGE FREQUENCIES

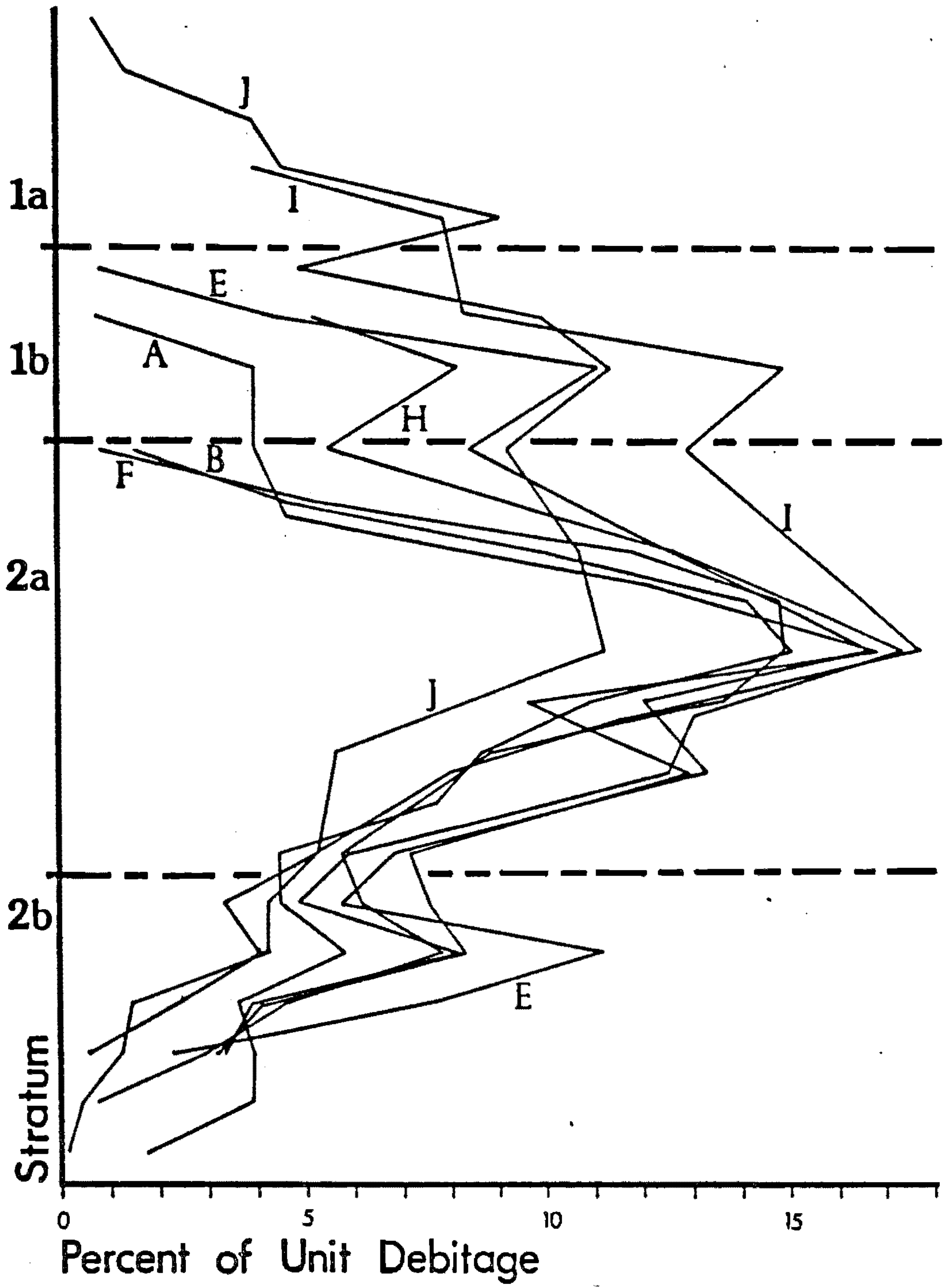

FIGURE 16. The cultural strata at Vine Rockshelter, as defined by excavation unit debitage frequency. Four peaks in the unit debitage frequencies can be discerned, but a low number of artifacts associated with the smaller peaks forced their combination with the larger units into just two cultural strata for analysis.

purposes, so the minor components were lumped together to form the two main strata: I and II.

Three of the excavation units contained rodent midden materials and evidence of rodent activity which apparently thoroughly mixed the cultural deposit. The result of this mixing made correlation of the debitage frequency of these units to the rest of the site impossible, so they were excluded from the analysis. This is less tragic than it might seem, for though the units contained 3.1 cubic meters of fill (27% of the excavation), they yielded less than 10% of the cultural materials. This statistic clearly reflects the minimal human use of the rear of the shelter.

A second use for debitage frequency patterning was developed with the Vine materials. In order to define cultural strata, debitage frequencies were determined for each excavation unit level and the graphs of each were then compared. In a separate analysis, horizontal patterning at the site was investigated by determining the debitage frequency of each excavation unit level using the site total. This clearly showed the distribution of areas used at the site by showing where maximum lithic debitage was located. Comparing the two graphs from Vine shows that the north front of the shelter had been the center of activity throughout the occupation of the site.

The Cultural Assemblage

The Vine Rockshelter cultural assemblage (Table 4;5), like that of Horse Pasture Cave, is almost entirely chipped stone. The collection consists of 81 projectile points and fragments (Figure 17;18), 22 unifaces, 28 utilized flakes, 49 bifaces, seven drill/perforators, and 27 cores. No ground stone artifacts were recovered from the Vine excavations, but two large and 10 small hammerstones were collected. Two items of Euro-American manufacture were collected from the site, a piece of wire and a piece of paper. Neither are thought to have been associated with the prehistoric cultural assemblage, but, as with some wired poles on the surface outside the shelter, were no doubt from the later use of the overhang by a twentieth century fur trapper as a storage area.

Faunal Assemblage

Though not as large, the faunal assemblage was very similar in content to that of Horse Pasture Cave. The vast majority of bone was *artiodactyl*, of deer size. Rodent bones, some undoubtedly due to wood rat nesting activity in the shelter, and carnivore remains were also present. Essentially all the identifiable bones were recovered from the upper levels. It is assumed that poor preservation in the lower levels rather than a change in human hunting behavior is responsible for this situation.

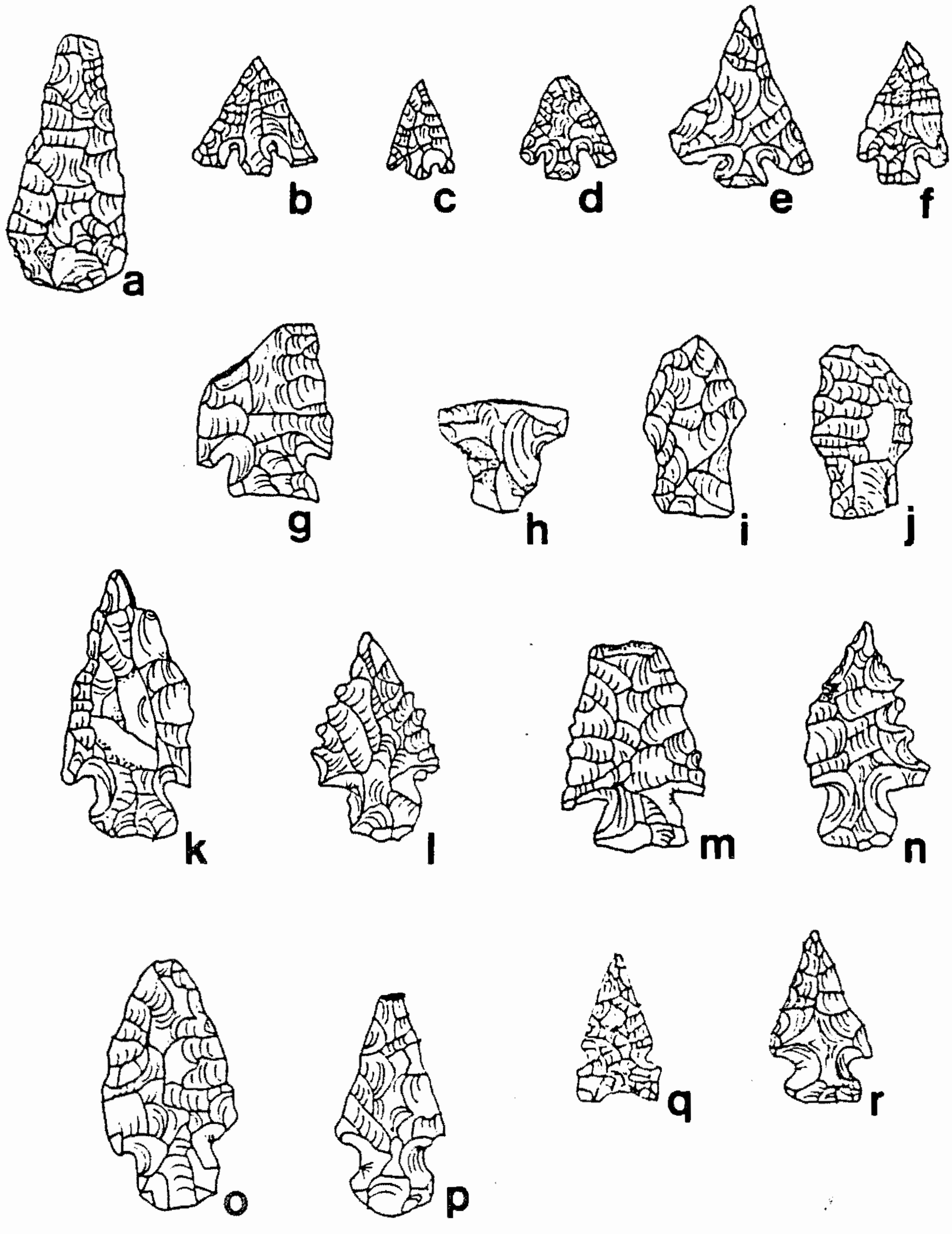

FIGURE 17. The projectile points from Vine Rockshelter. Type 1:A; 5:B-F; 7:G; 8:H; 9:I-J; 11:K-N; 12:O-P; 14:Q; 15:R.

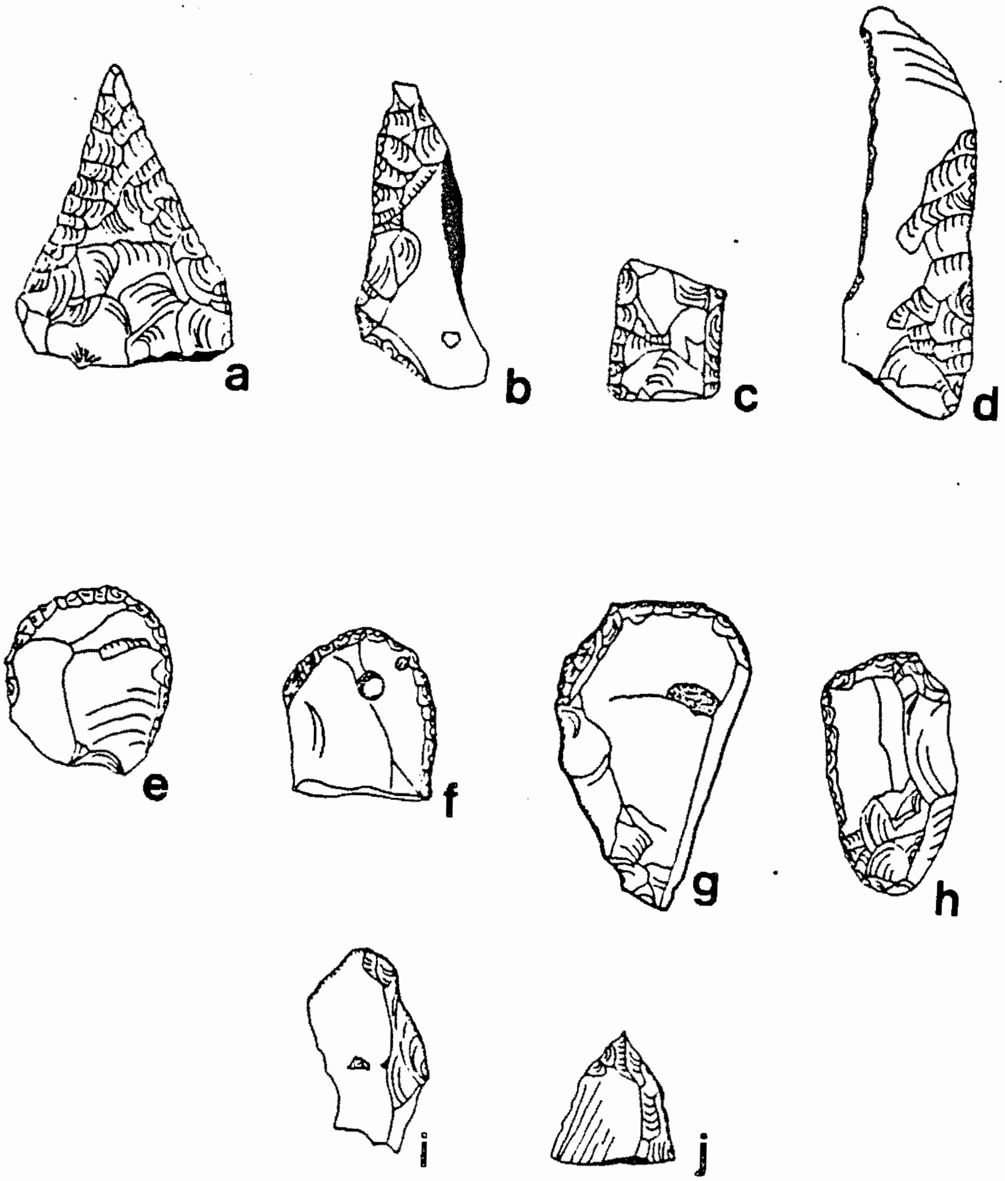

FIGURE 18. Other chipped stone artifacts from Vine Rockshelter. Drills/Perforators: A-B; Unifaces: C-J.

Table 4. Artifact Inventory from Vine Rockshelter

Artifact Class	Strata I	Strata II	Units C, D, G	Total
Chipped Stone Industry				
Projectile Points				
Type 1	-	1	-	1
Type 5	7	4	-	11
Type 7	1	-	-	1
Type 8	-	-	1	1
Type 9	-	2	1	3
Type 11	1	13	5	19
Type 12	-	2	1	3
Type 14	1	-	-	1
Type 15	-	1	-	1
	---	---	---	---
Total	10	23	8	41
Unifaces				
Type 1	1	1	2	4
Type 2	1	1	-	2
Type 3	2	5	4	11
Type 4	1	2	-	3
Type 5	1	1	-	2
	---	---	---	---
Total	6	10	6	22
Bifaces	19	23	7	49
Drills/Perforators	2	4	1	7
Utilized Flakes	5	18	5	28
Cores	3	24	1	28
Heavy Tool Industry				
Hammerstones	-	9	3	12

* Type definitions in Appendix 1

Site Chronology and Function

Two radiocarbon dates were assayed on charcoal from Stratum II of Vine Rockshelter. Owing to the relative scarcity of charcoal, both were small samples. One was a composite sample from levels 6 and 7 of Unit E and level 7

Table 5. Frequency of Artifact Classes at Vine Rockshelter

Artifact Class	Strata I	Strata II	Units C, D, G	Class Total
Projectile Points	24 /22	56 /23	20 /29	100
Unifaces	27 /13	46 /10	27 /21	100
Bifaces	39 /42	47 /23	14 /25	100
Drills/Perforators	29 / 4	57 / 4	14 / 4	100
Utilized Flakes	18 /11	64 /18	18 /18	100
Cores	11 / 7	86 /24	4 / 4	101
Stratum Total	99	102	101	
Heavy Tools	-	75	25	100

of Unit F. This mass spectronometry date was ad 1420 +/- 70 (Beta-12472). The second, from Unit J was subjected to extra counting time and yielded a date of ad 1560 +/- 90 (Beta-11391). These dates overlap by 20 years and confirm the strata configuration, as defined, using debitage frequency.

To further test these dates, the projectile point assemblages from the two Vine Rockshelter strata and the projectile point assemblages from the four Horse Pasture Cave strata were used to produce a Robinson similarity index (Robinson 1951). This is a method of determining how similar the assemblages are to one another. A method of displaying that similarity is to subject the index to average linkage clustering to produce a dendrogram (Johnson

1968). The result linked Vine II with Horse Pasture Cave stratum 3. A sample of bone fragments from the upper boundary of Horse Pasture Cave stratum 3 was submitted for radiocarbon dating. The resultant date of ad 1360 +/- 80 overlapped the ad 1420 +/- 40 date from Vine Rockshelter by more than one standard deviation. This confirmation places the end of Vine II in the 15th century, while the grouping of Vine I with Horse Pasture Cave stratum 2 places the end of Vine I near the Horse Pasture Cave ad 1800 dates. The lack of historic materials may simply be fortuitous, but the presence of only one Desert Side Notched Point as compared with the 77 at Horse Pasture Cave, shows that the use of Vine Rockshelter ended sometime prior to the dominance of the Desert Side Notched type and the introduction of Euro-American items.

Vine Rockshelter was interpreted as an upland hunting camp, very similar in use and surroundings to Rigdon's Horse Pasture Cave. Three major differences between the sites are: 1) Vine Rockshelter lacks the time depth apparent at Horse Pasture Cave; 2) raw material procurement and core reduction were major tasks at Vine Rockshelter, but not at Horse Pasture Cave; and 3) ground stone, present at Horse Pasture Cave, was absent at Vine Rockshelter.

The dated Vine Rockshelter assemblage showed that the projectile point assemblage was dominated by a preponderance of broad neck points until as late as perhaps AD 1500.

While many have connected broad neck points with the use of the atlatl, it is not suggested that the atlatl and dart were used 1000 or more years longer in the uplands than in the surrounding areas. Rather as will be shown in a later chapter, the narrowing of the broad neck suggests the older styles were being adapted to the new bow and arrow technology. In the initial analysis of Vine Rockshelter, the late appearance of narrow neck points was thought to be due to an occupational hiatus at Vine, but the concurring radiocarbon date from Horse Pasture Cave makes such a hiatus unlikely and supports the idea that narrow neck points were not introduced until later times.

The Colt Site

The Colt Site (35LA599) is located on the east side of the Upper Middle Fork Willamette River, on the ridge between two small tributaries, Dead Horse Creek and Jim's Creek (Baxter 1986). At 2200 feet, the site lies on a flat created by the rotating motion of a landslide (Figure 19). Such rotation causes the bottom end of the land slide to rise upward, making the formerly sloping surface flat. The process can create a series of flats down the route of the slide as the land flow "cascades" down hill. The flats are often marked by a marsh or pond at the upper sunken end. This is the situation at the Colt site, where the higher elevation Area 1 lies on the end of a slump unit from which

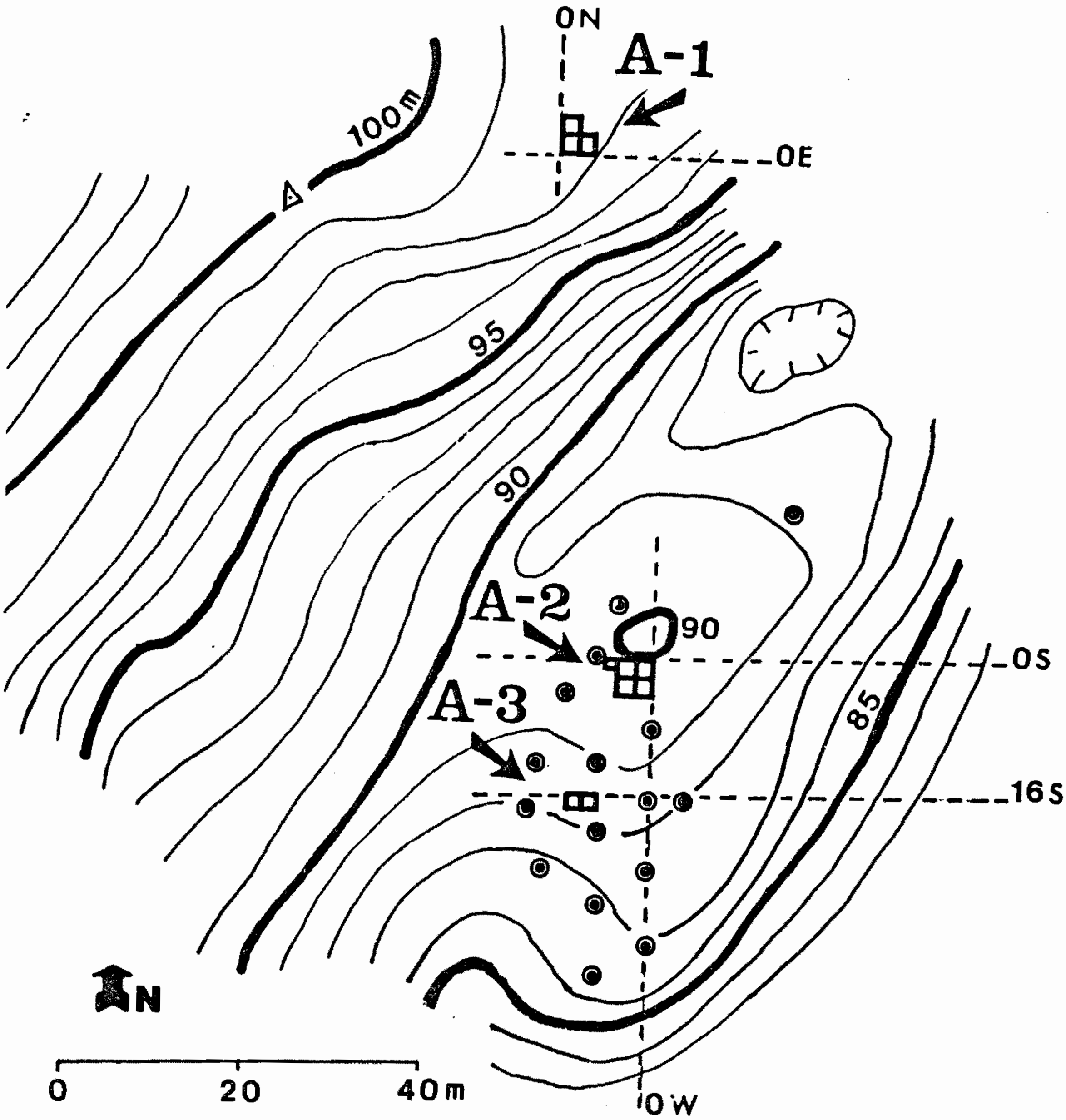

FIGURE 19. The Colt Site. The dotted circles are the location of 16 test probes; the squares the location of the 3 excavation areas. Note the small pont at the rear of the slump unit, a characteristic of this geomorphic phenomenon.

slump forming the flat occupied by the central site area (Areas 2 and 3) slid away.

Perhaps 100 meters due south of the site, Dead Horse Creek exposes the volcanic basalt flows which form the bed rock of the area. Lying just above these flows is a thick deposit of glacial outwash overlain by the clay of the landslide. The local vegetation consists of small Douglas fir, incense cedar and madrone, with large Ponderosa and Sugar pine interspersed. Undergrowth includes Oregon grape, salal, hazelnut, Ocean Spray and poison oak. Many of the Ponderosa pine exhibit charred scars from cambium harvesting (cf., Churchill 1979; White 1954). A tree ring count from one of these trees suggests that the harvesting took place in the 1860's (Baxter 1986). The size of the present timber and the presence of large Douglas fir with evidence of branch growth the full length of the trunk to the ground suggests that the area was once quite open (cf., Johannessen et al. 1971). A likely explanation is that the area was kept clear by annual burning, a practice discontinued sometime in the latter half of the nineteenth century when the present stand of timber began to grow.

Field Precedures

The site was investigated over four weeks in June and July of 1984, with excavations in three areas. The main units of horizontal collection were the 1 m X 1 m quadrants of the 2 m X 2 m excavation units. Vertical provenience was maintained with 10 cm arbitrary levels in block excavation areas 1 and 2 and in the 16, 50 cm X 50 cm test pits. Five centimeter levels were excavated in area 3. All fill was screened through 1/4 inch mesh, with a 25% sample also passed through 1/8 inch mesh. The volume of the excavation at the Colt Site equalled 17.8 cubic meters.

The Deposit

The 1-1.5 m of silt and clay loam on the ridge consists almost entirely of weathered basalt bedrock. Stratigraphy (Figure 20) at the Colt Site consisted of a 10 cm surficial deposit of decomposing organic forest duff. Beneath this, a silty loam layer overlies a clay stratum. Throughout the deposit angular rocks of various sizes were present. No visible cultural stratigraphy was apparent at the site, so debitage frequencies were again used to ascertain the waxing and waning of occupations (Figure 21). The three excavation areas were analyzed separately, but analysis established the existence of single culural strata in Areas 1 and 2, and three strata in Area 3. The upper stratum of Area 3 and the single stratum in each of the other two areas were correlated using projectile point styles.

The Cultural Assemblage

The assemblage (Table 6;7) from the Colt Site is

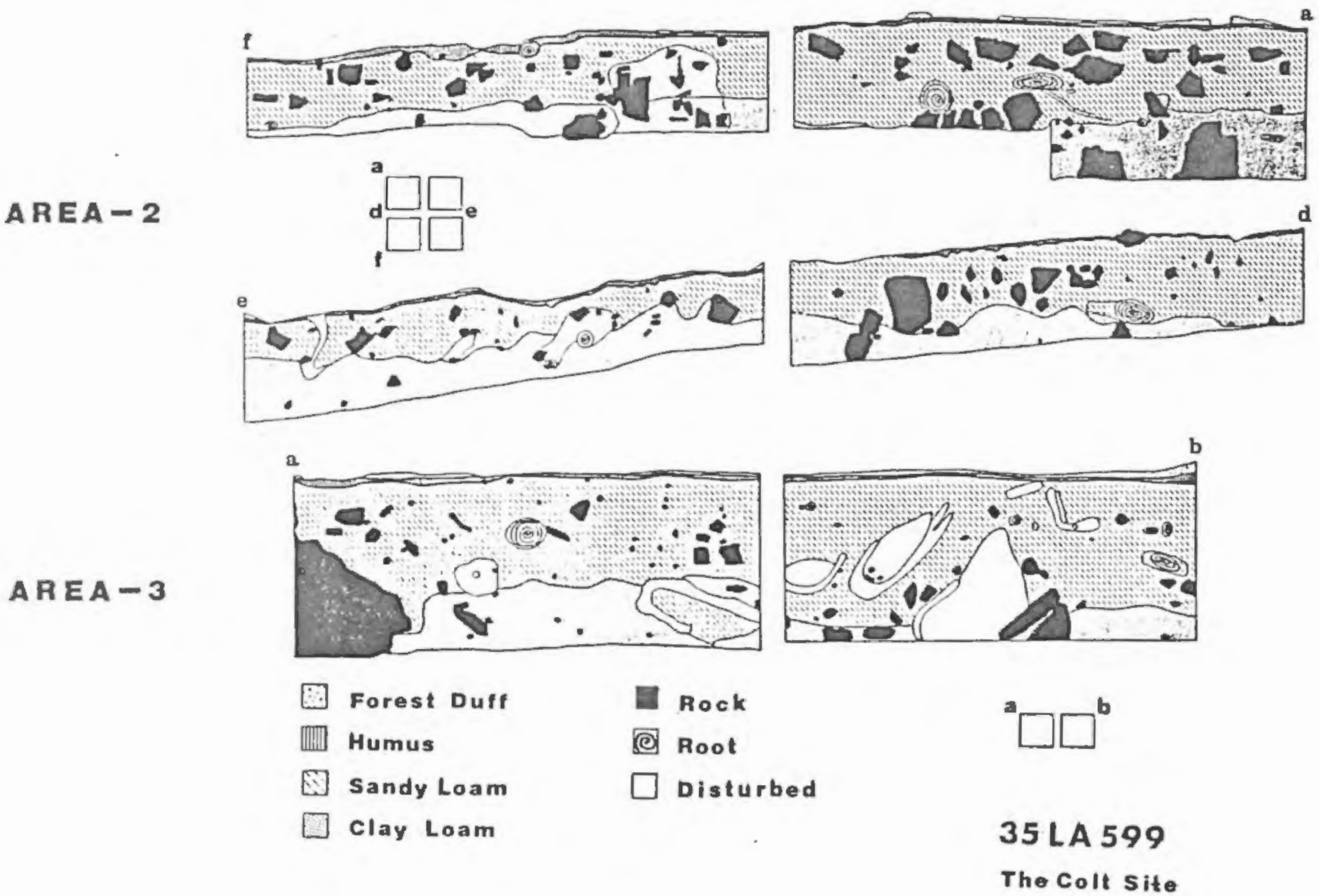

FIGURE 20. The stratigraphy of two of three areas excavated at the Colt Site.

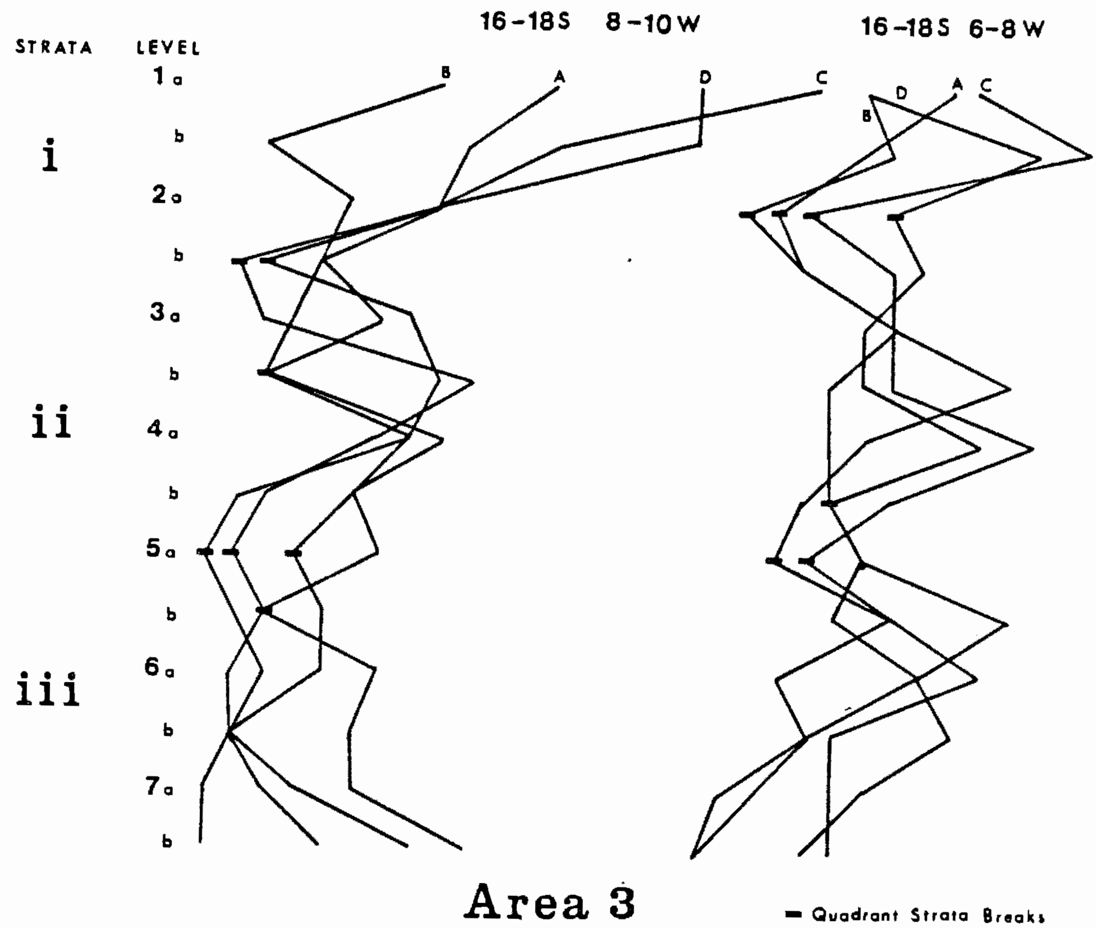

FIGURE 21. The cultural strata at the Colt Site. Three strata were defined at the Colt Site on the basis of debitage frequency. For analytic purposes, Colt 2 and 3 were combined, due to a low artifact count in stratum 3.

primarily chipped stone, with 106 whole and fragmentary projectile points (Figure 22), 50 whole and 34 fragmentary unifaces, 149 utilized flakes, 14 whole and five fragmentary drills/perforators, one whole and 102 fragmentary bifaces and 26 cores (Figure 23). In addition, 11 grinding slab fragments, three stone bowl mortar fragments, five pestle fragments, three edge ground cobbles, 10 small hammerstones, five anvils and five choppers were collected (Figure 24).

No bone tools were encountered although some bone was recovered from the surface levels of this open site. Historic materials, all from surficial provenience, were limited to four metal pieces. These include a brass firing cap, two fragments of a gear, and an unidentified piece.

Faunal Assemblage

The open site conditions of the Colt Site reduced preservation to a minimum, however, some of the upper levels produced faunal materials. As with Horse Pasture Cave and Vine Rockshelter, the majority of bone recovered from the Colt Site was artiodactyl, however, some was identified as deer and and some as elk. Also present were rodent and carnivore (Hemphill and Greenspan 1986).

All of the artiodactyl bones were leg bones, including toe bones, leg bones and scapulae. The lack of other bones suggests that primary butchering was being done elsewhere, and only the haunches were being brought to the site.

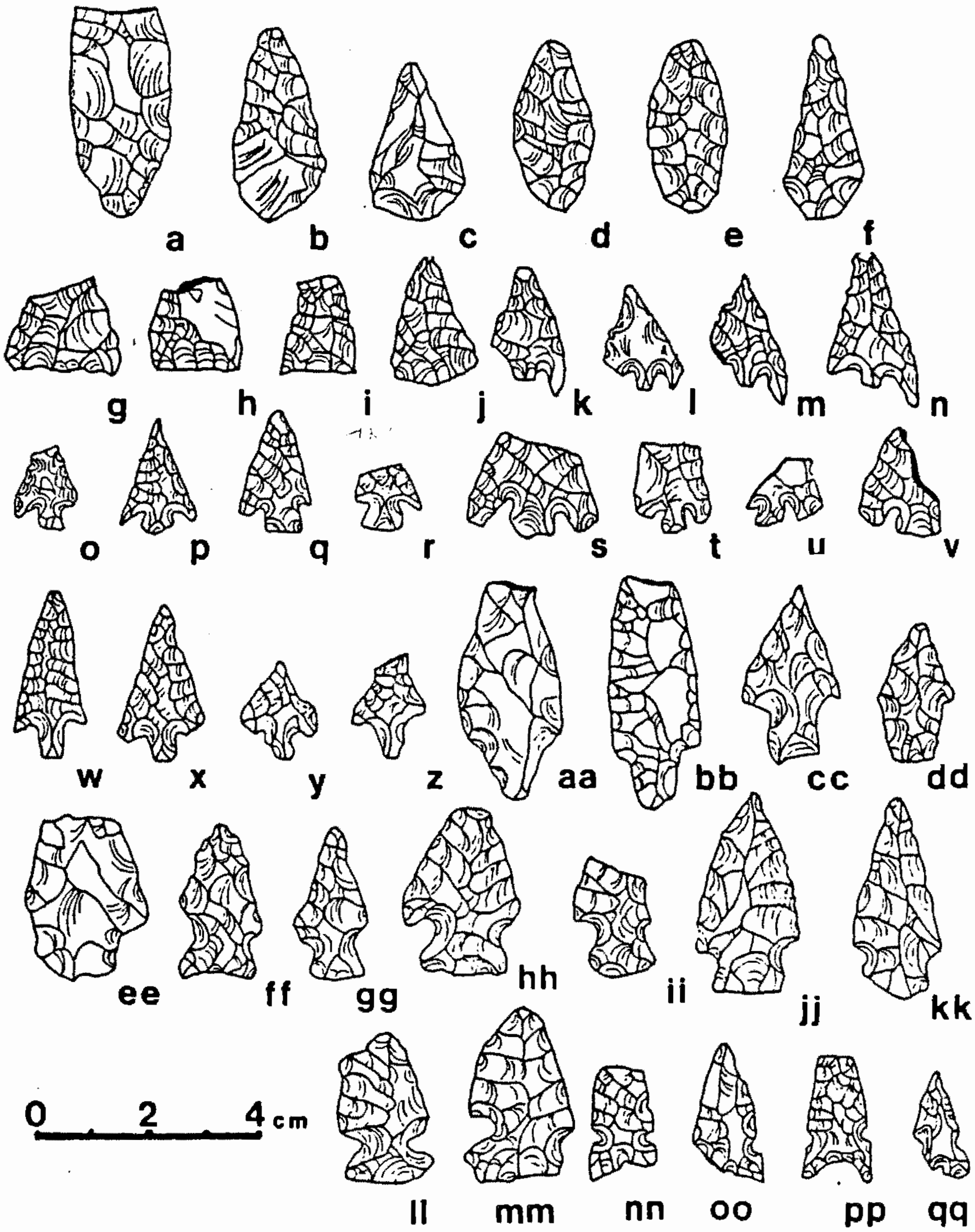

FIGURE 22. The Colt Site projectile points. Type 1:A-F: 2:G-I; 3:J; 4:K-N; 50-V; 6:W-Z; 7:0; 8:AA-BB: 9:CC-DD; 10:EE; 11:FF-HH; 12:II-KK; 13:LL-MM 14:NN-QQ.

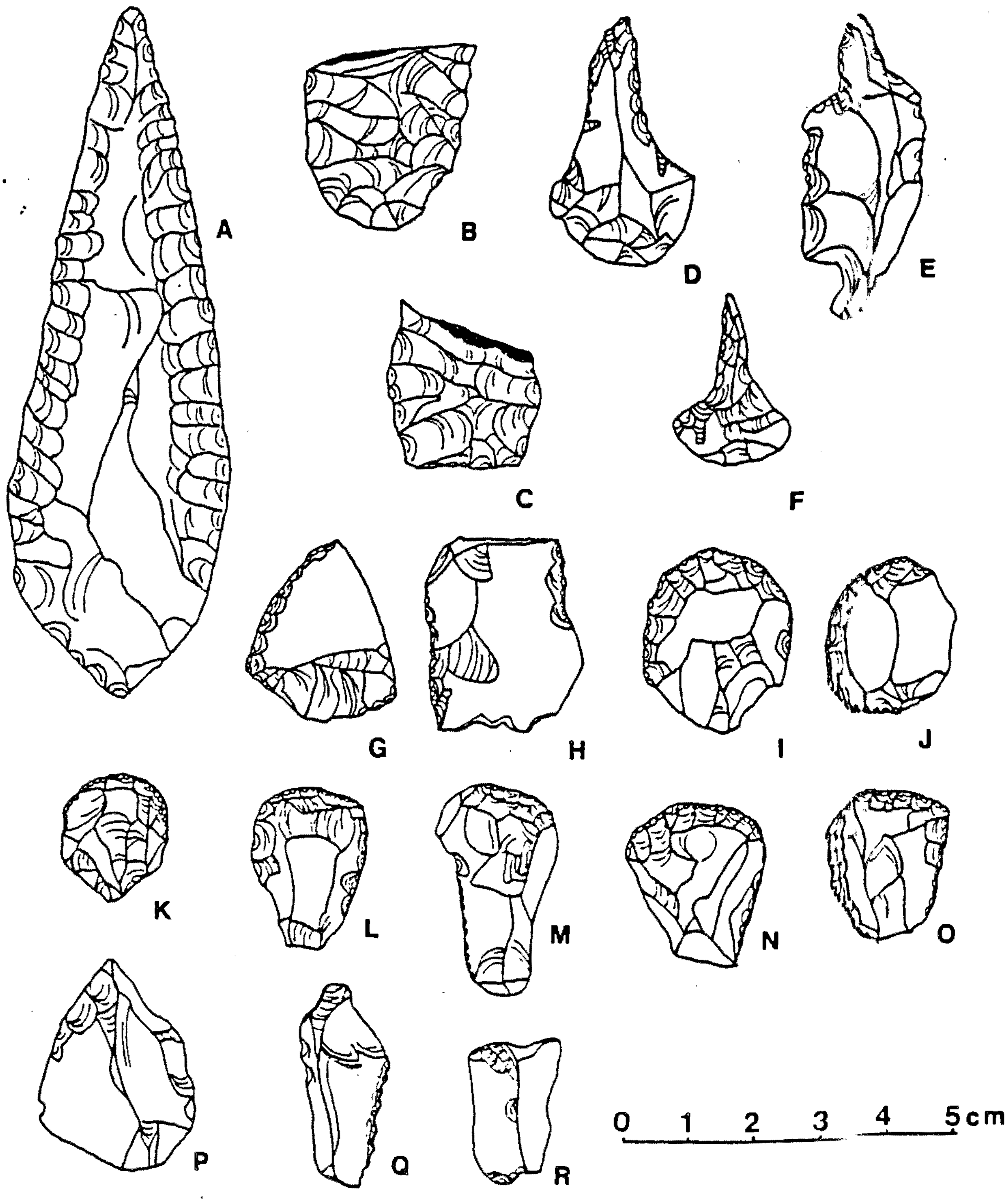

FIGURE 23. Other chipped stone artifacts from the Colt Site. Bifaces: A-C; Drills/Perforators: D-F; Unifaces: Type 1:G-H; 2:I-J; 3:K-O; 4:P; 5:Q; 6:R.

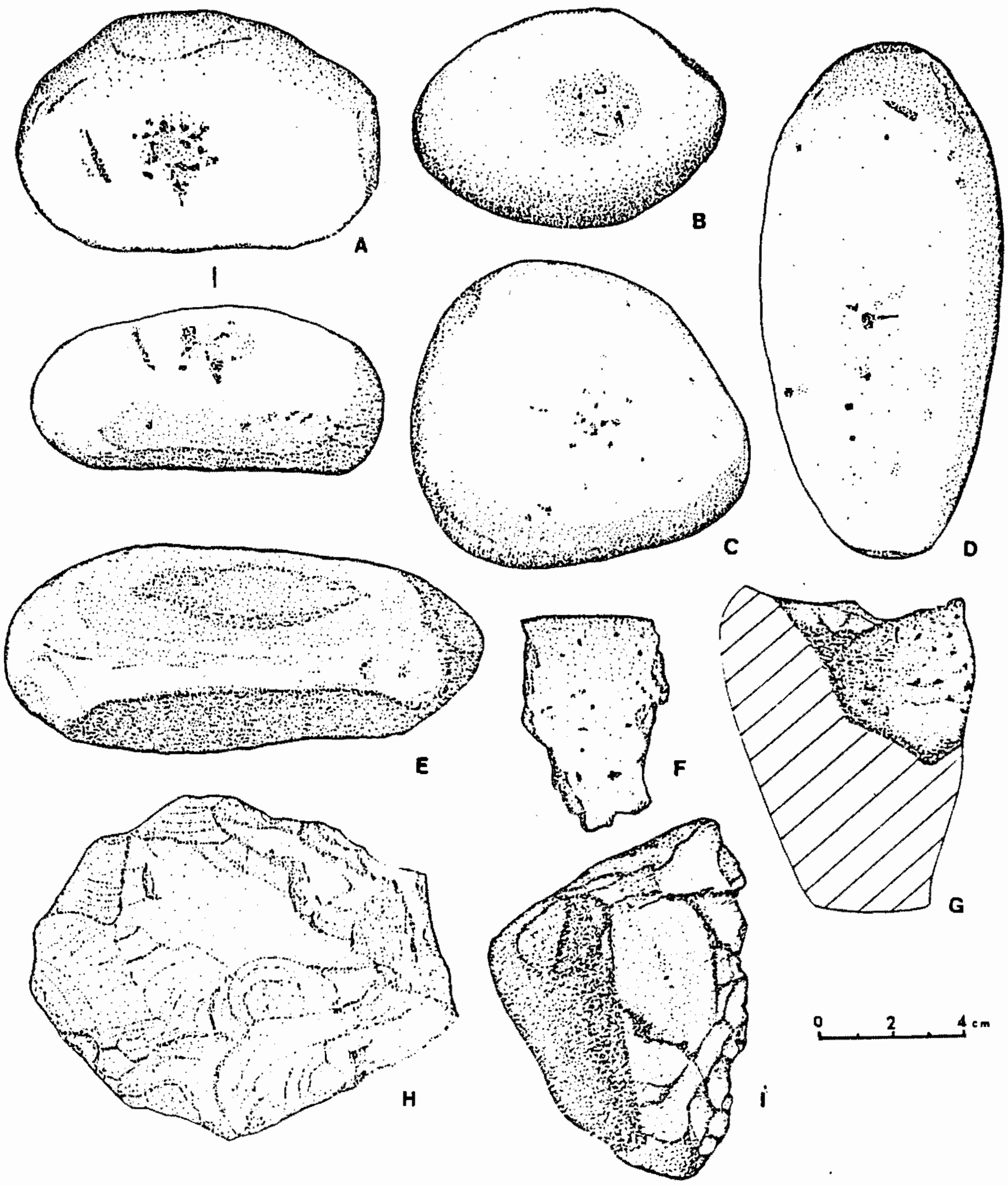

FIGURE 24. Groundstone and heavy tools from the Colt Site. Anvils: A-C; Hammers:D; Edge-battered cobbles: E (A also has a faceted edge); Pestle fragment:F; Mortar fragment: G; Choppers: H,I.

Table 6. Artifact Inventory from the Colt Site*

Artifact Class	Strata 1	Strata 2	Strata 3	Test Probes	Total
CHIPPED STONE INDUSTRY					
Projectile Points					
Type 1	2	3	-	1	6
Type 2	3	-	-	-	3
Type 3	1	-	-	-	1
Type 4	6	-	-	2	8
Type 5	8	1	-	2	11
Type 6	10	-	-	-	10
Type 8	1	2	-	1	4
Type 9	2	-	-	-	2
Type 10	-	2	-	-	2
Type 11	2	2	1	1	6
Type 12	2	2	2	-	6
Type 14	2	-	-	-	2
Type 15	7	-	-	1	8
Total	46	12	3	8	69
Unifaces					
Type 1	3	6	1	-	10
Type 2	1	-	-	3	4
Type 3	16	4	6	1	27
Type 4	1	-	-	-	1
Type 5	6	-	-	-	6
Type 6	2	-	-	-	2
Total	29	10	7	4	50
Bifaces	51	25	16	11	103
Drills/Perforators	5	4	4	1	14
Utilized Flakes	97	22	27	3	149
Cores	8	8	1	9	26
HEAVY TOOL INDUSTRY					
Hammerstones	5	1	2	2	11
Anvils	-	-	4	1	5
Choppers	1	2	1	1	5
GROUND STONE INDUSTRY					
Grinding Slabs	5	3	3	-	11
Stone Bowls	1	2	-	-	3
Pestles	3	-	2	-	5
Edge Ground Cobbles	2	-	1	-	3

*Artifact typology presented in Appendix

Table 7. Frequency of Artifact Classes at the Colt Site

Artifact Class	Strata 1	Strata 2	Strata 3	Test Probes	Total
Projectile Points	67/19	17/15	4/5	12/22	100
Unifaces	58/12	20/12	14/12	8/11	100
Bifaces	50/22	24/31	16/28	11/31	101
Drills/Perforators	36/2	29/5	29/7	7/3	101
Utilized Flakes	65/41	15/27	18/47	2/8	100
Cores	31/3	31/10	4/2	35/25	101
Stratum Total	99	100	101	100	
Heavy Tools	30/35	15/38	35/54	20/100	100
Ground Stone	50/65	23/63	27/46		100
Stratum Total	100	101	100	100	

Site Chronology and Function

The Colt site yielded two radiocarbon dates, one from a charcoal sample near the surface in stratum 1 and the other from a charcoal sample taken from stratum 3. The stratum 1 date was "modern" and the stratum 3 date was ad 1880 +/- 50. The two dates overlap at one standard deviation and may well be the product of the same fire. The date from stratum 3 cannot possibly be correct given the associated projectile points styles and depth of the deposit. One possible source of contaminated charcoal from a later period are burned tree roots. As mentioned above, one of the Ponderosa Pines exhibiting a charred cambium peeling scar was dated by a tree ring count which places the cambium gathering in the 1860's. Perhaps the fire that burned the scars, or one of the annual fires set to maintain the open prairie, is responsible for the dated charcoal from the Colt Site.

Using projectile point styles the strata from Colt were seriated with those from Vine Rockshelter and Rigdon's Horse Pasture Cave. The stratum 1 collections from all three areas were combined to form the late Colt 1 assemblage, and the stratum 2 and 3 materials from Area 3 were also combined to form the early Colt 2 assemblage. The seriation and average linkage clustering show that the Colt 1 assemblage fits best between the Horse Pasture 2 and 3 strata. This dates Colt 1 near the upper end of the HPC-2 occupation about AD 1800. The Colt 2 assemblage fits best between HPC-3 and 4, placing it near AD 1400.

The variation in artifact types present in the Colt Site assemblage suggests that the site functioned as a base camp where a wide range of activities took place. The large proportion of projectile points to other artifact classes at Rigdon's Horse Pasture Cave suggests that hunting was a major task accomplished at that site. Conversely, the lower proportion of points at the Colt Site suggests that hunting was less emphasized there. Given that the site was not a village site with house pits, and that it lies on an aboriginal trail system, it seems likely that the site was one of a series of summer base camps used during the seasonal round. At such a camp many activities would be represented by different artifact classes, as the various task groups moved to and from resources, perhaps retrieving materials for processing. The presence of a relatively substantial number of cores, well made stone bowls, edge ground cobbles and choppers suggest this wide range of tasks. The nearness of the main stem of the river also suggests that fishing may have occurred, although no artifacts or fish bones were recovered.

The Saddle Site

The Saddle Site (35LA529) lies above the Colt Site at 2600 feet in elevation, about one-quarter mile further up the ridge (Baxter 1986). This open site lies on a flat behind a basalt knob which outcrops on the spine of the ridge (Figure 25). Dead Horse Creek lies to the west some 200 meters. The Youngs Rock trail, probably aboriginal, connects the Saddle and Colt Sites to the mainstem Middle Fork Willamette River, about one-half mile distant. The ridge drops steeply off to either side of the site, leaving about a flat about 50 m X 100 m where the site is located.

Vegetation today is dominated by Douglas fir interspersed with large Ponderosa pine, as at the Colt Site. Again, based on the presence of large Douglas fir "wolf trees" and a stand of relatively young trees, it seems

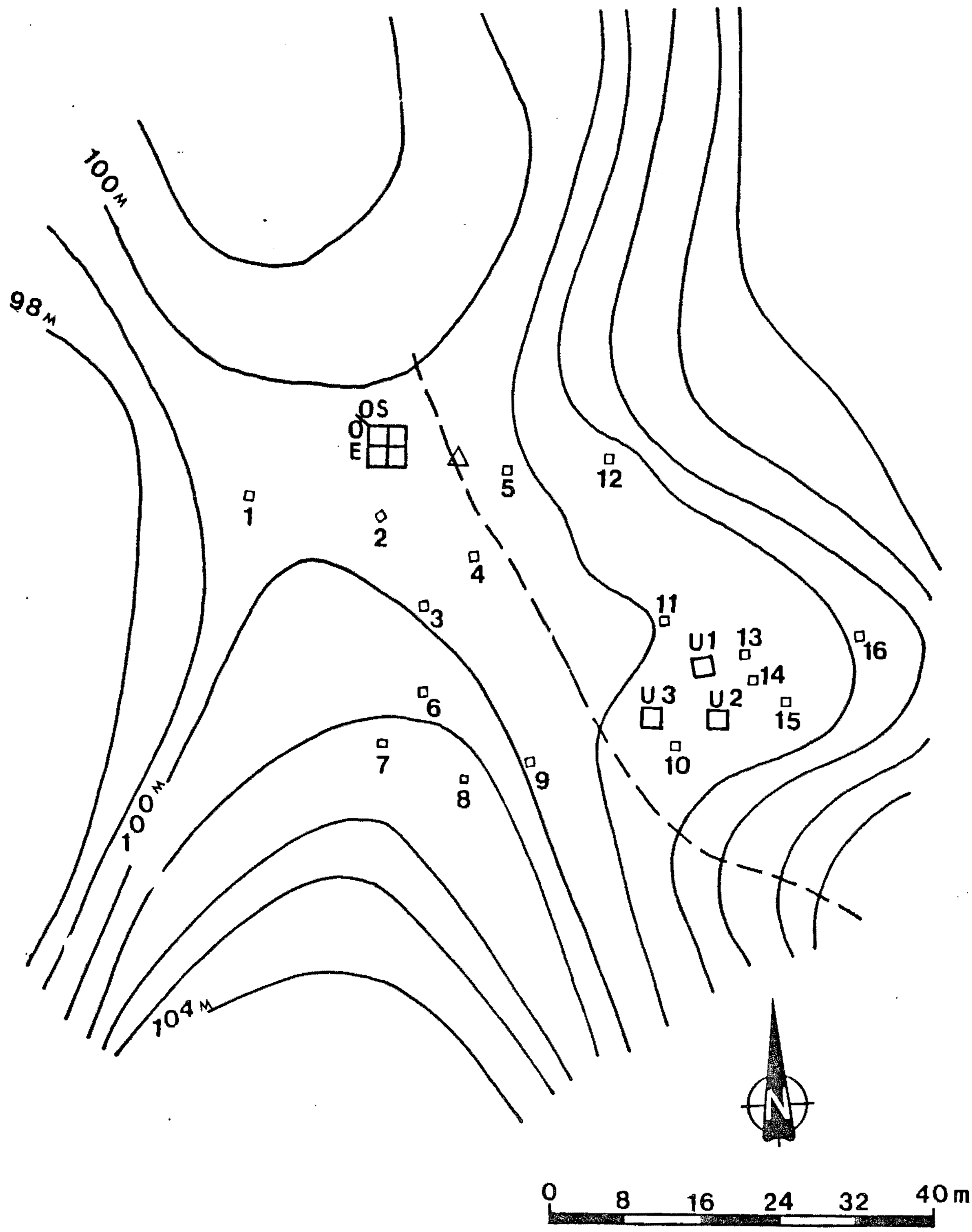

FIGURE 25. The Saddle Site. Small squares are the location of test probes, large squares are the location of excavation units.

likely that the site was near or on an open prairie at the time of occupation.

Field Procedures

Investigations were conducted over a four week period in July and August of 1984. The volume excavated equalled 13.95 cubic meters. This was dug from a western block excavation of four 2 m X 2 m units, and an eastern area of three similar but non-contiguous units. In addition sixteen 50 cm X 50 cm test probes were excavated across the site. A large wind storm had blown down most of the timber on the site. That downed timber covered most of the ground, such that the location of the excavation units was based partly on test excavations which had been conducted two years before and partly on available open surface area.

The fill was excavated in 1 m X 1 m quadrants of the larger units, and by 5 cm vertical levels. The test probes were dug in 10 cm arbitrary levels. As at the other sites, the fill was passed through 1/4 inch mesh and a 25% sample was also screened with 1/8 inch mesh. As at all sites, the 1/8 inch mesh was responsible for the recovery of thousands of small flakes.

The Deposit

The sediments of the ridge are almost entirely the weathered residuum of the basalt parent rock with only a thin surficial layer of organic material. The main unit is a sandy clay which grades in color from yellow-brown to red, depending on the oxidation of the iron rich basalt. Angular rocks increase in size and number with depth until bedrock is reached at about a meter in the deepest area which lies near the center of the site (Figure 26).

As at the other sites, no visible cultural stratigraphy was discernable in the profiles of the Saddle Site, so debitage frequencies were used to divide the assemblage into analytical units. As defined by this method, the site consists of two cultural strata (Figure 27).

The Cultural Assemblage

The Saddle Site cultural assemblage (Table 8;9) consists of 26 whole and 13 fragmentary projectile points, 24 whole and 26 fragmentary unifaces, 120 utilized flakes, 55 biface fragments, 17 drills/perforators and nine cores. Ground stone artifacts included fragments of three mortars, two pestles, five grinding slabs, and two abraders. One hammerstone and one anvil were also recovered (Figure 28;29).

Site Chronology and Function

A single radiocarbon date was assayed on charcoal collected from stratum II of the Saddle Site. The date of ad 1830 +/- 60 is statistically the same as the two Colt

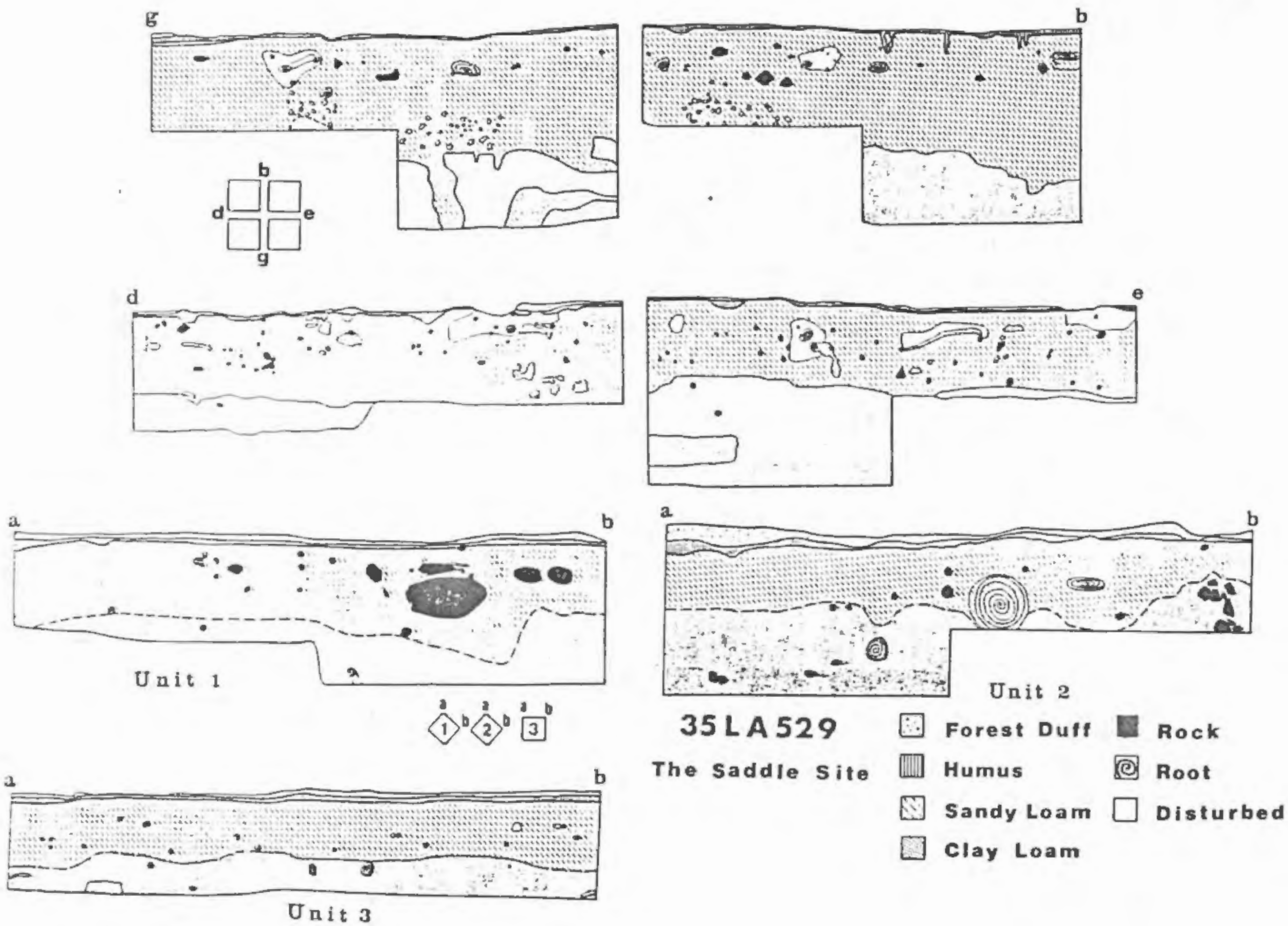

FIGURE 26. The stratigraphy of the Saddle Site.

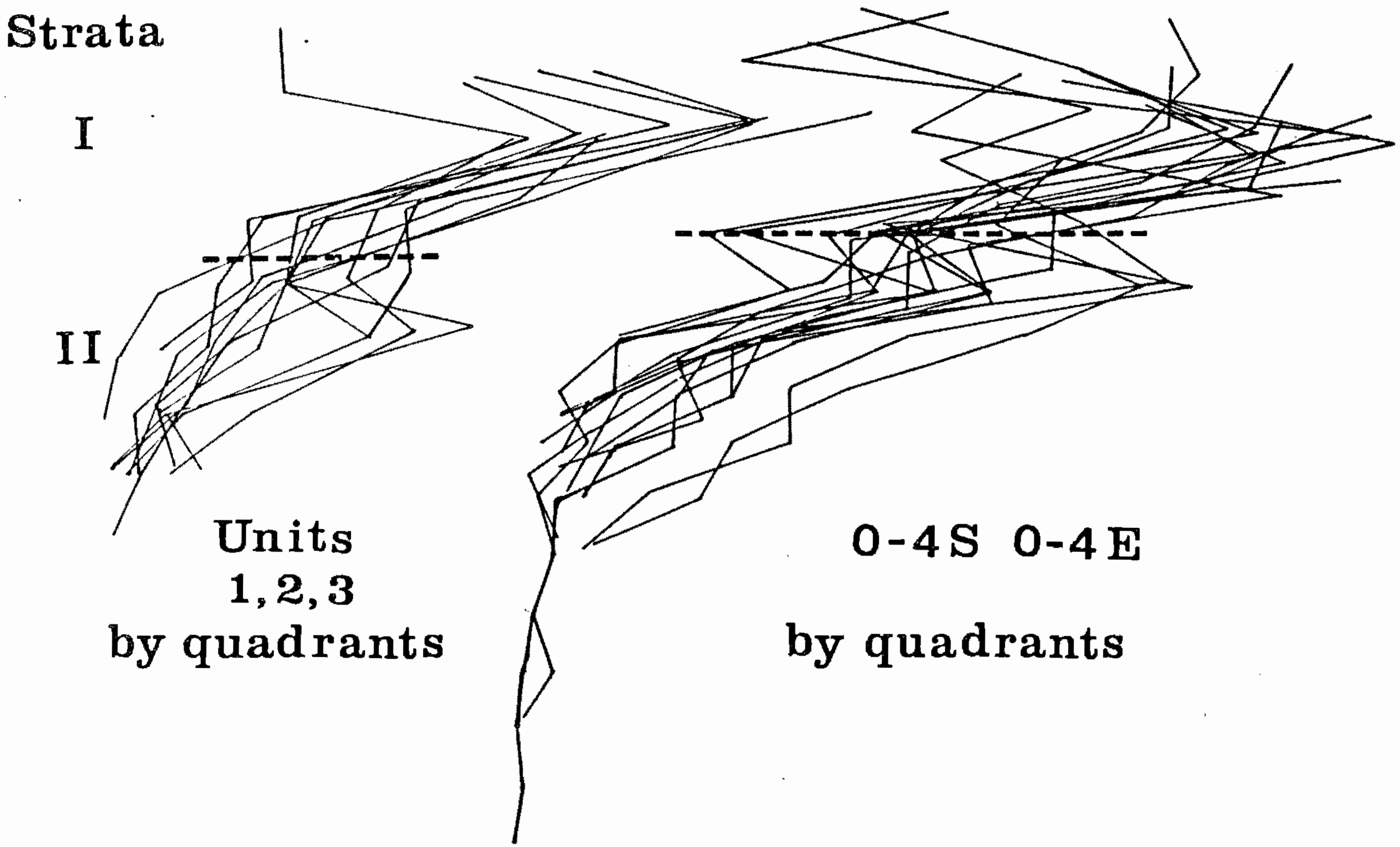

FIGURE 27. The cultural strata defined at the Saddle Site using debitage frequency. While two strata were defined, these were combined for analysis due to low artifact frequencies (x axis-excavation level; y axis-debitage frequency).

site dates. While it may be associated with the cultural deposit in this case, that association is not firm.

Table 8. Artifact Inventory from the Saddle Site*

Artifact Class	Strata I	Strata II	Test Probes	Total
CHIPPED STONE INDUSTRY				
Projectile Points				
Type 1	1	-	-	1
Type 5	2	2	-	4
Type 7	8	1	-	9
Type 8	5	4	1	10
Type 9	1	-	-	1
Type 14	-	-	1	1
Stratum Total	17	7	2	26
Unifaces				
Type 1	6	-	-	6
Type 2	2	2	-	4
Type 3	6	5	-	11
Type 4	1	-	-	1
Type 5	-	1	-	1
Type 6	1	-	-	1
Stratum Total	16	8	-	24
Bifaces	37	15	3	55
Drills/Perforators	12	4	1	17
Utilized Flakes	80	29	11	120
Cores	7	2	-	9
HEAVY TOOL INDUSTRY				
Hammerstone	1	-	-	1
Anvil	1	-	-	1
GROUND STONE INDUSTRY				
Stone Bowl	3	-	-	3
Pestles	2	-	-	2
Grinding Slabs	6	-	-	6
Abraders	2	-	-	2

*Artifact typology presented in Appendix

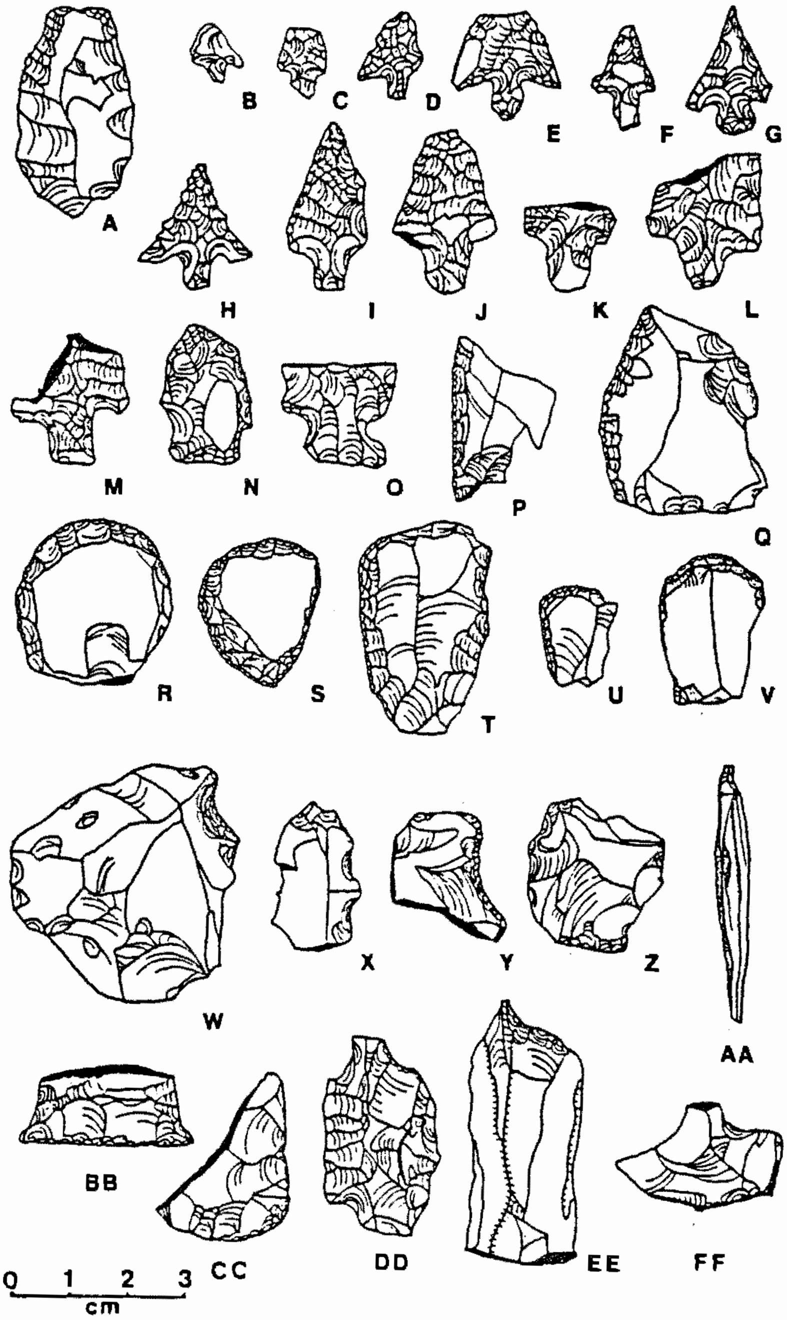

FIGURE 28. Projectile points and other chipped stone artifacts from the Saddle Site. Projectile points: Type 1:A; 5:B-C; 7:D-H; 8:I-M; 9:N; 14:O; Unifaces: Type 1: P-Q; 2:R-S; 3:T-V; 4:W; 5:X; 6:Y; Retouched Flake: Z; Obsidian Tinkler: AA; Bifaces:BB-CC; Drills/Perforators:DD-FF.

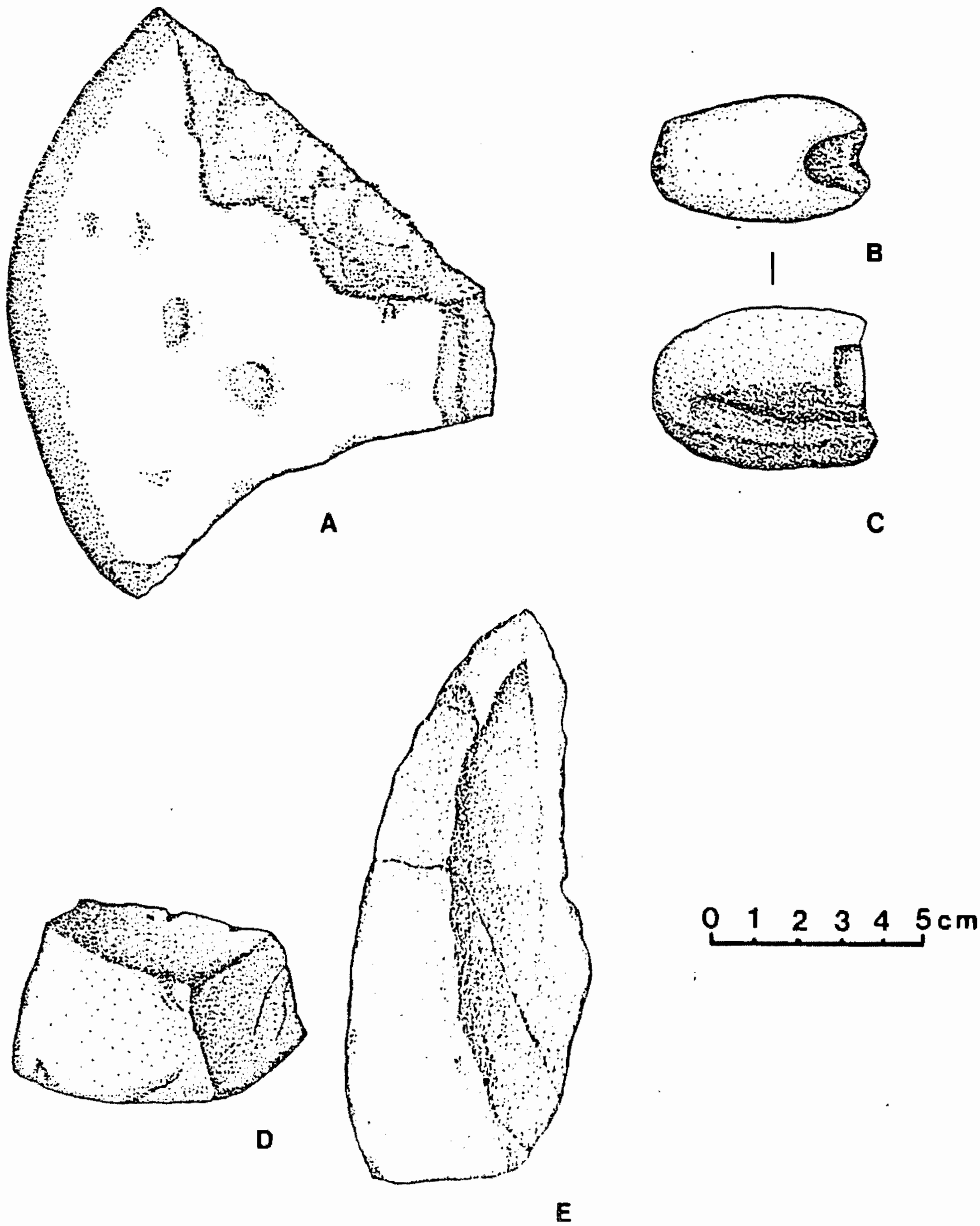

FIGURE 29. Ground stone from the Saddle Site. Grinding slab fragment: A; Abrader:A (end view), B (front view, same abrader); Mortar fragments: D,E.

The small number of points in Saddle site stratum II dictated that the two strata be lumped into a single site collection which could be seriated with the strata assemblages from the other sites. This decision was upheld by an average linkage clustering which linked the two Saddle

Table 9. Artifact Frequency from the Saddle Site

Artifact Class	Strata I	Strata II	Test Probes	Total
Projectile Points	65 /10	27 /11	8 /12	100
Unifaces	67 /10	33 /12	-	100
Bifaces	67 /22	27 /23	6 /18	100
Drills/Perforators	71 / 7	24 /6	6 /6	101
Utilized Flakes	67 /47	24 /45	9 /65	100
Cores	78 / 4	22 / 3	-	100
Stratum Total	100	100	101	
Heavy Tools	100 /13	-	-	100
Ground Stone	100 /87	-	-	100
Stratum Total	100			

strata to one another, before linking to the other late strata assemblages. This places the occupation between about AD 1400 and 1800 (Baxter 1986).

The Saddle Site is thought to have functioned in much the same way as the Colt Site. The frequencies and classes of artifacts at the two sites are very similar, and it seems likely that the same tasks were accomplished in essentially the same environmental situation. It is also likely that the Saddle Site was used as a short term base camp during the annual subsistence cycle.

Summary

Four archaeological sites were excavated in the Upper Middle Fork Willamette River Valley. All of these are less than ten miles from one another and are considered to represent a single settlement-subsistence pattern which relates to the Upper Middle Fork Willamette River sub-basin.

The first site excavated was Rigdon's Horse Pasture Cave which overlooks the confluence of Staley Creek and the Middle Fork Willamette River. That site produced a sequence of chipped and ground stone artifacts estimated by four radiocarbon dates to begin in the historic period and stretch more than 2500 years into the past. Using debitage frequencies the cultural deposit was divided into four major occupational periods which were confirmed by the grouping of independently defined projectile point types. Dating suggests that a period of lessened use, if not a complete hiatus, occurred between the earliest and next to earliest occupation.

The second site to be excavated was Vine Rockshelter, which produced a modest artifact assemblage that could be divided into two major occupation periods. Radiocarbon dating of the lower occupation period placed it far later than expected; however, stylistic cross-dating with the radiocarbon dated Horse Pasture Cave sequence confirms that placement. The shelter occupation probably ended just before historic times, as no Euro-American materials were recovered from the site. The sequence of projectile point styles parallels that from strata 2 and 3 of Horse Pasture Cave.

The Colt and Saddle Sites were excavated during the same field project. The Colt Site produced a long sequence of materials divisible into three cultural strata. These confirmed the sequence as found at the first two sites; however, the two radiocarbon dates from this site were apparently contaminated by a late nineteenth century fire. The Saddle Site produced two cultural strata and again the radiocarbon date may be contaminated. The Colt Site was interpreted as a summer base camp, and the smaller Saddle Site may also have served this function.

In the following chapter the nine components of the four sites are seriated and a local chronology is developed.

CHAPTER FOUR

DEVELOPING A LOCAL CHRONOLOGY

This chapter presents the results of seriational studies of the nine components of the four sites discussed in the previous chapter. These studies use two methods: the "Battleship Curve", or best fit technique (Ford 1962), and "Correlation" or "Similarity Scores" (Robinson 1951; Johnson 1968). Similarity scores were also used to create dendrograms, which group similar assemblages by average linkage clustering (Johnson 1968:18).

Other Willamette Valley Chronologies

The first Willamette Valley cultural chronology was developed by White (1974, 1975, 1979), using data collected during an intensive period of archaeological investigation carried out by the University of Oregon in the late 1960's and early 1970's. White proposed a sequence of five cultural periods. The chronology used radiocarbon and tree ring dates, as well as the relative positions of cultural components based on pollen analysis, stylistic cross dating and the presence/absence of historic artifacts (White 1975:54) to date the various periods. Originally presented as a tentative chronology, White later reaffirmed the sequence after six additional sites were fitted to the scheme (1979:559).

In 1981, Minor and Toepel (1981:151-176) reviewed White's temporal framework and proposed a more extensive chronology for the upper and middle Willamette Valley. In 1985 it was slightly revised (Toepel 1985). Minor and Toepel found White's chronology lacking on two counts: 1) diagnostic traits associated with the periods were either rare, known to occur in more than one period or were geographically restricted, and 2) White failed to explain clearly the reasons for choosing the dates which define his five periods (Minor and Toepel 1981:160).

In an attempt to place the Willamette Basin within the larger perspective of Pacific Northwest prehistory, Minor and Toepel (1981) proposed a chronology which followed the cultural stage format suggested by Willey and Phillips (1958) and Jennings (1974) (Figure 30).

The Willamette Basin was geographically divided into three areas: Upper Willamette Valley, Middle Willamette Valley, and Cascade Foothills. The archaeological record in each of the geographic areas was then divided into the PaleoIndian period, the Early, Middle and Late Archaic periods, and the Historic Period. The periods were further divided into eight phases.

The presence of the PaleoIndian stage is suggested only by two isolated Clovis point finds from the upper Valley

		MINOR AND TOPEL				BAXTER
			PHASES			UPPER WILLAMETTE PHASES
YEARS BP	WHITE PERIODS	PERIODS	UPPER VALLEY	MIDDLE VALLEY	CASCADE FOOTHILL	
0						HORSE PASTURE
	AD 1851	--AD 1855	-------	-------	-------	
	PERIOD V	HISTORIC	ETHNOGRAPHIC			---------
	AD1700	--AD1750-	-------	-------	-------	COLT
		LATE				-AD 1400-
1000			HURD	FULLER	RIGDON	
	PERIOD	ARCHAIC				
	IV					
		--AD 200-	-------	-------	-------	
2000	250 BC		LINGO			STALEY
		MIDDLE	----2000 BC---		BABY ROCK	
4000	PERIOD	ARCHAIC				
	III		FLANAGAN			
6000	4000 BC	---------	-------	-------	-------	---------
	PERIOD II	EARLY ARCHAIC	?		CASCADIA	OAKRIDGE
8000	6000 BC	_ _ _ _ _			_ _ _ _ _	_ _ _ _ _
	PERIOD I	PALEO-INDIAN	?		?	?
10000	8000 BC	11,000 BC	_ _ _ _ _	_ _ _ _ _	_ _ _ _ _	_ _ _ _ _

Figure 30. The Proposed Willamette Basin Chronologies with the Upper Middle Fork Area Sequence (White 1975; Minor and Toepel 1981)

near Eugene (Allely 1975, Minor 1985).

The Cascadia Phase of the Early Archaic (6000-4000 BC) in the Willamette Basin is known from only two sites in the Cascade foothills: Cascadia Cave and Baby Rock Shelter. A single radiocarbon date from the lower levels of Cascadia Cave (5960 bc +/- 280) is associated with this phase; however, the phase is presumed to have been represented at Baby Rock Shelter due to the presence of artifactual materials below a layer of 7000 year old Mount Mazama ash. The cultural assemblage from this phase resembles the Cascade phase of the Lower Snake River on the Southern Plateau at about the same time period. Two "hallmark" diagnostics of those assemblages were lanceolate Cascade projectile points and edge ground cobbles (Leonhardy and Rice 1970:6-11).

Other pre-Mazama sites, outside the Willamette basin, the Odell Lake Site (Cressman 1948) and the Medicine Creek Site (Snyder 1981) have been documented in the Cascades and these can be related to the Cascadia Phase on the basis of willow leaf and bipoint lancolates. Two other sites in the lower Willamette Basin, the Geertz Site (Woodward 1972) and the Ripple Site (Lebow 1984), neither of which yielded radiocarbon dates, have been typologically associated with Cascadia Cave. The projectile point assemblages from both sites were dominated by lanceolate projectile points, and at the Geertz site edge battered cobbles were also recovered.

Recently, an Early Archaic occupation on the floor of the upper Willamette Valley has been suggested by a single radiocarbon date of 5800 +/- 90 bc from the Hannavan Creek Site (Cheatham 1984:102). Although not associated with any diagnostic artifacts, the origin of the date is almost certainly cultural as it was assayed on a sample from 350 charred camas bulbs recovered from an earth oven.

The Middle Arhaic (4000 BC - AD 1) Period is represented in the Minor-Toepel scheme by three phases: the Baby Rock Phase in the Cascade foothills and the early Flanagan and later Lingo Phases in the Upper and MIddle Valley. The period is marked by broad necked (>8 mm), stemmed points, and the presence of mortars and pestles.

The Baby Rock phase was defined on the basis of collections from Baby Rock Shelter (Olsen 1975), the Fall Creek Sites (Cole 1968), Rigdon's Horse Pasture Cave (Baxter et al. 1983) and the suggestion of such materials from the upper levels of Cascadia Cave (Newman 1966). These collections include the diagnostic broad necked points, as well as, knives, scrapers, gravers, drills, perforators and cobble choppers, mauls, hammerstones, manos and milling stone fragments. At the time no radiocarbon dates were available from these sites. Since that time dates have been obtained from the Upper Middle Fork sites. The implication of those dates will be discussed in the course of this discussion.

In 1985, Toepel refined the scheme by defining the Flanagan phase (4000-2000 BC) for the Upper Willamette Valley. The original single Lingo Phase was subdivided using a new projectile point typology which splits broad necked points into a Heavy and a Moderate series. A predominance of the Heavy Broad Necked point series is found in the Flanagan Phase, while the Lingo Phase (2000 - AD 1) is dominated by the Moderate Broad Necked projectile point series. The same series of ground stone artifacts appears in both phases.

The Late Archaic Period (AD 1 - 1750) is represented by the Rigdon Phase in the Cascade foothills, the Hurd phase in the Upper Willamette Valley and the Fuller Phase in the Middle Willamette Valley.

The Rigdon Phase, represented at Rigdon's Horse Pasture Cave and Baby Rock Shelter, is marked by the predominance of narrow necked projectile points. With the exception of the decline of broad neck points, the other artifact classes found during the Baby Rock phase are also found in the Rigdon phase.

Chronological Ordering of Upper Middle Fork Assemblages

Previous archaeological work in Oregon has shown that of the preserved cultural materials, projectile points exhibit the most readily visible morphological variability. Using this variation they can be grouped into modal types, which may then be seriated. The typology developed for this study is the fourth revision of a subjective, morphological typology originally developed during the analysis of the Rigdon's Horse Pasture Cave projectile point assemblage. For the original typology it was assumed that the creation of many types by splitting of attributes was preferable to lumping together possibly meaningful differences; the significance of any particular attribute was then unknown. Later examination of the collections from the other three sites provided reasons to reduce the original 22 types to 15 (see Appendix A). The major attributes which separate these 16 types are diagrammed in Figure 31.

The local sequence here developed for the Upper Middle Fork Willamette River Valley follows the system set forth by Willey and Phillips (1958). The cultural strata identified at each site are viewed as components. That is, the physical manifestation of the phase at a site. The phase is:

> an archaeological unit possessing traits sufficiently characteristic to distinguish it from all other units similarly conceived, whether of the same or other cultures or civilizations, spatially limited to the order of magnitude of a locality or region and chronologically limited to a relatively brief interval of time (1970:22)

Seriation of the components by projectile point assemblages following the technique outlined by Ford (1962) organized the nine site components in time (Figure 32, Table 10). This ordering is confirmed by the correspondence between the seriation and the actual stratigraphic positioning of the four Horse Pasture Cave components, the two components from Vine Rockshelter, and

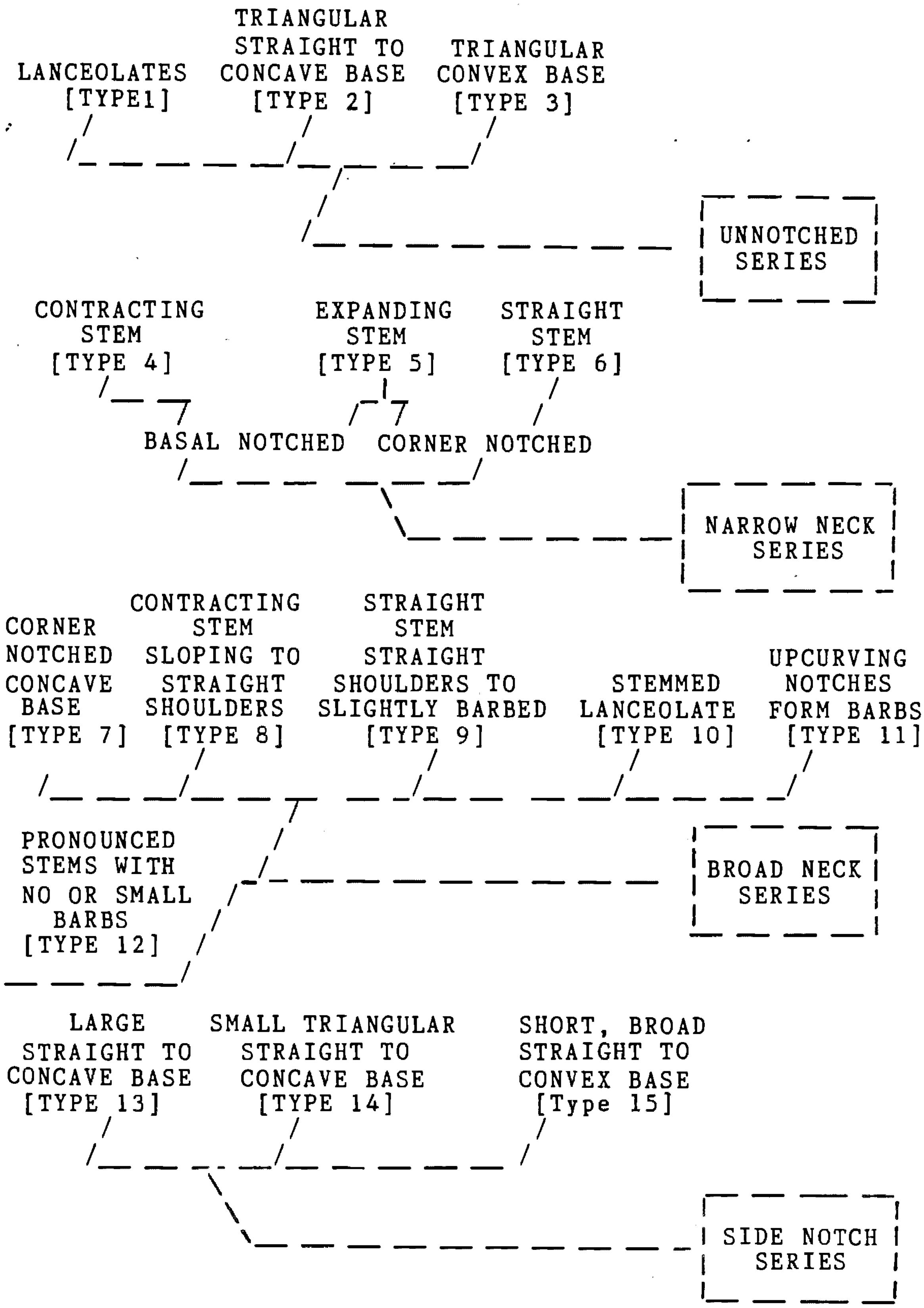

Figure 31. Diagram of the Projectile Point Typology.

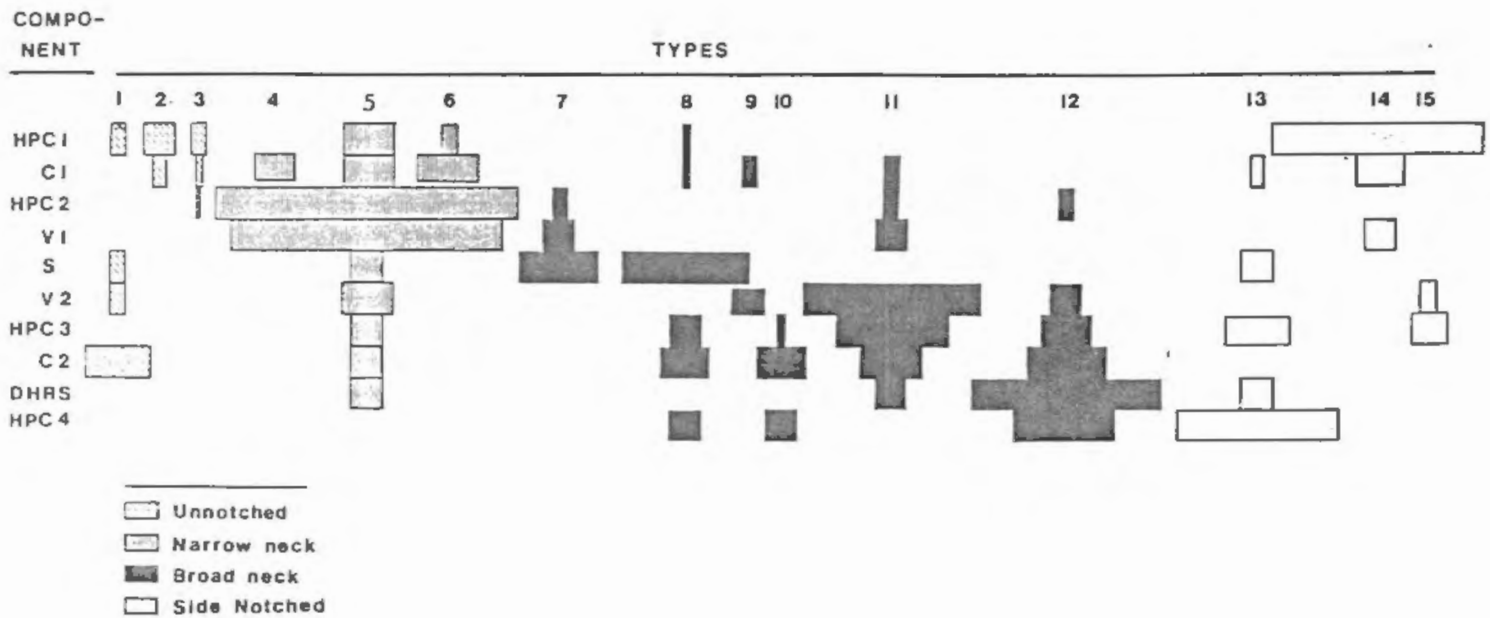

FIGURE 32. The projectile point seriation. The abrupt domination of the assemblages by the Colt phase narrow necked point series is clearly evident as is the sudden termination of the broad necked series.

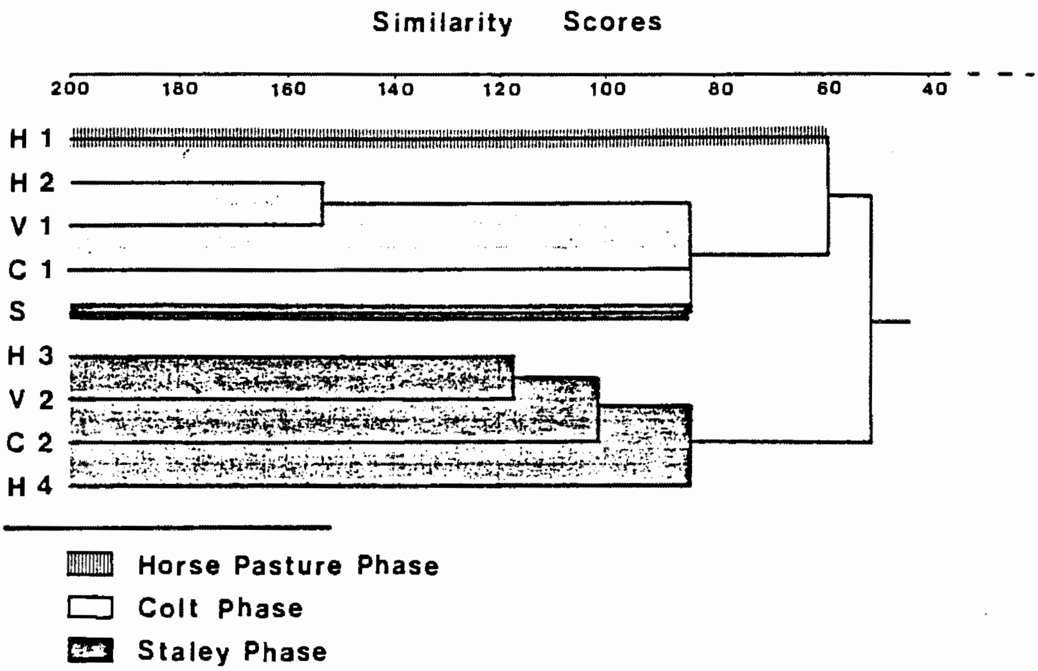

FIGURE 33. The average linkage clustering dendrogram of components. The phases are marked. The clustering of the Staley phase Saddle site component with the later materials is probably due to the collapsing of the two cultural strata at Saddle into a single analytic unit.

and the two components from the Colt Site, as well as by seven radiocarbon dates and associated Euro-American trade goods and items. One date comes from a small test excavation at Dead Horse Rockshelter just upstream from the Colt and Saddle sites. Although the test was small it revealed a Staley Phase component which seriation places between Colt 2 and HPC 4. It is mentioned here because that Staley Phase collection was in association with a fire hearth, charcoal from which was radiocarbon dated to ad 390 +/- 70 (Beta-15274).

Table 10. The Chronological Ordering of Site Components

Site No.	Component	Phase: Oak-Ridge	Phase: Staley	Phase: Colt	Phase: Horse Pasture	Dates
LA39	HPC - 1				|—|	--Glass Beads
						--- ad 1800
LA599	Colt - 1			|—|		
LA39	HPC - 2			|—|		
LA304	Vine - 1			|—|		
LA529	Saddle - 1			|—|		
LA304	Vine - 2		|—|			--- ad 1400
LA39	HPC - 3		|—|			
LA599	Colt - 2		|—|			
LA656	DHRS - test		|—|			--- ad 390**
						--- 500 BC
LA39	HPC - 4		|—|			
						--- 5000 BC
LA53*	Baby Rock Shelter Lowest Component	|—|				---Pre-Mazama

* - Baby Rock Shelter was not excavated for this study; all other components investigated for the present work.

** -This date is from a Staley Phase component at Dead Horse Rockshelter, <1 mile from the Colt and Saddle sites.

The phases developed in the local sequence are representative of the Archaic Stage, characterized by the hunting of varied small game and a great dependence on gathering (Willey and Phillips 1970:107). Following Minor and Toepel's (1981) lead, the Archaic stage is divided into four periods: Early, Middle, Late, and Historic.

The Early Archaic Period

The Oakridge Phase

The Oakridge Phase of the Early Archaic Period in the Upper Middle Fork sequence is defined by the dominance of leaf shaped projectile points; it begins in pre-Mazama times and probably ends about 4000 BC. This phase is not known from any of the sites excavated during this study, but was present in the earliest levels at Baby Rock Shelter located near Oakridge. This component was previously placed by Minor and Toepel in thier Cascadia Phase (1981). It is very poorly represented due to the almost total destruction of the Baby Rock Shelter deposit by collectors prior to scientific investigation (Olsen 1975). Subsequent work documented the pre-Mazama component, but only one foliate point was recovered. A private collection from Baby Rock Shelter, donated to the Oregon State Museum of Anthropology, contains only two more foliate points which can be attributed to that early component. No other pre-Mazama occupation has been located in the Upper Middle Fork;

however, about 12 miles to the south in the North Umpqua River drainage, the Medicine Creek site contains such a component (Snyder 1981). That site produced a small number of leaf-shaped points from below Mazama ash and notched points from above it. Some 20 miles east of Baby Rock shelter at Odell Lake, a similar pre-Mazama occupation dominated by leaf-shaped points was reported by Cressman (1948). The close proximity of the pre-Mazama occupation at the Medicine Creek site to the south and the Odell Lake site to the east confirms the probability of an early occupation at Baby Rock Shelter.

The 500 bc date from from between Horse Pasture Cave-3 and HPC-4, both attributable to the later Staley Phase of the Middle Archaic, shows that the ending of the Oakridge phase is sometime earlier. Stylistic cross-dating with radiocarbon dated assemblages from the Columbia River place the end of the Early Archaic period at about 4000 BC (cf.,Dumond and Minor 1985; Leonhardy and Rice 1970). In the Willamette Basin, the Early Archaic is marked by the dominance of stemmed points over foliates, and also dates to 4000 BC (Minor and Toepel 1981:167). Given the lack of foliate points in the Staley phase materials from Horse Pasture Cave which date to about 500 BC, it seems reasonable to also tentatively assign an ending date of 4000 BC to the Oakridge phase.

The Oakridge Phase of the Early Archaic is a Western

Cascades expression of a widespread and, in Western Oregon, apparently long-lived tradition. A comparison of the 8000 year old Cascadia Cave assemblage with that from the 2300 year old Standley site on the upper Coquille River in southwestern Oregon revealed a remarkable similarity between the assemblages (Connolly and Baxter n.d.). The comparison found that the two collections had similar projectile point styles, blade technologies, unifaces, edge battered cobbles, and hammer/anvil stones. The Standley site point assemblage contained stemmed points, as well as foliates, but analysis suggested the foliate and stemmed points were part of a continuum which was labled the Coquille series (Connolly and Pettigrew 1986). This and other "late" radiocarbon dates (Schreindorfer 1985), make it clear that willow-leaf dominated assemblages cannot be treated as a region wide "horizon" but rather may represent a tradition of particularly long tenure in southwestern Oregon. The edge battered cobble, a "hallmark" of the Cascade phase on the Lower Snake River (Leonhardy and Rice 1970:6-11) continues to occur until much later in the Upper Middle Fork, again suggesting that inter-regional correlations may prove faulty.

The Middle Archaic

The Staley Phase

The Staley phase derives its name from Staley Creek, the Middle Fork tributary which runs below Rigdon's Horse Pasture Cave. The five components attributable to this phase are Saddle, Vine-2, Colt-2, HPC-3, and HPC-4. They contain almost exclusively broad necked points. It should be remembered that the cultural strata from which these components were defined were identified by debitage frequencies. This means the dominance of these components by broad neck projectile points is independent of the formation of the components and confirms their validity.

The Staley phase of the Middle Archaic is defined by the predominance of broad necked stemmed and notched projectile points. It dates between about 4000 bc and ad 1400. Although the beginning of this phase is indefinite, though clearly sometime prior to 500 BC as discussed above, the ending date of AD 1400 was firmly established at Vine Rocksheleter by two radiocarbon dates and confirmed by a third radiocarbon date from Rigdon's Horse Pasture Cave, stratum 3. The ad 1360 date from the top of HPC-3, and the 500 bc date from the top of HPC-4 suggests that a period of little or no site use passed between the two occupations. The radiocarbon date of ad 390 +/- 70 from nearby Dead Horse Rockshelter (discussed above) suggests that the area, if not Horse Pasture Cave, continued to be in use, and further supports the late dominance of broad neck points in the area.

The projectile point attribute known as "broad necked" refers to the distance between the notches or across the stem just below the shoulders. This measurement has been shown to be a temporally sensitive attribute (Corliss 1972) apparently relating to the changes required for hafting smaller points to arrows rather than larger dart shafts. A bimodal curve is formed by graphing the neck width of assemblages containing both broad and narrow necked points. The break between the two has been shown by various studies to occur at about 8 mm (cf., Pettigrew 1981).

In this study the types were first defined on the basis of morphological similarities, and then the distinction of broad necked or narrow necked was applied. This allowed points similar in overall appearance to be placed in the same type even though their neck widths may have been lower or higher than the 8 mm standard used in other studies. The mean of the particular type was then used to define the broad or narrow necked categories. This procedure avoided the arbitrary imposition on the local cultural tradition of a metric standard developed elsewhere. In fact, narrow necked points are so small that the distinction between broad and narrow necked points is completely clear. The mean and standard deviations for the broad neck points from the various components of the Staley phase are presented in Table 11.

The major technological change implied by the broad to narrow necked projectile point change has been shown to have occured about ad 1400 in the Uplands. Elsewhere, the dominance of broad necked points has been shown to end between AD 0 and 500.

The presence of broad neck dominated point assemblages at ad 1400 in the Upper Middle Fork calls into question the relationship between the Willamette Valley proper and the Upper Middle Fork. Clearly the Upland tradition hypothesised by Cole (1968) and Grayson (1975) is supported by this temporal variation; however, the direct temporal correlation reflected in the Minor/Toepel chronology does not seem to apply.

This pattern is apparently not the case in the Willamette Valley, where a number of radiocarbon dates from just after the turn of the first millennium AD (cf., Toepel 1985; Cheatham 1984; Aikens 1975) have been associated with narrow neck dominated assemblages. In southwestern Oregon a broad neck point dominated assemblage has been dated to much later times at the Standley site (Pettigrew et al. n.d.).

It is hard to believe that people would fail to adopt the superior technology for over a thousand years. An alternative explanation may be that the traditional broad neck projectile point styles were adapted to the new technology. Table 11 of neck width means and standard deviations is presented with the smallest mean, that of the Saddle broad neck assemblage, on the top and the highest mean, the HPC-4 assemblage, on the bottom. Except for the reversal of Colt-

Table 11. Staley Phase Broad Neck Points (Mean & Std.Dev.)

```
                                          Neck Width
Component   0.6   0.7   0.8   0.9   1.0   1.1   1.2   1.3   1.4   1.5

 Saddle         |-------X-------|
 Vine - 2             |------X------|
 Colt - 2                |-------X-------|
 HPC - 3                  |--------X--------|
 HPC - 4                      |--------------X--------------|
```

* - Mean and std. deviation in millimeters

2 and HPC-3, the components are ordered in the same manner accomplished by the projectile point seriation. That is, neck width is progressively reduced through time. The break in the linear reduction in mean neck width between HPC-3 and HPC-4 happens during the period when the bow and arrow are introduced elsewhere. It is possible that the "jump" marks that event in the Upper Middle Fork.

The well established connection between a lessening in neck width and the introduction of the bow and arrow suggests that while the basic point styles were retained, their adaptation to the new technology is likely. That the "broad neck" dominated point assemblages suggest the continuing use of the atlatl and dart until such late times is probably not the best interpretation. The introduction of the bow and arrow, without doubt, took place during the period HPC-3 and 4. The constant reduction of mean neck width seen in the Upper Middle Fork assemblages, suggests that the jump between HPC-3 and HPC-4 may eventually show a bimodal curve with larger broad necked points earlier and smaller broad necked points later. That bimodality would represent the same technological shift suggested by the broad neck/narrow neck curve. With that information, the addition of a new phase or sub-phase may be possible based on the frequency of the larger and smaller broad necked points.

Future work needed to refine this phase includes a closer approximation of the temporal boundary between the Oakridge Phase and the Staley Phase. This can be accomplished only through the excavation and radiocarbon dating of more site components. This work may also flesh out the body of the Staley phase between 500 BC and AD 1400. During that time the introduction of the bow and arrow may be observable as a bimodal curve of projectile point neck widths, and frequencies of the two neck width sizes might serve as phase designators.

The Late Archaic

The Colt Phase

The Colt Phase of the Late Archaic period, as known from Colt-1, Vine-1 and HPC-2, is marked by a predominance of narrow necked points. The phase is securely dated between three radiocarbon dates of AD 1400 from Vine-2 and Horse Pasture Cave-3, and two dates of AD 1800 from the top of HPC-2, as well as by associated historic materials from HPC-1 and Colt 1. The beginning dates were previously discussed as the ending dates of the Staley Phase. The ending dates of the Colt Phase were assayed on charcoal from the top of HPC-2, and brought dates of 1) less than 130 years before Modern, and 2) ad 1760 +/-50. The HPC-1-Horse Pasture phase component was associated with copper and glass trade beads probably not available in the region earlier than AD 1750 (Minor and Toepel 1981:174), and not likely to have occurred in the remote Upper Middle Fork until even later. Horse Pasture phase materials were also found in association with historic debris at the Colt site.

The Colt Phase appears suddenly in the Upper Middle Fork, with the narrow neck types leaping from a very minor portion of the assemblage to predominance (Table 12). The almost instant increase from 6% of the HPC-3 assemblage to 81% of the HPC-2 assemblage by narrow neck points is striking. The gap, which radiocarbon dates suggest exists

Table 12. Frequency of Projectile Point Series by Phase

---Phase: Component	Unnotched	Narrow Necked	Broad Necked	Lg.Side Notched	Sm.Side Notched
--------Horse Pasture:					
HPC-1	15	18	2	-	65
--------Colt:					
COLT-1	13	52	14	4	15
VINE-1	-	70	20	-	10
HPC-2	2	81	16	-	-
--------Staley:					
SADDLE	4	16	64	8	-
VINE-2	13	17	66	4	-
HPC-3	-	6	66	29	-
COLT-2	20	7	73	-	-
HPC-4	-	-	50	50	-

between HPC-4 and HPC-3, is not apparent in the dating of HPC-3 and HPC-2. The sudden increase of narrow neck points cannot simply be blamed on a missing piece of the archaeological record. In the Middle Archaic component at the Flanagan site (Toepel 1985) the broad neck points are only 54% while the narrow neck points equal 46%. The Late Archaic components at Hager's Grove (Pettigrew 1980) still contain 30% and 35% broad neck points. It is suggested that the change from broad neck to narrow neck styles in other areas moves by increments, as does any other stylistic change. That is not the situation in the Upper Middle Fork. A drastic change occurs between the Staley and Colt phases in which the broad neck series - large and completely dominant - all but disappears and is replaced by the narrow neck series.

The loss of the broad neck series is also accompanied by a severe drop in the number of heavy tools. Functional changes in site use which occur at this time will be discussed in a later chapter.

The Historic Period

The Horse Pasture Phase

The Horse Pasture Phase of the Upper Middle Fork sequence is dated to after ad 1800. It is marked by the presence of historic items of Euro-american manufacture, such as trade beads of glass and copper, or metal items.

The single component representative of this phase was HPC-1. That component is also characterized by an overwhelming majority of small side notched points. This point style was also recovered from the Colt Site where it was found in association with historic metal debris, but the specimens could not be separated from the earlier Colt phase component. Also associated were Type 4 narrow neck points not present at any of the other sites. A single small side notched point was also found in the Vine-1 component, but no historic materials were located. Small side notched points are present before the historic period in other areas, but it seems safe to say that if found in dominant frequencies, the point style is a horizon marker in the Upper Middle Fork.

Summary and Discussion

The collections recovered from four archaeological sites in the Upper Middle Fork of the Willamette River were divided into analytical units based on the waxing and waning of debitage frequencies. The projectile points from these sites were assigned to morphological types which were then found to form classic battleship curves when arranged by these strata. On that basis these units were determined to be cultural strata and, after seriation, were considered to define cultural components. The seriated components were internally consistent as all actual vertical relationships between components from the same sites were maintained.

The nine seriated components from the four sites were then grouped by shared assemblages using average linkage clustering. These groups were assigned phase names, and radiocarbon dates were then used to assign beginning and ending dates to the groups. In addition to the three phases defined from the nine components excavated for this study, a fourth phase was proposed based on the presence of a pre-Mazama ash component at Baby Rock Shelter. That phase is poorly defined in the Upper Middle Fork, but pre-Mazama ash components dominated by foliate points occur in the immediate vicinity suggesting this as a reasonable proposal.

The four components thus defined for the Upper Middle Fork Willamette sequence include the Oakridge Phase of the Early Archaic period, assigned a beginning date in pre-Mazama times and known to have ended sometime prior to 500 bc; the Staley Phase, dating from sometime before 500 bc to ad 1400; the Colt Phase, dating from ad 1400 to 1800; and the Horse Pasture Phase, beginning after ad 1800 and lasting until late in the 19th century.

Each of the phases are characterized by distinctive suites of projectile point styles, and the Horse Pasture phase is also marked by items of Euro-American manufacture. The dating of these phases does not match the dates for phases defined for the Willamette Basin, or those previously proposed for the Cascade Uplands. The most closely similar dating of these point styles occurs in southwest Oregon at the Standley site. There a broad necked point assemblage similar to that of the Staley Phase was found to date to at least AD 1600. This problem is discussed further in the next chapter.

CHAPTER FIVE

REGIONAL PERSPECTIVES

The archaeological sequence recovered from the Upper Middle Fork has been described and defined in the previous chapter. It remains for that sequence to be placed in regional perspective.

The Upper Middle Fork sequence is based on projectile point styles which are not unique to that area. These styles have been defined and radiocarbon dated at various sites, including the Flanagan Site in the Willamette Valley (Toepel 1985), the Salt Caves Project sites (Mack 1983) on the Klamath River, the Nightfire Island site (Sampson 1985) in the Klamath Basin, the Standley Site (Pettigrew et al. n.d.) on the Coquille River and the Marial Site (Schreindorfer 1985) on the Rogue River. The dominant styles from each phase will be examined and similar radiocarbon dated forms from the surrounding areas will be discussed. While no clear picture of the place of the Upper Middle Fork in regional prehistory can yet be drawn, its unique position will become very clear.

The Unnotched Point Series

In the Upper Middle Fork this series contains three types: lanceolates (type 1), triangular straight to concave base points (type 2), and triangular convex base points (type 3).

Lanceolate points dating to the Colt and Staley phases are found in both components of the Colt Site, in the Saddle Site and in the lower component of Vine Rockshelter. These are of two varieties: those with a maximum width at the center of the specimen, and those with the maximum width towards the base.

Lanceolates seem to be more common in earlier times, but they also occur in later contexts (Aikens 1975; Cheatham 1984; Toepel 1985; Schriendorfer 1985; Davis 1983).

The Upper Middle Fork's Oakridge phase is defined by the dominance of lanceolate points; however, while a pre-Mazama component at Baby Rock shelter has been documented, it produced a very small assemblage. Other sites in the area at Odell Lake (Cressman 1948) and Medicine Creek (Snyder 1981) have given more detailed evidence for this early phase.

Foliate points in western Oregon are most often related to two named point types: Cascade and Gold Hill. Since points associated with the Oakridge Phase would relate to the temporal period of the Cascade type and since the foliates from the Staley phase occur during the span of the Gold Hill type, both of these named types will be reviewed. It is interesting to note that these two point styles have been separated on various grounds; however, recent work at the Marial Site (Schreindorfer 1985) shows a clear development from one to the other.

The most concise definition of the Gold Hill type is found in Mack (1983:145):

> [Gold Hill Points] are small to medium-sized leaf-shaped points, with convex edges. The maximum width position is approximately midway on the point or about one-third of the distance from the base. The base is usually slightly rounded. [The type] was first recognized by Cressman (1933) and later partly described by Davis (1968;1970).

The small size of some of the lanceolates from the Upper Middle Fork suggest that they could be of this type. Mack states that these points are distributed in the upper Willamette Valley, in the upper Klamath River region and on the Northern California Coast, but their "highest frequency is associated with ... the Rogue River drainage". This area, she suggests, is the distribution center of the type. The temporal span of Gold Hill points is unclear, but appears to be wide, the type beginning by perhaps 5000 BC and persisting to shortly before AD 700 (Mack 1983:148). In the Upper Rogue River, an age range of 3000 BC to AD 0 is suggested (Nisbet 1981), and at Nightfire Island in the Klamath Basin, Sampson found them throughout the sequence (3500 BC to AD 1500), most prominently about AD 100, after which time they declined rapidly. In the Willamette Valley they are a common form dating from about 1000 BC (Aikens 1975;Pettigrew 1980), but lasting to much later times

(Toepel 1985). Minor (1985) has suggested that small teardrop-shaped points date between AD 490 and 850 on the Columbia River.

The other named lanceolate point type which the Upper Middle Fork may have produced, the Cascade Point, was originally defined by Butler (1961).

> [Cascade points] are generally long, narrow leaf-shaped or bi-pointed items which tend to be quite thick in proportion to their width and are usually thickest above the butt end; none shows evidence of basal thinning. A number have a fairly prominent bulb of percussion at or near the butt end, which may indicate these had been made on a flake that was struck from a prepared core. Most of the points are diamond-shaped in cross section (1961:28).

Since Butler initially defined that type, people have recognized the difficulty in pinning specific boundaries on the range of variation. Nelson (1969) eventually defined a local variant, the "true Cascade point", which according to him is restricted in distribution to the Southern Columbia Plateau. Recently Lebow (1984:48-60) has struggled with the problem, and following Nisbet (1981) and echoing Nelson's work, showed that the length/width ratio of Western Oregon foliate points is statistically different from the "true Cascade Point" and from some foliates from Cougar Mountain Cave in the Northern Great Basin. Lebow suggested a new type, the "Cascadia Point" as the Western Oregon variant of these early foliate points. Lebow legitimately wants to focus attention on western Oregon foliates, rather than Plateau foliates. However, offering a type name, with no type definition, does not take us much farther along the journey. He showed that a few points from each of three Western Oregon sites were not significantly different from one another in a particular attribute. A major weakness in the study is that only one radiocarbon date from the bottom of Cascadia Cave is available to date the compared point assemblages. The averred "association" of the three geographically dispersed sites is based strictly on stylistic similarity. Connolly and Baxter (n.d.) have shown that undefined stylistic similarity is simply not enough to prove contemporaneity, at least not at that level of regional dispersal. Certainly Nelson would agree. If a "Cascadia" type exists in western Oregon, the well dated sequence of styles from the Marial site on the Rogue River (Schreindorfer 1985; Ross 1985) may help to define an historic type comparable to Nelson's "true Cascade Point".

Triangular unnotched forms are late, increasing from a relatively low frequency in the late Colt phase to a much greater frequency in the Horse Pasture phase components. In the excavated sites of the Upper Middle Fork, they occur in Colt I, and HPC 1 and very minimally in HPC 2. It is clear from their form and associations, that they are related to the small side notched form (type 15) and may simply be unnotched blanks for such points. Because they are both formally and temporally related, the Desert Side Notched form may also be discussed in this context. Types 2 and 3 are best referenced to the Cottonwood Triangular (Lanning 1963) and Cottonwood leaf-shape (Thomas 1981) types. In the western and central Great Basin these two forms, as well as the Desert Side Notched points, date to after AD 1300 according to Thomas (1981:15-18). Cottonwood triangular points from the Salt Cave project date to after AD 1360 (Mack:1983). Mack also observes that they are probably blanks for Desert Side Notched points, which are radiocarbon dated in the mountains of central and northeastern California at AD 1600.

In the Willamette Valley unnotched triangular points are recognized as late (White 1975:123); however these should probably not be seen as comparable to the Cottonwood series since the closely associated Desert Side notched style is rare in the valley. A single Desert Side notched point in association with a glass trade bead was recovered from the Halverson Site (Minor and Toepel 1980:40), but neither Cottonwood triangular or leaf shaped points were found in association. Similarly late contexts have been shown for the Desert Side Notched points at Fern Ridge Reservoir near Eugene (Cheatham 1985). On the Columbia River small triangular unnotched and side notched styles occur after AD 1250 (Pettigrew 1981:106-107;120). Desert Side notched and unnotched, apparently Cottonwood triangular points, were also found in the undated, but seemingly late, upper levels of the Lava Butte site in the upper Deschutes drainage (Ice 1962; Davis and Scott 1984). In northern California, the Desert Side Notched style dates to after AD 1500 (Baumhoff and Byrne 1959).

At Nightfire Island, Cottonwood Triangular points are placed between 2500 and 500 BC (Sampson 1985:350), which in light of associated radiocarbon dates from the Great Basin (see above), as well as elsewhere, seems inordinately early. Interestingly, Sampson (1985:316-320) chose not to designate any of the small side notched points as Desert Side Notched because some are longer than the type norm and because they date too early at Nightfire Island. This presents at least two possibilities. The stratigraphic correlation of excavation units at Nightfire Island was a massive undertaking, and may not be wholly correct, or perhaps the extremely simple triangular form is actually a blank, associated with an earlier projectile point, and not actually the Cottonwood type. The apparently correct temporal positioning of the narrow neck points from the site suggests the latter rather than former explanation as most likely.

The Narrow Necked Point Series

The narrow necked series in the Upper Middle Fork typology consists of types 4, 5 and 6. Type 4 is a basally notched form with a converging stem and often asymmetrical, inward contracting barbs which extend to or past the base.

This style is comparable to certain Gunther barbed forms (Treganza 1958). In the Upper Middle Fork area it is found only in the Colt phase component of the Colt site, in association with Desert Side Notched and Cottonwood triangular points. Type 5 is an expanding stemmed corner notched style with square and pointed barbs. This is the most common narrow neck style and dominates the Colt phase components of the Colt, Vine Rockshelter, and Horse Pasture Cave sites. Type 6 is a corner to basal notched form often with pronounced straight stems. Some forms approach basal notching and differ from Type 4 points due to flaring rather than contracting barbs.

The Gunther barbed type was originally defined by Treganza (1958) for northern California. That definition has proven too broad, and more strictly defined types have been used by later investigators (Mack 1983; Sampson 1985). The long barbed, contracting stem variety, most similar to the form found in the Upper Middle Fork Willamette area, is referred to as the Classic form. It appears late in the Nightfire Island sequence (Sampson 1985:342), and around AD 1000 on the Klamath River (Mack 1983:226). It is absent in the Willamette Valley and north.

Numerous point types can be referenced to the styles represented by Type 5. These include the Rosegate type (Thomas 1981:19) extant in the west and central Great Basin between AD 700 and 1300, the general Gunther type (Sampson

1985:342), dated between AD 300 and 1500, the Gunther stemmed type (Mack 1983:140) and various narrow neck corner notched forms from the Willamette Valley and Columbia River (Pettigrew 1981; White 1975; Toepel 1985). Assemblages in all these areas are dominated by these points by about AD 200 and the type continues to historic times. The exception to this pattern occurs in southwest Oregon, where the style is diagnostic of the newly proposed Siskiyou pattern (Connolly 1986). It may appear somewhat later (about AD 500) in southwest Oregon and is known in California by AD900 in the Shasta Complex. Connolly suggests that the sudden appearance of these points at Nightfire Island by AD 300, and the increasingly later dates to the west are indicative of a western migration. He marshals ethnographic, linguistic and stylistic evidence to suggest that environmental and perhaps social stress in the Great Basin may have resulted in a migration into western Oregon. In this regard it is interesting to note that about AD 300-500 burial evidence at Nightfire Island indicates increased raiding. In any case, these point styles do not replace the broad neck series in all southwest Oregon sites. The late dates accompanying the Standley Site assemblage, which was dominated by broad neck points, led Connolly to suggest a population replacement, as well as technological diffusion. He suggested that at least some of the original populations were pushed into "refugia" where they continued to produce broad neck points until well after narrow necked points dominated the assemblages elsewhere.

The Broad Necked Point Series

Six types (7-12) in this series encompass three stemmed and three corner notched types. Types 7, 11 and 12 are comparable to the Elko corner notched type from the Great Basin (Heizer and Baumhoff 1961; Thomas 1981). Type 7 points are well made with concave bases. They are not numerous in the Upper Willamette, but are present during the Colt Phase at Vine Rockshelter and Horse Pasture Cave. Types 11 and 12 are the most prominent broad neck styles during the Staley phase, occurring only minimally in the later Colt phase. Type 11 points are barbed with a straight to convex base, while Type 12 points are straight shouldered with convex bases.

In the Great Basin the Elko series dates between 2000 BC and AD 1080 according to Heizer and Hester (1978). At Nightfire Island, they date from earlier than 3500 BC to AD 300 (Sampson 1984:330); however to the west, on the Klamath River, Mack (1983:144) reports several with dates of AD 654, AD 1360 and AD 1386. These dates square much more closely with those for the Colt period than do the others. Thomas states (1981:20) that "the Elko series can be defined only relative to the smaller (and later) Rosegate series." His definitional key places emphasis on a basal width greater than 10 mm, a width which all of the Upper Middle Fork specimens exceed. It seems clear that none of the Upper Middle Fork broad neck corner notched points are Rosegate points, however most of the Type 7 points and some of the other types appear in components which are characterized by a predominance of Rosegate forms.

In the Willamette Valley and on the Columbia River corner notched broad neck points are common from about 4000 BC to around AD 200 (Toepel 1985; Pettigrew 1981), and while they are clearly present in the Deschutes drainage, only a few dates are available (Ross 1963). Those dates suggest that the Deschutes points have a similar temporal distribution to those known from the Columbia River. Unnamed broad necked corner notched styles occur in Southwest Oregon at the Standley site between 400 BC and 1600 AD. Such broad necked corner notched, stemmed and foliate point styles, as well as mortars, hammer/anvil stones, edge-faceted cobbles and "fluted" endscrapers are characteristic of the Glade tradition (Connolly 1986). That tradition, "characterized by an unusual degree of conservatism and stability" (Connolly 1986), is associated with radiocarbon dates spanning the period from 9000 to 300 years ago.

The stemmed broad necked points occur as shouldered contracting stemmed (Type 8), shouldered straight stem (Type 9) and shouldered lanceolate (Type 10) forms in the Upper

Middle Fork forms. These points were few at Nightfire Island where they formed a single "Large Stemmed Point" type dating from 3000 BC to AD 300 (Sampson 1985:336). On the Rogue River, they are difficult to date precisely, but occur approximately between 4000 BC and perhaps AD 0 (Schreindorfer 1985). In the Willamette Valley and on the Columbia River they date from about 4000 BC to AD 200 (Toepel 1985; Pettigrew 1981); however on the Columbia River one type remains in greater frequencies until AD 700 and continues as late as AD 1250. On the Deschutes River their occurrance is undated (Ice 1962). In southwestern Oregon, over half of the Standley site projectile point assemblage forms "a continuum from diamond-shaped bipoints to distinctly shouldered points with v-shaped stems" (Connolly 1986). Connolly names this continuum the Coquille Series and sees it as characteristic of the long lived Glade tradition.

The Side Notched Projectile Point Series

Three types of side notched points were defined for the Upper Middle Fork. These include a large side notched type (Type 13), the Desert Side Notched type (Type 14) and an "other" side notched type (Type 15) at least some of which may be comparable to the Siskiyou side notched type (Mack 1983). The Desert Side Notched point was previously discussed with the closely associated the Cottonwood triangular point styles.

The large side notched points (Type 13) from the Upper Middle Fork are crude and not clearly similar to any named style. They are prominent in the Staley Phase, but only a minor constituant of the later Colt phase assemblages. Large side notched points at Nightfire Island were attributed to Northern Side Notched, Elko Side Notched and four types of unnamed side notched points. The large Side Notched points occurred there between 3500 BC and AD 300 (Sampson 1985). Sampson used a minimum width of 17.5 mm to define the Northern Side Notched type. Those smaller are normally seen as Desert Side Notched points (Sampson 1985:316); however, since at Nightfire Island the latter fall outside the length norm and temporal span of that type, Sampson attributed such points to Mack's (1983:148) Siskiyou side notched type which is "consistently smaller than the Northern Side-Notched and larger than Desert Side-Notched". The distribution of Siskiyou side notched points is limited to the Klamath River, Klamath Basin, Southwest Oregon and Baby Rock shelter.

A Student's T test of the difference of means for Mack's major attribute, a ratio of blade width to neck width, shows that a statistically significant difference exists between the point samples that she has defined as Northern Side Notched, Siskiyou Side Notched and Desert Side Notched. In addition a test of the same attribute applied to the Horse Pasture Phase type 14 points (Desert Side

Notched) and the Salt Caves Desert Side Notched points shows no statistical difference. Testing of the large side notched and other side notched categories for the Upper Middle Fork sites did not find a correspondence to Northern Side Notch or Siskiyou side notched, although a single Type 15 point from Vine Rockshelter looks and measures the same as Siskiyou Side Notched points. Mack also reports various side notched points which do not fit named types.

The Siskiyou type is not directly associated with any radiocarbon dates; however, it was recovered from the fill of two house pits from different sites, the floors of which date to the late AD 1300's. The Northern Side Notched points from the Salt Caves area were also not directly dated. To the north, in the Willamette Valley, large side notched points occur before AD 0 (Toepel 1985). They are not part of the collections from the Portland Basin of the Columbia River (Pettigrew 1981:16;126); however the Northern and other large side notched types are reported to the east. Northern Side Notched points on the John Day River date from 3000 to 5000 BC and other side notched points are common to much later times (Dumond and Minor 1983). Ice (1962) reports an undated large side notched form from the Deschutes River. Side notched points from the Standley site (300 BC to AD 1600) (Connolly and Pettigrew n.d.) seem to be very similar to Siskiyou Side Notched points.

Discussion

It is clear that the Upper Middle Fork sequence is not like that from the Willamette Valley (Minor and Toepel 1981; Toepel 1985), or that suggested by the Nightfire Island sequence (Sampson 1985), or that presented in a synthesis for southwest Oregon (Lyman et al. 1985). While these sequences have dissimilarities, they all agree that lanceolates and broad necked points dominated until about AD 0-500 and thereafter narrow neck points predominated. To fit the Upper Middle Fork sequence to this pattern, three radiocarbon dates from two different sites and the seriation data from all would have to be ignored. It is, of course, conceivable that the congruent radiocarbon dates from two different sites with essentially the same broad neck dominated point assemblages could both be wrong, but this does not now seem likely.

Connolly (1986) suggests that not one, but three contemporaneous artifact complexes existed in Southwest Oregon. His perspective is most useful in resolving the problem of placing the Upper Middle Fork in regional perspective. He suggests that the Glade Tradition was extant between 7000 BC and AD 1600. That tradition is characterized by a continuum of foliate and broad necked to large narrow necked shouldered converging stemmed points (the Coquille series), and other broad necked stemmed and side notched points, as well as stone bowl mortars, hammer-anvil stones, edge faceted cobbles and "fluted" unifaces with thick bits. Clearly this set of diagnostic traits can be seen in the Upper Middle Fork Oakridge and Staley phase components.

Connolly's second artifact complex, the Siskiyou pattern, post dates AD 450. It is characterized by small corner notched points, small side notched points, some Gunther barbed points, hopper mortars, large bifaces, notched net sinkers, circular pit houses, and occasionally pottery. The Colt and Horse Pasture phases exhibit a number of these traits and could be related to this pattern.

The third complex, the Gunther sphere, consisted of a post AD 900 coastal adaptation, traits of which spread and mixed by diffusion with inland, river oriented Siskiyou pattern sites. Gunther sphere diagnostics are not represented in the Upper Middle Fork.

Within Connolly's scheme, the Siskiyou and Gunther patterns are introduced to an area dominated by the very ancient and long lived Glade tradition. Connolly suggests that the older tradition was not wholly replaced, but continued in out of the way refugia, such as at the Standley Site in Camas Valley. There it lasted for a thousand years after the small corner notched points of the Siskiyou pattern were introduced to the Klamath River basin. The Shasta Complex "appears" in northern California about AD 900 some 500 years after its counterpart the Irongate complex occurs in Oregon. A similar gradual, but northward, spread of the Siskiyou pattern may also be responsible for the late introduction of the narrow neck series in the Upper Middle Fork.

When phase assemblages are seen as representative of different peoples, it may be suggested that Staley phase components (assignable to Connolly's Glade Tradition) could have continued in some areas, and may have been contemporary with Colt Phase and perhaps even Horse Pasture phase materials. That is, Glade tradition "refugia" might have continued to exist within the Upper Middle Fork. Interestingly, functional analysis of component assemblages (Chapter 6) suggest that human activities at Horse Pasture Cave and Vine Rockshelter changed in character between the Staley and Colt Phases. It is certainly possible that people of one tradition could change their use of a site even after thousands of years; however an influx of new peoples seems even more likely to result in a somewhat changed settlement/subsistence pattern. After all, it seems probable that major resource areas would be exploited by new peoples, but secondary areas might be overlooked, especially if the population influx was seasonal. Such a pattern might account for the functional changes indicated at Vine Rockshelter and Horse Pasture Cave.

Available survey data provides an indication of whether this hypothesis has merit. A study of 203 isolated projecttile point finds from all districts of the Willamette National Forest was made. These finds were fortuitous and not part of any representative sampling strategy; however, of 27 narrow necked points recovered from all over the forest, 20 (74%) were found on the Oakridge, Lowell and Rigdon Districts in the Willamette River drainage. Broad necked points were more evenly distributed, with 24 (42%) of 57 found in the Willamette drainage. That distribution is quite similar to the 35 (38%) of 92 foliate points found in the Willamette basin. Five (23%) of the 22 large side notched points were recovered from the Willamette drainage, and only five small side notched points have been recovered as isolated finds from the entire Forest. Whether it is significant that broad necked and foliate points appear in about the same frequencies (about 40%) throughout the forest, but narrow necked points are apparently restricted to the Willamette drainage is unknown, but it is a pattern well worth further investigation. Especially so, since it is remarkably coincidental to the pattern suggested by Connolly's model.

To summarize, the cultural assemblages recovered from the Upper Middle Fork of the Willamette River can be assigned to four phases based on projectile point types. The temporal spans of the Upper Middle Fork projectile point types are unique in Oregon, and they are well supported by radiocarbon dates and other analytic evidence.

This situation may be best explained using a model (Connolly 1986) which suggests three separate but contemporary cultural assemblages. Two of these correlate to the Staley and Colt phase materials of the Upper Middle Fork area. In the following chapter, a functional analysis of the components further supports the possibility that Staley phase peoples of the Glade Tradition were replaced by an influx of people carrying the Siskiyou pattern, thus marking the start of the Colt phase.

CHAPTER SIX

FUNCTIONAL SITE ANALYSIS

A major thrust of the Upper Willamette Valley study was to examine the differences between the various component artifact assemblages excavated in the Upper Middle Fork and to interpret the functions of these assemblages. In order to address this question, the site components were divided into chipped stone, ground stone and heavy tool industries. It is assumed that the three industries represent at least three categories of activity sets, with various task specific tool kits subsumed under each.

The chipped stone component assemblages were analyzed separately from the ground stone and heavy tool industries because the lower number of ground stone and heavy tool artifacts preclude the same type of quantitative treatment.

Presence/absence scores were computed for the ground stone and heavy tool artifact classes using a formula developed by Kroeber (1940:34). This formula subtracts all differences from the total of similar presences and similar absences, and normalizes them to the total number of classes. This produces a score which can then be subjected to average linkage clustering and the development of a dendrogram.

The chipped stone industry occurs in all site components and, for comparison of these assemblages, similarity scores as defined by Robinson (1951) were prepared. These scores result from subtracting the differences between all artifact frequencies between all components. These scores were also grouped by average linkage clustering and used to create a dendrogram which displays degrees of shared similarity between various assemblages.

Average linkage clustering can be done in both Q-mode and R-mode. The Q-mode linkage sorts items by similar frequencies of characteristics, and the R-Mode linkage extracts co-varying characteristics from sets of items (Dumond 1974:265). In the present study, the Q-mode technique was used to sort the assemblages by the frequencies of artifact classes, and the R-mode technique was used to group the artifact classes as they co-varied in the assemblages. The work was undertaken in order to discover which components were similar, and then, by assessing the provenience of the grouped artifact classes, to clarify which groups of artifacts were causing the components to group as they did.

The Ground Stone and Heavy Tool Industries

The components excavated in the Upper Middle Fork produced a small collection of ground stone tools including abraders, grinding slabs, manos, pestles, stone bowl mortars, and edge ground (or battered) cobbles. These occur in all components except the two Vine assemblages (Table 13). It was explained that due to the few projectile points in the Colt-3 stratum it was combined with Colt-2 for the projectile point seriation. A sufficient number of chipped stone and heavy and ground stone artifacts are present for it to be analyzed separately. Therefore, ten, rather than nine, components are used in this analysis. The Saddle Site was considered as a single component for reasons discussed in the previous chapter. The grinding slabs, manos and ground stone fragments were combined into a single category as the manos occurred at only one site and the various other ground stone fragments were undoubtedly manos or grinding

Table 13. Ground Stone and Heavy Tool Industry Provenience

	Ground Stone					Heavy Tools*		
Component	1	2	3	4	5	6	7	8
HPC 1		4						
HPC 2		5	1					1
HPC 3		5	1	1		2	2	2
HPC 4		3	1			6	2	1
VINE 1								
VINE 2						12		
SADDLE	2	6		2	3	1	1	
COLT 1		5	2	3	1	5		1
COLT 2		3			2	1		2
COLT 3		2	1	2		2	4	1

*1-abrader; 2-Grinding slabs and manos; 3-Edge ground cobble; 4-Pestles; 5-Mortars; 6-Hammer stones; 7-Anvils; 8-Choppers.

slab fragments. The heavy tool industry consisted of hammer stones, anvils, and choppers. This industry is also wide spread, but does not occur in HPC 1 or Vine 1. The Vine 1 component contains artifacts of neither industry; however, since the purpose of the analysis was to locate functional groups, the absence of such tools is important.

The presence/absence analysis proceeded by comparing each component to all others, one at a time. The formula was designed to account for co-occurring presences and absences in each artifact class. Kroeber's (1940:34) presence/absence formula is: (A+D)-(B+C)/N where (A) equals the number of classes in which both components have members, and (D) equals the number of classes in which both components do not have members; and where (B), the first component has a member, but the second component does not and its reverse, (C), where the first component does not have a member, but the second component does have one. "N" is the number of classes. For example, Colt 1 compared to Colt 2 would be:

(4+3)	-	(0+2)	/8 = 0.625
(similarities)		(differences)	(score)

where Colt 1 and 2 are both present in the same four artifact classes and absent in the same three classes, and where Colt 1 is not present in any class in which Colt 2 is absent, but Colt 2 is present in two classes where Colt 1 is absent. There are eight artifact classes.

Figure 34 presents the symmetrical Q-Mode presence/

absence matrix derived by this method. In this matrix the first groupings are Vine 1 and Vine 2, and HPC 3 and 4.

The dendrogram formed by Q-mode average linkage clustering of the matrix scores is shown in Figure 35.

Site Component	Site Components H1	H2	H3	H4	V1	V2	S	C1	C2	C3
H1	--	.50	-.25	0	.75	.50	.25	-.25	.25	-.25
H2		--	.25	.50	.25	0	-.75	.25	.25	.25
H3			--	.75	-.50	.25	0	.50	0	.50
H4				--	-.25	0	-.25	.25	.25	.75
V1					--	.75	-.50	-.50	0	-.50
V2						--	.25	-.25	.25	-.25
S							--	-25	0	0
C1								--	.75	.75
C2									--	.50
C3										--

Figure 34. Q-Mode Matrix of Presence/Absence Scores.

Three groups are formed. Group I consists of only the Saddle Site, Group II represents Vine 1, Vine 2, HPC 1 and HPC 2, and Group III contains all three Colt components and the two lower Horse Pasture Cave Components, 3 and 4.

In order to ascertain the tool kits which form these groupings, an R-mode clustering was done (Figure 36), with the resultant dendrogram shown in Figure 35. This also formed three groups. The Group I cluster consists of mortars and abraders, Group II contains edge ground cobbles, choppers and the grinding slab-manos category, while pestles, anvils and hammers are clustered in Group III. Comparison of the Q-mode and R-mode groups (Table 14) was accomplished through

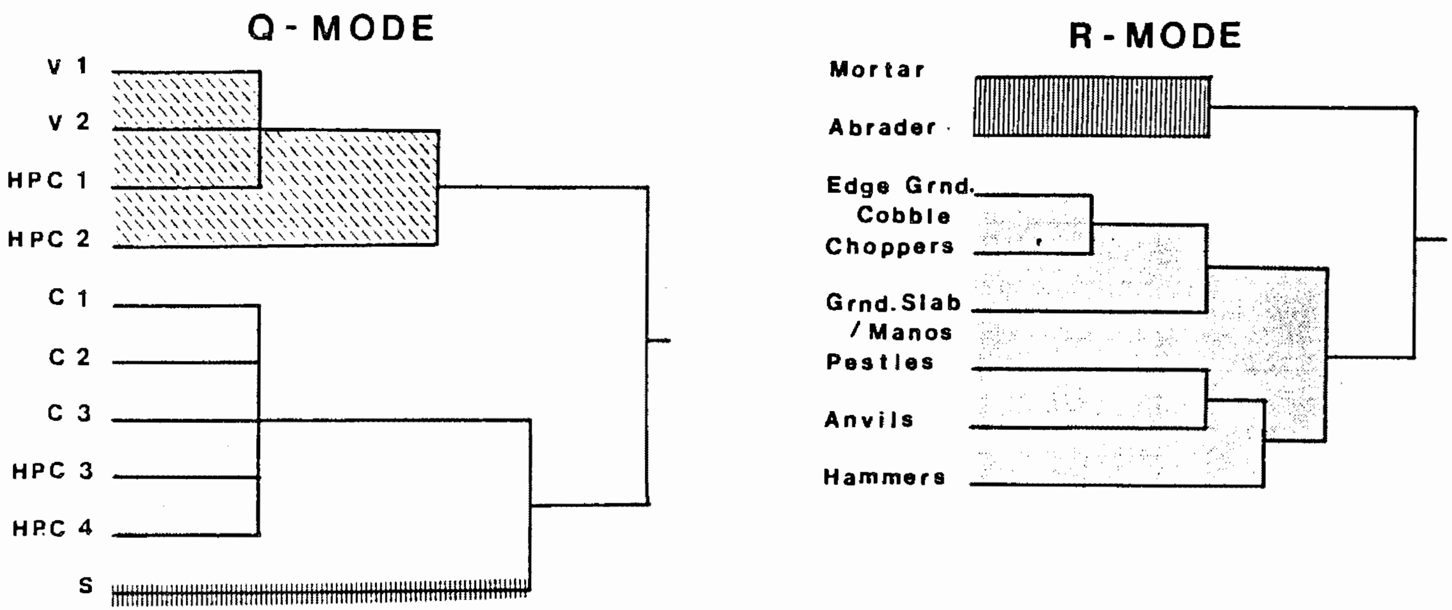

FIGURE 35. Q- and R-mode Average Linkage Clustering Dendrograms for the groundstone and heavy tool industries. Hatched components in the Q-mode dendrogram are not associated with these industries. The shaded components are associated with the shaded R-mode artifact classes. The Saddle Site is associated with the mortars and abraders.

Artifact Class	Artifact Class 1	2	3	4	5	6	7	8
1	--	-.4	-.2	.4	.6	-.2	.4	-.4
2		--	.4	.2	0	.4	.2	.6
3			--	.4	-.2	.2	.4	.8
4				--	.4	.4	.6	.2
5					--	.2	0	0
6						--	.4	.4
7							--	.2
8								--

Figure 36. R-Mode Presence/Absence Matrix.

the simple expedient of comparing the provenience of the various artifact classes.

The Q-mode Group I, the Saddle Site, is clearly responsible for the R-mode Group I. The only abrader recovered was from that site, while mortars were recovered from only three components: Saddle, Colt 1 and Colt 3. Reasoning that the high association between the abrader and

Table 14. Summary of Q-Mode and R-Mode Analysis Comparison* for the Ground Stone and Heavy Tool Industries

Q-Mode Groupings	Items Contained	R-Mode Groupings	Items Contained
Group I	Saddle	Group I	Abraders, Mortars
Group II	Colt 1,2,3 HPC 3,4	Group II	Edge Ground Cobbles Choppers Grinding Slabs-Manos
		Group III	Pestles, Anvils, Hammers
Group III	Vine 1,2 HPC 1,2	-------	Minimal association with ground stone and heavy tools industries

* Most R-Mode items were found in these Q-mode components.

the mortars might be causing the mortars to group with the rest of the artifacts at an artificially low level, the dendrogram was recreated without the abrader artifact class. The dendrogram remains unchanged, the mortars continue to cluster with the other artifact classes at a very low level.

The R-mode groups II and III are directly related to Q-mode group II. That group consists of all three components of the Colt Site and the lower two Horse Pasture Cave components. Q-mode cluster III, consisting of Vine 1 and 2, and HPC 1 and 2, is not related to any of the clusters created with the ground stone and heavy tool industries.

The Q-mode and R-Mode analysis of the ground stone and heavy tools industry from the ten components of the Upper Middle Fork sites created three groups of sites which are related to three groups of artifacts. The Saddle Site is associated with abraders and mortars. Colt components 1,2,and 3, and Horse Pasture Cave components 3 and 4 are associated with edge ground cobbles, choppers, grinding slabs and monos, as well as pestles, anvils and hammerstones. Vine components 1 and 2 and Horse Pasture Cave components 1 and 2 are not closely associated with any of these artifact classes.

The Chipped Stone Industry

Q-mode and R-mode analyses were also conducted for the chipped stone industry. Artifact class frequencies were used to create a Robinson Index of Agreement matrix and average linkage dendrograms (Johnson 1968) (Figure 37).

The Q-mode analysis produced four groupings. Group I consists of the upper two components of Horse Pasture Cave. Group II contains the lower two Horse Pasture Cave components, all three Colt components, and the Saddle site. Groups III and IV consist of the solitary Vine 2 and Vine 1 components respectively.

The R-mode analysis produced a single series of linkages which can be divided into three groups. Utilized flakes, bifaces, unifaces and drills/perforators make a single, closely related cluster. Clustering at a somewhat lower level are the projectile points, suggesting less agreement with the other artifact classes, and grouping at an even lower level are the cores.

Comparison (Table 15) of the Q-mode and R-mode groups was made by determining artifact class provenience.

Table 15. Summary of Q-Mode and R-Mode Analyses* for the Chipped Stone Industry

Q-Mode Groupings	Items Contained	R-Mode Groupings	Items Contained
Group I	HPC 1,2	Group II	Points
Group II	HPC 3,4 Colt 1,2,3 Saddle	Group I	Utilized Flakes, Bifaces, Unifaces, Drills/Perforators
Group III	Vine 2	Group III	Cores
Group IV	Vine I	------	

* Most R-mode items were found in these Q-Mode components

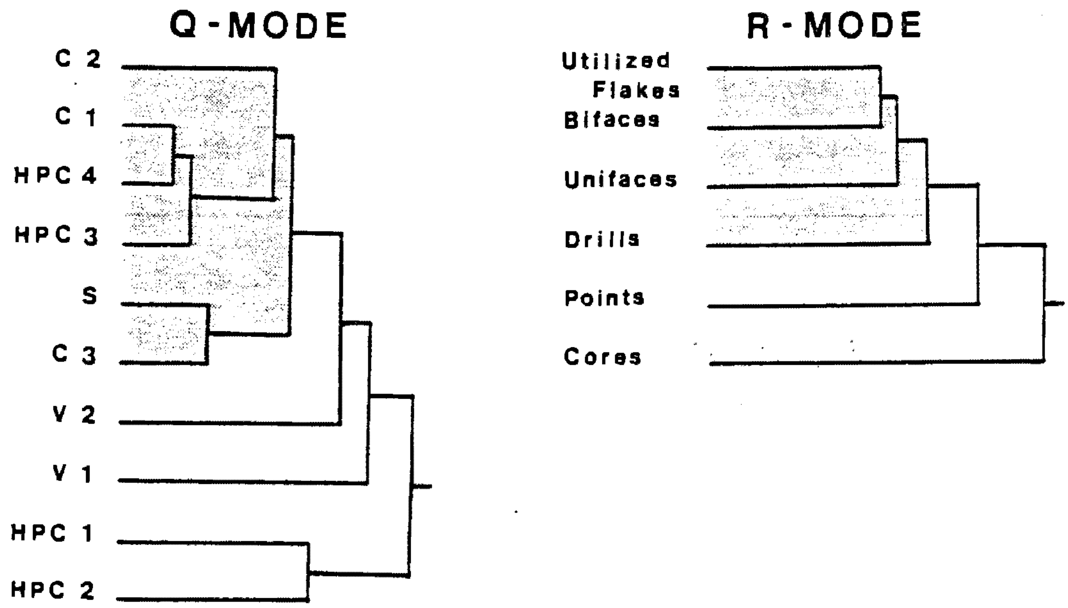

FIGURE 37. Q- and R- Mode Average Linkage Clustering Dendrograms for the chipped stone industry. The shaded Q-mode components are grouped due to similar assemblages of those artifacts classes shaded in the R-mode dendrogram. The unshaded Q-mode components are associated with the unshaded artifact classes in the R-mode dendrogram.

Discussion

The two independent Q-mode and R-mode analyses corroborate one another and together can be used to develop a site typology based on the variation in activities inferred from the differing artifact classes. The findings are summarized in Figure 38. In order to define the functions of the sites, specific functions were assumed for each of the artifact classes. This technique was used by Minor (1983) with two provisos:

> ...it incorporates only those artifact classes which were identified at the six sites forming the focus of this study. As such the listing of artifact classes and activity sets/subsets should not be considered exhaustive. Secondly, because of the small samples...a particular artifact type was assigned to only one activity set/subset (Minor 1983:195).

The analyses suggest that individual site components conform to two of the site categories modeled for the Upper Middle Fork. These are task specific sites and summer base camps.

The task specific sites (components) are represented by Horse Pasture Cave 1 and 2 and Vine 1 and 2. These were identified by the limited variety of artifact classes in those assemblages. They include only chipped stone artifacts, except in the case of Vine 2 where hammerstones were also recovered. The specific activity practiced at each site can be postulated based on the activities delineated in Table 16. The Horse Pasture Cave strata contain a very high frequency of projectile points, about twice as many as any of the other components. It seems most reasonable to interpret these as hunting camps, given the significant number of artiodactyl bones found in them.

Vine 1 has a lower frequency of projectile points, but a comparatively high frequency of finished bifaces. The site may have been associated with butchering, however the size of the biface fragments suggested that they might be point fragments (Baxter and Connolly 1985:64). In any case,

Table 16. Summary of Activity Sets by Site Type

Artifact Class	Activity Set	Activity Subset
Projectile Points	Food Procurement*	Game
Basketry		Plant Foods
Bifaces	Food Processing	Butchering
Utilized Flakes		
Choppers		
Grinding Slabs		Plant and Meat Processing
Manos		
Mortars		
Pestles		
Hammerstones	Manufacturing	Stone Tools
Anvils**		
Cores		
Debitage		
Abraders		Wood/Bone Working
Gravers***		
Edge Battered Cobble		Hide Working
Unifaces		
Drills/Perforators		

* - The basketry could obviously be used for many things
** - Some of the Anvils were edge faceted and may have been used in a different manner.
*** - Gravers were included in the uniface category and were not considered separately

the site would be interpreted as a hunting camp since hunting and butchering are very closely connected. Vine 2 produced a large number of cores and hammerstones, and may have been a lithic reduction site or it may have been an obsidian source area with just enough stone working to ascertain the quality of the particular nodules collected. The obsidian nodules have been sourced by the X-ray fluorescence method to an as yet unlocated local source (Sappington 1986).

CHIPPED STONE INDUSTRY	COMPONENT	GROUND STONE AND HEAVY TOOL INDUSTRIES
	TASK SPECIFIC SITES	
POINTS	HPC 1,2	NONE
LARGE NO. BIFACES	VINE 1	NONE
CORES	VINE 2	LARGE NO. HAMMER STONES
	SUMMER BASE CAMPS	
UTILIZED FLAKES BIFACES UNIFACES DRILLS/PERFORATORS	HPC 3,4 COLT 1,2,3 SADDLE	EDGE GROUND COBBLES GRINDING SLABS/MANOS PESTLES ANVILS HAMMERSTONES MORTARS ABRADERS

Figure 38. Functional site types as summarized from the Chipped Stone, Ground Stone and Heavy Tool Industries Q-Mode and R-Mode Analyses.

Summer base camps are represented by the lower two components at Horse Pasture Cave, all three components at the Colt Site and the Saddle Site. All of the activities suggested in Table 16 are represented by the chipped stone, ground stone and heavy tool industries in these components.

There seems to be some change through time in the frequency of certain kinds of artifacts, with anvils becoming fewer in the later components. The Saddle assemblage is separated from the other components by the presence of a large frequency of mortars, but its chipped stone industry is quite similar to the others.

As can be seen in Figure 38, over time the activites associated with Horse Pasture Cave and Vine Rockshelter changed. During the Staley phase, Horse Pasture Cave was used as a summer base camp, and Vine Rockshelter was a lithic reduction site apparently near a local obsidian source. With the advent of the Colt phase, the number of activities carried out at these sites was reduced to just hunting. The kinds of activities pursued at the Saddle and Colt sites apparently remained stable throughout their period of use.

CHAPTER SEVEN

SETTLEMENT-SUBSISTENCE IN THE UPPER MIDDLE FORK VAllEY

The four sites excavated in the Upper Middle Fork of the Willamette River have been placed in time, and characterized as to site function. It remains to place those sites into the larger perspective of a land use pattern by relating their location to the surrounding environment.

The relationship of site location to site use has been a concern of archaeological research for many years (Willey 1953; Taylor 1948).

> The extent to which a society utilizes its natural surroundings is one of its most particular and significant aspects (Taylor 1948:186).

Currently, studies of the relationship of people to their environment are being heavily influenced by ethno-archaeological (cf., Binford 1978, 1980; Yellen 1976, 1977) and ethnographic studies (cf., Lee 1968; Woodburn 1968). These endeavors attempt to place human behavior in an ecosystemic context. Within this area of research various theories have been offered to explain the relationship of humans to the land.

Butzer believes that "spatial behavior is fundamentally rational in economic terms, but it is not necessarily optimal and is never exclusively economic" (1982:258). The Hadza illustrate this point dramatically. They are dependent on vegetal materials for about 80% of their diet, however, hunting and therefore meat is held to be of such importance that they

> are apt to describe themselves as suffering from hunger when they have less meat than they would like. In fact there is never any general shortage of food ...(Woodburn 1968:51)

Harpending and Davis (1977) have presented a model of group sedentism and mobility based on resource clustering and seasonality. Their model states that scattered resources, seasonally out of phase with one another, result in a high rate of mobility for human exploitation. Conversely, low mobility or sedentism results from low spatial variability of resources which become available in series by season. Winterhalder (1981) thinks that optimal foraging theory, developed using non-human biological data, is relevant to the interpretation of human adaptation. In that scheme, based almost entirely on the dynamic of energy output versus energy gain, dispersed but stable resource distribution is accompanied by regular dispersion of the smallest viable social units, while clustered resources draw aggregated social units (Winterhalder 1981). Of course, the resources in question are the staples, those foods which were the major dietary items. Vita-Finzi and Higgs (1970) make the point that while many plant foods are recognized and used as "relishes, delicacies, medicines and the like", only a few are dependable enough and in sufficient numbers to be exploited as a staple, and therefore to significantly influence human patterns of exploitation.

In sum, it can be stated that only a few resources are plentiful enough to be staples. When they are scattered, harvesting requires small, mobile social groups. Clustered resources, however, result in larger, sedentary groups.

In the Upper Middle Fork, the ethnographic model (see Chapter 1), environmental information (Chapter 2) and archaeological data (Chapters 3-6) suggest that the area's resources called for moderate mobility and therefore smaller groups during most of the year. Conditions may have allowed congregation of larger groups, not dependent on stored foods, only during a fairly short period in the late fall when large game gathered in sufficient numbers to support many humans. In contrast, the huge camas fields, larger grass fields and greater number of oaks of the Willamette Valley proper could have supported much larger, relatively sedentary social units.

The valley floor and small prairies of the Upper Middle Fork basin and the immediate uplands no doubt contained all necessary subsistence resources for a hunting and gathering lifeway. Some resources were in scattered lower concentrations, however, that may not have been a major factor in site movement. Woodburn (1968) records that

Hadza settlements were often shifted to obtain more desired foods well before local foods were exhausted. Winterhalder, while not modeling human desire, also argues (1981:29) that resource patches are abandoned long before they are exhausted because energy collection costs grow greater than energy gains.

According to the hypothesized seasonal round (Chapter 1), in the spring multifamily Molala winter villages split into small family groups which scattered to harvest camas and other resources relatively common in the small prairies throughout the valley. As the summer passed, hazelnuts, acorns, and camas, as well as grass seeds, fern roots and other vegetables were harvested and processed for storage. Hunting, drying and storage of meat may have been even more important activities. These scattered low concentrations of resources were probably very stable, but able to support the subsistence and food storage needs of only fairly small groups.

In the mid- to late summer the upland berry fields were exploited by small, short term task groups, whose harvesting and production of dried berries was probably more limited by human ability to transport the product than by its availability. It is likely that the uplands (>3500 feet), no more than two linear miles from the lowlands at any point on the main stem of the Upper Middle Fork, were not occupied for long periods, but were visited again and again by hunting and berrying expeditions. That is, it is not likely that summer base camps were located in that area. While the concentrated food supply available at the berry fields might have allowed larger groups to congregate, such groups would probably have quickly scared or hunted the game out of the immediate area. It is assumed that while berries were greatly desired, meat was the more important upland resource. After all, berries were desired as sweeteners to make other foods more palatable but they did not serve to stave off starvation through the winter.

In the fall, families remained dispersed as they gathered acorns from the scattered oak trees and burned and collected the grass seed fields. In the late fall and winter, however, they again gathered at the winter villages. The gathering deer and elk herds at that season may have made group hunting productive enough to support larger social units for a time before they resorted to their stored winter supplies.

Settlement-Subsistence in the Upper Middle Fork

It is likely that the Upper Middle Fork comprised a self sufficient settlement-subsistence system. The ethnographic model, set out in Chapter 1 and summarized immediately above, was tested by looking at the assemblages from the nine components of the four excavated sites (Chapter 5), and placed into a larger land use scheme by comparing the distribution of all site locations presently known in the upper Middle Fork area against the distribution of ethnobotanically meaningful plant communities. The original Land Office Survey maps and notes for the area were consulted; however, the detailed modern plant community studies are far more meaningful in the Upper Middle Fork area where logging has not subjected the entire area to environmental ravages as has farming in the Willamette Valley proper.

The Upper Middle Fork Willamette was maintained through burning, so oak savanna and oak woodland were common. Intricate inter-fingering of the prairies with conifer and riparian forests provided a maximum number of ecotones harboring game and economically valuable understory.

In order to assess the relationship of site location to the environment, the six townships of the Upper Middle Fork were examined using the Oregon Archaeological Survey Records. Within that area 123 aboriginal sites have been recorded. These include 110 lithic scatters, eight of which were in rock shelters, and 12 of which also contained ground stone implements. The other 13 sites were single or multiple rock cairns with no accompanying cultural debris. Plotting the location of these sites by elevation shows a bimodal curve (Figure 39) with peaks at 2000 and 5500 feet. The break between the two peaks occurs at about 3500 feet.

Rock cairn sites follow this bimodality with six above 3500 feet and seven below. Ground stone sites do not follow that pattern, with 11 of 12 being found at lower elevations. The even upland/lowland distribution of the vision quest mound sites is perhaps due to a lack of seasonality in such activities. Since nothing is known about the Molala vision quest little can be said about this pattern. Ground stone,

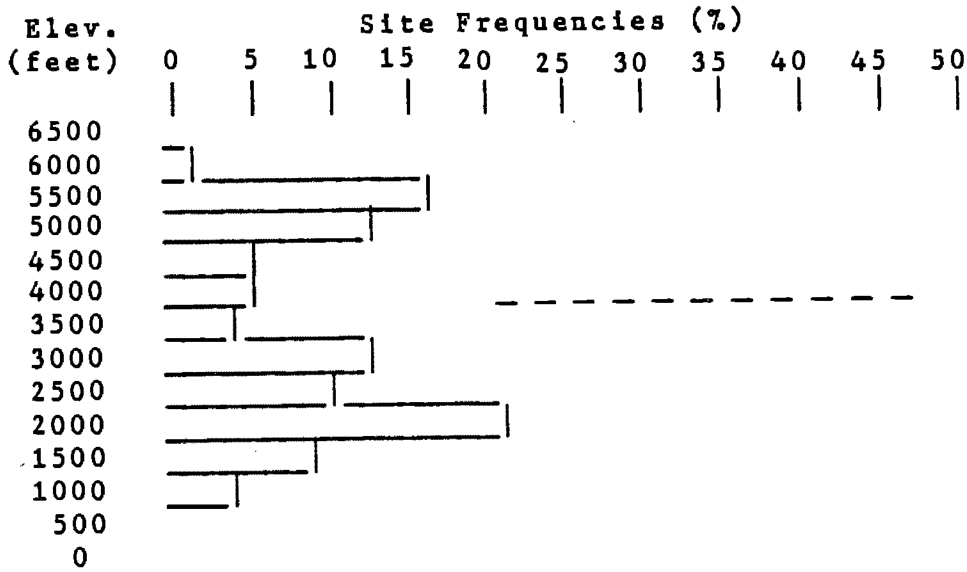

Figure 39. Frequency distribution of sites in the Upper Middle Fork by elevation.

on the other hand, is ethnographically known to be part of the plant processing tool kit used in subsistence activities. Since it seems reasonable to believe that ground stone is as likely to be found and reported from upland sites as lowland sites, the lowland distribution bias for ground stone artifacts is probably not due to the non-systematic sample of the Oregon Archaeological Survey, but rather to plant resource distributions.

This clear cut pattern suggested that elevations of area plant associations (Hemstrom, Logan and Pavlat 1985) should be examined. It turned out that they also show a break at about 3500 feet (Figure 40).

The bimodal site distribution matches to a certain extent the general elevational distribution of the four major plant series known for the area. The four tree series

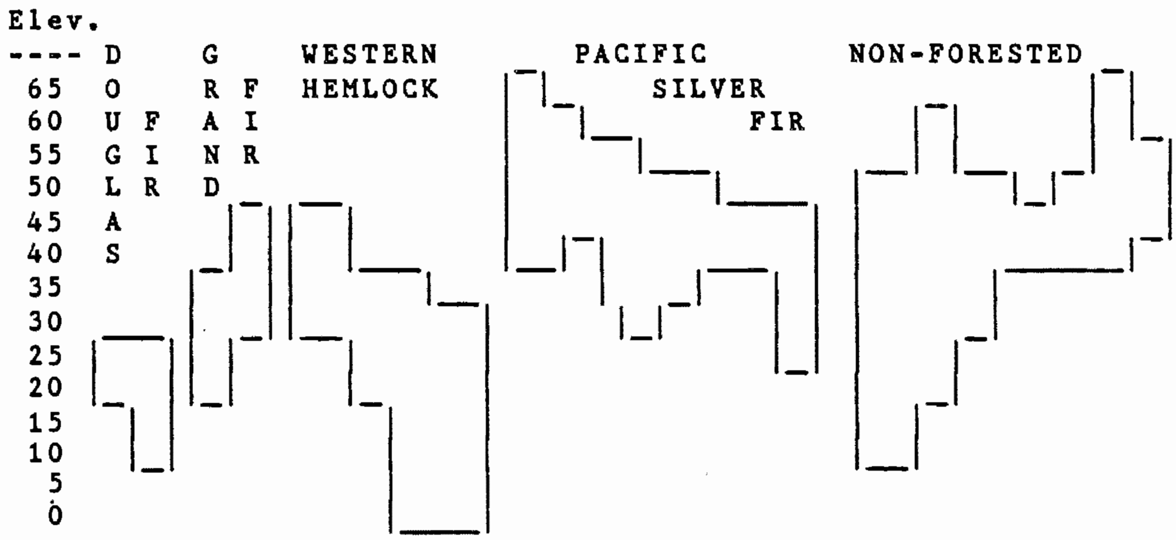

Figure 40. Generalized distribution of Willamette National Forest plant associations by elevation (Elevation in feet X 100).

overlapped the 3500 foot elevation, but in general the Douglas fir, Grand fir and Western hemlock series occur below that line and the Pacific Silver fir series lies above it. The generally small, non-forested areas are found at all elevations. Local variations in moisture and temperature account for "misplaced" communities of lower elevation Pacific Silver fir and higher elevation Douglas fir, Grand fir and Western hemlock.

The fact that both sites and plant communities are bimodally distributed above and below the 3500 foot elevation, in conjunction with the fact that ground stone sites occur almost exclusively at the lower elevations indicates that plant food processing was restricted to the lower elevations by environmental factors.

In order to more clearly understand the settlement distribution, the specific relationship between particular plant communities and site location was explored. Over 3000 botanical test plots have been described for the Willamette National Forest. While these have been very specifically described, those data have not yet been generalized in the form of plant association maps. Therefore the entire 123 archaeological sites in the area could not be placed within specific plant communities. In lieu of this, the locations of the 123 sites were examined, and 46 were found to be less than a mile from 56 botanical test plots.

The 3000 plant plots located all over the Willamette National Forest have been grouped into 63 plant communities, including five in the Douglas fir series, three in the Grand fir series, 19 in the Pacific Silver fir series, 17 in the Western hemlock series and 19 non-forested communities.

These plant communities (Hemstrom, Logan, and Pavlat 1981) were cross tabulated with an ethnobotanical list for Western Washington (Gunther 1945) and with a shorter more general ethnobotanical listing for the Pacific Northwest

(French 1966). For this initial work, only food plants were used, as major logistical moves are assumed to have been in response to changing food resource locations, while other resources were gathered on a task specific basis. Between the two ethnobotanical lists, 57 plants are noted as having been used for food. The two purely botanical upland plant association studies included 36 of these plants (Table 17). In the final correlation, only 17 of these food plants were found to be located in the plant communities found near the 46 sites; however, these 17 plants include the resources which are considered to have been plentiful enough to have been staples. These staples would have been the ones actually responsible for the major site shifts.

Several problems are immediately apparent in this study. Obviously the botanists did not directly attend to paleoethnobotanical interests, and so certain important plants are not included in those studies. These include the native grasses (most of which have been replaced by introduced species) and important compositae, such as tarweed (Madia spp.). If plants were present in even a moderate frequency they were recorded; however, another problem, recognized by the botanists, is seasonality. Certain plants may have gone unnoticed by the botanists because they were not yet, or no longer prominent. Even with these reservations, the present work is thought to be sufficient to aid the interpretation of the relationship of

Table 17. Food Plants* in the Upper Middle Fork Willamette Valley (Gunther 1945; French 1966)

SCIENTIFIC NAME	COMMON NAME
Allium spp.	Wild Onion
Amelanchier alnifolia	Western Serviceberry
Athyrium felix-femina	Lady Fern
Arctostaphylos uva-ursi	Kinnikinic (bear berry)
Berberis spp.	Oregon Grape
Brodiaea spp.	Lily
Calochortus macrocarpus	Cat's Ear
Camassia spp.	Camas
Castanopsis chrysophylla	Chinquapin
Claytonia lanceolata	Springbeauty
Dryopteris spp.	Fern
Equisetum arvense	Horse Tail
Erythronium spp.	Fawn Lily
Frageria spp.	Wild Strawberry
Gaultheria shallon	Salal
Heracleum lanatum	Cow Parsnip
Lewisia spp.	Bitter Root (related)
Lilium spp.	Lily
Lilium columbrianum	Columbia Lily
Lomatium spp.	Cous (related)
Lysichitum americanum	Skunk Cabbage
Oemleria cerasiformis	Indian plum
Oxalis oregana	Oregon Oxolis
Perideridia spp.	Wild Carawa
Polystichum munitum	Sword Fern
Potentilla pacifica	Silverweed
Pteridium aquilinium	Bracken Fern
Quercus garryana	Oregon White Oak
Ribes spp.	Currants; Gooseberries
Rosa spp.	Wild Rose
Rubus spp.	Wild Black- Raspberries
Rumex spp.	Sorrel and Dock
Sambucus racemosa	Red Elderberry
Symphoricarpos spp.	Snowberry
Tolmiea menziesii	Youth-On-Age
Vaccinium spp.	Huckleberries

* - These 17 plants were found on both botanical and northwest ethnobotanical lists.

site location and plant community (Table 18). The present study should be seen as an opening gambit, and it is hoped that in the future a more sophisticated field research program will be undertaken. Certain plants, such as Lewisia rediviva, were not mentioned in either of the Cascade plant community studies, but plants in the same genus are a possible local variety.

Sugar pine and Ponderosa pine were no doubt collected. The two species being relatively numerous in the area, they were probably staple foods. The other conifers produce such small seeds on such irregular schedules as to be unsuitable as a staple. The average mature Douglas fir produces a yearly average of about 1000 cones, altogether containing one pound of seeds. One year in seven is an excellent year when two to three pounds per tree might be produced, but the cycle is unpredictable (Allen and Owens 1972:129-133). In comparison, a Washo couple are reported to have gathered about one and a half gunny sacks of Pinon pine nuts in a day (Downs 1966:25). It seems that the expenditure of energy needed to collect Douglas fir and probably all the other non-pine conifer seeds would greatly outweigh any returns. Clearly the majority of conifers in the Upper Middle Fork can be ignored as staple food sources. Table 18 contains the list of ethnobotanically important plants present on the Willamette National Forest, as found by cross-referencing the botanical lists of Hickman (1973) and Hemstrom, Logan and Pavlatt (1985).

Forty-six sites were found to be within a mile (an arbitrary distance) of a plant test plot. Sixteen

Table 18. Plant Communities Associated with Sites*

Number	Series	Plant Communities	Notes
1	Douglas	D.fir/Ocean Spray-Grass	Hot,Dry
2	Fir	D.fir/Ocean Spray-D.Ore.Grape	Pine common
3 **		D.fir/Ocean Spray-Whipple	< 2500 feet
4		D.fir/Dwarf Oregon Grape	
5		D.fir/Salal	
			Warm,
6	Western	W.H./Rhododendron-Salal	Moist,shrubby
7	Hemlock	W.H./Rhododendron-D.Ore.Grape	Pine not common
8		W.H./Rhododendron/Twinflower	< 3500 feet
9	Grand Fir	Grand fir/D.Ore.Grape	Moderately dry
10	Western	W.H./Salal	shrub dominated
11	Hemlock	W.H./D.Ore.Grape	
12		W.H./D.Ore.Grape-Salal	
13		W.H./TwinFlower	---Shaded
14		W.H./Vanilla leaf	---Herb rich
15		W.H./D.Ore.Grape/Ore.Oxalis	---Moist
16	Pacific	P.S.F./Coolwort foamflower	> 3500 feet
17	Silver	P.S.F./Big Huckleberry/Beargrass	Cool,herbs
18	Fir	P.S.F./Rododendron/Twinflower	huckleberries
19	Grand Fir	Grand Fir/Prince's Pine	deep winter snow
20	Non-	Wet Meadow - Low Elevation	
21	Forested	Dry Meadow - Low Elevation	
22		Wet Meadow - High Elevation	
23		Dry Meadow - High Elevation	

* - Grouped by elevation
**- Numbered to relate to Table 20.

archaeological sites were near five Douglas fir communities, 21 sites were near nine Western hemlock and two associated Grand fir communities, 11 sites were near three Pacific Silver fir communities, and six archaeological sites were near four non-forested communities. That is, the 46 sites were located near 23 of the 63 defined plant communities. Of those 46 sites, eight were near communities of two different series.

Table 19. Sites Associated with Plant Communities*

Plant Community Series*				
Douglas Fir	Western Hemlock	Pac.Silver Fir	Non-Forested	Notes
39**	-	-	-	Horse Pasture Cave
295	295	-	-	Lithic Scatter
-	296	296	-	Lithic Scatter
297	297	-	-	Lithic Scatter
-	-	298	-	Lithic Scatter
-	426	-	-	Lithic Scatter
-	427	-	-	Lithic Scatter
428	-	-	-	Lithic Scatter
-	436	-	-	Lithic Scatter
-	-	489	-	Rock Cairns
-	490	-	-	Lithic Scatter
492	-	-	-	Lithic Scatter
-	-	493	-	Ground Stone
-	-	494	-	Lithic Scatter
-	495	-	-	Lithic Scatter
-	-	496	-	Lithic Scatter
-	-	498	-	Lithic Scatter
-	-	499	-	Lithic Scatter
-	-	500	-	Lithic Scatter
-	-	501	-	Lithic Scatter
528	-	-	-	Cambium Peeled Trees
529	-	-	-	The Saddle Site
-	530	-	530	Lithic Scatter
-	-	-	532	Lithic Scatter
533	-	-	-	Lithic Scatter
534	-	-	-	Lithic Scatter
535	-	-	-	Rock Cairns
537	-	-	-	Rock Cairns
-	562	-	-	Lithic Scatter
569	569	-	-	Rock Shelter
-	584	-	-	Lithic Scatter
-	-	-	591	Rock Cairns
-	-	-	594	Lithic Scatter
-	595	-	-	Lithic Scatter
599	-	-	-	The Colt Site
-	600	-	-	Ground Stone
-	601	-	-	Rock Cairns
-	602	-	-	Lithic Scatter
-	-	-	604	Rock Cairns
-	605	-	-	Lithic Scatter
-	607	-	-	Rock Cairns
613	-	-	-	Rock Cairns
623	623	-	-	Ground Stone
-	631	631	-	Lithic Scatter
648	648	-	-	Lithic Scatter
-	-	-	656	Dead Horse Rock Shelter

* - See Table 18 For Descriptions of Plant Communities.
** - Site numbers, as in 35LA39 or 35LA656

Five archaeological sites were located near Douglas fir and Western hemlock communities, between Western hemlock and Pacific Silver fir communities, and one on the edge of a non-forested plant community within the Western hemlock series.

Table 20 contains a listing of those plant and animal resources associated with the 23 plant communities located near the 46 sites.

Sixteen of the 46 archaeological sites were located on or near plant communities on hot, south facing slopes below 2500 feet. These are the locations of the major Oak, Ponderosa and Sugar pine stands, as well as the largest camas fields. Hazelnuts and sword ferns, potentially very important staples, are also located in these areas. The driest of the present-day Douglas fir communities would have been Oak savanna when the area was being burned regularly. The five plant communities of the Douglas fir series also represent heavily used deer and elk winter range.

Twenty-one of the 46 sites were located near seven plant communities in the generally cooler and moister Western Hemlock series. Included in these is a Grand fir community. These seven communities do not immediately seem to offer any plant resources which could be called staples, and with the exception of a single community, were not used directly as winter or summer range by large game. Deer and Elk had to pass through the Western Hemlock zone, however, to get to their summer and winter ranges, and it seems

Table 20. Resources Available in Plant Communities

GENERAL ELEV.	AVAILABLE RESOURCES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
L	Wint. Range	X	X	X	X	X						X								
O	Oak (acorns)		X																	
W	Strawberr's	X		X																
	Pond. Pine	X	X	X	X	X														
	Sugar Pine	X	X	X	X	X	X	X												
	Hazelnuts	X	X	X	X	X				X	X									
	Rose	X	X	X	X	X				X	X	X					X			
	Sword Fern	X	X	X	X	X	X	X		X	X	X	X	X		X				
	D. Or. Grape	X	X	X	X	X	X	X	X			X	X			X	X	X	X	
	T. Or. Grape	X	X							X	X			X	X					X
	Blackberries			X			X	X	X			X	X	X			X			
	Salal					X	X	X	X		X	X	X			X				
	Red Huckbrs						X	X	X			X	X	X			X	X		
	Bracken					X					X									
	Oxalis														X	X				
H	Blue Huckbrs														X		X	X	X	
I	Bunchberries								X								X	X	X	
G	Chinquipin							X										X		
H	Summer Range																X	X	X	

PLANT COMMUNITIES*

* See Table 18 for definitions of plant communities

likely that the game trails were exploited as hunting areas.

Plant resources of these seven communities include blackberries (Rubus spp.) which are more common there, as are Salal, Red Huckleberries and Bracken. There is little doubt these plants would have been the specific goal of collecting parties. It also seems likely that many of the sites associated with the Western hemlock and Grand fir series are camps associated with travel between the more productive lowlands and uplands. The low number of economic plants in this zone also suggests that some sites are probably associated with non-food oriented tasks. The limited information available on site size and artifact variety in these areas makes further assessment difficult, but personal communication with forest archaeologists suggests that the sites are mostly small and likely to have been hunting camps. It is also important to remember that prairie burning extended up the small drainages to an unknown extent, so that these sites may have been associated with a forest edge which no longer exists.

Eleven sites are near five plant communities of the Pacific Silver fir zone. Those sites are associated most clearly with three resources: blue huckleberries, bunchberries and the summer deer and elk range.

Six sites are associated with non-forested environments: one with the low elevation Douglas fir communities, two with the Western hemlock groups and three with the Pacific Silver fir zone. These openings contain such resources as huckleberries, blackberries and strawberries, and game are often drawn to these by the springs and marshes that offer water, an especially important factor for upland game distribution.

Discussion

The 123 archaeological sites presently known in the Upper Middle Fork area follow a bimodal elevational distribution with peaks at about 2000 and 5500 feet and a break at about 3500 feet. Further examination showed that 11 of the 12 sites with ground stone implements are found at the lower elevations. The association of ground stone implements with plant food processing suggested a clear cut relationship between certain subsistence activities and site location which might be ascertained by examination of the plant communities in which the sites are found. Some support for this hypothesis was given by the even distribution of 13 non-subsistence related rock cairn sites; sites not related to food production were not distributed according to economically important environmental zonation.

In order to understand where specific plant resources were located, two Pacific Northwest ethnobotanical lists prepared by anthropologists were cross-tabulated with two plant community lists collected in the Willamette National Forest by botanists. This exercise resulted in a list of aboriginal plant food resources known to be in the area. The botanical work is based on 3000 plant plots and has yet to be generalized into a map of plant communities. Given this situation, only 46 of the archaeological site locations could be assessed for their association with locally available plants.

This assessment clearly showed that most major aboriginal plant food resources were located in the lowlands, as were the majority of sites with ground stone artifacts. The forest botanical data also suggested that the lowland areas where sites were located were also the major winter ranges for deer and elk. Very few plant resources were located in the zone between the uplands and lowlands, however, a number of sites exist in these intervening areas. It was suggested that these sites were short duration task specific sites connected with blackberry picking, travel between uplands and lowlands, and probably hunting of deer and elk which passed along trails in their seasonal transhumance.

The uplands are characterized as the location of huckleberries, bunchberries and the deer and elk summer range. The examination highlighted the fact that the distance from lowlands to the uplands was short. It seems likely that the uplands were not the location of summer base camps, but instead were exploited by many mid- to late summer hunting/berrying excursions. It is probable that the manifold activities of a summer base camp would be better supplied by the large lowland resource base. Probably berry picking and drying, and hunting, butchering and perhaps meat drying would have been relatively full time upland occupations. The apparent lack of upland ground stone supports the thesis that full base camps did not occur in the uplands.

The present biotic study, even though using only available, statistically unrepresentative data, clearly supports the ethnographically derived settlement-subsistence model. The potential of this technique for clearly defining catchment areas and helping to interpret settlement-subsistence patterns is also clear. It remains for the future to develop a field study program to test the hypotheses generated by this study.

In order to assess the settlement-subsistence pattern proposed here, upland sites must be investigated. While the present interpretation seems reasonable, it is not based on hard archaeological data. The apparent lack of upland ground stone needs to be confirmed. In the lowlands, winter villages must be located. While this study has suggested that the southern Upper Middle Fork is a likely place for them, no house pits were discovered at any of the sites excavated for this study. Pithouse villages are known in the Umpqua Valley to the south, and it may be that the Upper Middle Fork band retreated to that basin for the winter. Work in both areas is needed to confirm or deny this possibility.

The wide variety of tools and the lack of pithouses suggested that some components were summer base camps. Winter villages and summer base camps were probably located in the same general area. The Klamath are ethnographically known to have dismantled their earth lodges in the spring and moved into portable summer dwellings located as needed near available resources (Stern 1966:11). Even though the winter and summer sites were often near one another, they were situated for differing reasons.

Open summer base camp locations were chosen for proximity to spring, summer and fall resources, such as camas and lilies, sword fern roots, oak, hazel, and pine nuts, grass and other seeds.

The winter village was permanently located and was more subject to other types of needs. The southern Upper Middle Fork offered superior winter climate due to a rain shadow cast by the Calapooya Mountains. This dryness and southern aspect resulted in a locally unique warm area which is still a preferred deer and elk winter range. Proximity of the winter village to the herds of deer and elk meant a supply of meat, and the nearby summer resource areas afforded the additional benefit of allowing year around plant collecting to supplement their winter diet of stored food.

CHAPTER EIGHT

SUMMARY, CONCLUSIONS AND FUTURE DIRECTIONS

This study has been directed towards describing the assemblages from four archaeological sites in the Upper Middle Fork of the Willamette River. Those assemblages have been used to define a local cultural sequence for the area, as well as an initial local site typology. Locations of 123 sites were compared to the distribution of local plant communities, which had been characterized using ethnobotanical data, so as to begin to understand the Upper Middle Fork settlement-subsistence pattern. This chapter presents a summary of those analyses and suggests the directions which future studies might fruitfully take.

The Ethnographic Model

This study of the prehistory of the Upper Middle Fork of the Willamette River was based on archaeological collections from four sites. Recently (Connolly 1983), a lifeway specifically adapted to the interior valley environment has been theorized. That lifeway was dependent on a focused exploitation of certain of the plentiful plant and animal resources. Based on the concept of an interior valley adaptation, ethnographic and ethnohistoric data were used to help build a settlement-subsistence model of human occupation in the area. The Molala and nearby Kalapuya were the main source of this information, but interior valley groups in California also provided data. While the environments of the main stem Willamette Valley and the Upper Middle Fork are different, the difference is one of degree not kind. The Upper Middle Fork had more limited and scattered plant resources, but big game were undoubtedly at least as plentiful as in the main stem Willamette Valley. Evidence of the historic use of prairie burning and similar ground stone artifacts in both areas bolster the available ethnohistoric information to strongly suggest that the cultural adaptations in both areas were quite similar.

That the environmental adaptations are thought to be about the same does not, however, mean that similar social or cultural lifeways were extant. The scattered resources of the uplands could not support large population clusters, and so led to an emphasis on the smallest social unit, the nuclear family, rather than, as in the valley proper, the village. The cultural elaborations resulting from this variance in the level of social integration were no doubt numerous and are of major importance to cultural interpretations, but that does not mean that the basic seasonal round in the relatively similar environments was fundamentally different. The basic adaptation to interior valleys was essentially the same everywhere.

Six months of the year the Upper Middle Fork groups were at least partly dependent on stored foods. Even during the winter, however, the relatively mild climate and proximity of the village to the winter range of the deer and elk herds would have promoted large game hunting. In the spring, the nuclear families moved into open camps, and began to exploit the botanical resources of the scattered prairies. The summer base camp was a locus for hunting, gathering and other excursions which occupied the family throughout the summer and fall.

Hunting was probably a major focus of the group. The slow upward migration of deer and elk on well known routes probably centered the hunting activities. In the mid- to late summer, task specific excursions included upland forays to the large game summer range and highland fields of ripening huckleberries. In the fall the lowland hazelnut, acorn and seed harvesting was done.

Three functional site types originally suggested for the Willamette Valley (Minor and Toepel 1981: 147) seem appropriate for the Upper Middle Fork settlement-subsistence model. These are:

1) Annually reinhabited Lowland, multi-family winter villages, which were the locus of many activities archaeologically recorded as diverse artifact, faunal, and floral assemblages. These sites were located for access to large game winter range.

2) Spring through summer base camps, also located in the lowlands, were near the dispersed plant resource base and were occupied for varying

lengths of time. These were the locus of multiple activities - particularly, food procurement, processing and storage - which required a large variety of tools.

3) Single purpose, short term task specific sites which focused on the exploitation of specific resources or carrying out of specific tasks, were located throughout the Upper Middle Fork. As the large game moved upward in its seasonal migration, task specific sites were located at ascending elevations as needed, until, in the mid- to late summer, excursions to the upland huckleberry fields and summer big game range produced task specific sites. These are characterized by a very limited variety of tools. Many such sites required only perishable tools and so left no traces.

This study has confirmed many aspects of the upland lifeway suggested for the Molala by the limited ethnographic data, and in turn has raised many questions. The Molala, and those before them, had a distinct upland tradition, based on lower elevation resources, with the higher elevations used for only short periods of the year. The potential to expand our understanding of that tradition, to answer questions, such as those concerning the winter villages, outside contacts and migrations, lies in further archaeological reasearch.

The Cultural Chronology

Four sites were excavated in the Upper Middle Fork of the Willamette River. Debitage distribution at these sites enabled the division of the collections into 11 components. The Colt-3 component contained too few projectile points for separate analysis and was combined with the Colt-2 component. The two Saddle site components were also combined, so that only nine components were used in this analysis. These components were confirmed by stylistic comparison of artifacts and radiocarbon dating. Based on projectile point styles and radiocarbon dates the nine components were used to define a local chronology which consists of three phases. In addition a fourth phase was defined on the basis of a pre-Mazama component at nearby Baby Rock shelter. While that excavation did little more than confirm an early local occupation, other pre-Mazama materials 20 mile (32 km) to the east and 12 miles (19.2 km) to the south were used to define the phase.

The local sequence begins with the Oakridge Phase which is characterized by a predominance of foliate points. Based on dates from other areas it lasted from 8000 to 6000 years ago. This is replaced by the Staley Phase which is characterized by broad necked projectile points. While the earliest radiocarbon date available from the Upper Middle Fork is 500 bc, dates from other areas confirm the introduction of broad necked, stemmed and notched points by about 4000 BC. In the Upper Middle Fork, the Staley Phase is long lived, lasting until ad 1400, when an influx of small narrow necked points marks the beginning of the Colt Phase. The beginning of the historic Horse Pasture Phase is marked by a predominance of small side notched points and Euro-American materials, about ad 1800.

It is clear the Upper Middle Fork local sequence is not complete. No local information is available concerning the earliest occupations of the area. The Oakridge Phase confirms an antiquity of at least 7000 years, but Paleo Indian projectile points found in the Willamette Valley (Allely 1975; Minor 1985) indicate a possibily earlier human presence.

The very late transition to the Colt Phase must also be further investigated. The tenure of broad necked dominated projectile point assemblages in the Upper Middle Fork is perhaps 1000 years longer than that estimated for the Willamette Valley and Southwestern, Oregon (Minor and Toepel 1981; Mack 1983). The data marshalled to support this late occurrence in the Upper Middle Fork are substantial.

Connolly's (1986) tri-cultural tradition model fits the Upper Middle Fork data well, but more information needs to be gathered to the south before it can be completely accepted. It remains an intriguing and worthy hypothesis for future testing.

An equally important area for future research is marked by the abrupt influx of narrow necked points into the Upper Middle Fork and an accompanying change in the settlement subsistence pattern (see below) at the beginning of the fifteenth century. Available survey data suggest that such points are essentially limited to the Willamette River drainage and are not common to the north. The ad 1400 appearance of this new style of projectile point with a distribution limited to the Upper Willamette basin has implications for our present understanding of tribal distributions in the Oregon Cascades.

Given the apparently fairly low level of linguistic diversity between the Molala bands, which inhabited the Cascades in ethnohistoric times--a dialect split of less than 1000 years--it seems likely that the Molala incursion into the Upper Middle Fork area corresponds to the change marking the begining of the Colt Phase. Berreman's maps (1937) (Figure 4, Chapter One) show a Molala as originally residing in the Deschutes river drainage. An hypothesized late 18th century Paiute incursion into the Deschutes valley split the tribe and forced the two bands into the Mountains. Although the eighteenth century date is apparently too late in terms of the archaeological evidence, Berreman's map places the Southern Molala band in the Umpqua basin just to the south of the Upper Middle Fork study area. The presently accepted Molala range (Beckham 1976) (Figure 3, Chapter 1) is the entire Oregon Cascades from Mount Hood to Crater Lake.

The archaeological data from the Upper Middle Fork suggests that the Molala movement into the Cascades corresponds to the sudden and overwhelming appearance in ad 1400 of a distinct projectile point style. That distinctive projectile point style is not well represented in the McKenzie and Santiam drainages to the north, but does exist in the Umpqua basin to the south. The archaeological data, therefore, appear to support Berreman's Molala distribution. While Berreman's distribution may better represent pre-contact conditions, during the historic period native peoples were often forced out of their traditional homelands and the wider pan-Oregon Cascades distribtion is suggestive of that period.

Finally, the appearance of large numbers of distinctive small side notched points in the Upper Middle Fork during the historic period needs further investigation. The fact that this style is not common in the Willamette Valley, and that historic accounts chronicle Molala-Klamath presence in the Upper Middle Fork, again directs the attention of researchers towards the south.

Unfortunately, little work has been conducted in the uplands which can be directly compared to the Upper Middle Fork collections. A problem not addressed in the above discussion is the relationship of the Deschutes River Valley, very possibly the ancestral home of the Molala, to the Upper Middle Fork area. Ethnographic data shows that the uplands were also used annually by the Tenino, Paiute and Klamath. Until further work is done in the Deschutes River area, it will remain difficult to assess the ethnicity of upland cultural manifestations. The common archaeological problem of distinguishing contemporaneity among sites is further complicated by the need to distinguish ethnicity. The nature of Tenino, Paiute, Klamath and perhaps Molala sites may be more easily distinguished in their native lands, the Deschutes River and Klamath areas, than in the Cascades.

The Functional Analysis

The components of the four Upper Middle Fork sites were functionally analyzed and interpreted as being summer base camps and task specific sites. That the components showed variation in the types of activities represented by their artifact assemblages supports the basic site typology of the ethnographic model. Future work needs to focus on locating and excavating winter villages as predicted by the model, as well as further defining the functions of the many and varied task specific sites, with some emphasis on the upland sites where no work has yet been done. It should be noted that pithouse villages are known in the North Umpqua basin and these may prove related to the Upper Middle Fork settlement system, at least during the Colt and Horse Pasture phases.

As noted above, a further finding of the functional analysis was that the activities carried out at Rigdon's Horse Pasture Cave and Vine Rockshelter changed between the Staley and Colt Phases. Thus the phase change, marked by a sudden flood of small narrow necked points, is also marked by a change in the function of some sites. If the Upper Middle Fork was inhabited by the same peoples throughout the Baby Rock and Staley phases, it seems quite likely that their highly adapted land use pattern would not be entirely echoed by new inhabitants. This change can be added to the evidence which suggests that a new group moved into the area at the begining of the Colt phase.

Future work needs to attend to this apparent land use disparity. Further, if Connolly's model is correct, the earlier assemblages, dominated by broad necked points, may not have been replaced in the entire Upper Middle Fork. Dating of assemblages is essential, and the apparent use of local obsidian suggests the development of a local obsidian hydration rate may well be possible. An initial study (Origer and Hughes 1986) performed on samples from the Colt and Saddle sites suggests that the potential for development of a locally usable obsidian hydration rate is fairly good, and given the limited amount of charcoal recovered from these sites, it may prove a necessity in order to date open upland sites.

Cultural Adaptation in the Upper Middle Fork

Using ethnobotanical lists for the Pacific Northwest and presently available plant community studies from the Willamette National Forest, the presence and seasonal availability of botanical resources were assessed for the

Upper Middle Fork. It is clear that the Upper Middle Fork was an environment rich in economically valuable botanical resources. The resources were distributed bimodally with respect to elevation, with most resources located in the lowlands. Other than large game, which were subject to a seasonal transhumance, all ethnographically described staples were lowland resources. Upland hunting and berry picking were part of the seasonal round, but the proximity of the upper elevations to the lowlands (less than 10 km distance), and the logistics of transporting large amounts of stored foods to the lowlands, suggests these excursions were common, but short term and task specific.

Examination of site distribution in the Upper Middle Fork shows that sites are also distributed bimodally, with the peak frequencies at 2000 and 5500 feet in elevation. Further, sites with ground stone are almost exclusively associated with the lowlands. Comparison of the plant communities associated with the sites show that the lowland sites are associated with plant communities which include those resources considered staples. In addition, the lowland locations were found to be in an area of mild winter climate which is also the major winter range of the local deer and elk herds. The upland sites were associated with just two resources: the large game summer range and the blue huckleberry fields. Sites between the upland and lowland areas were not associated with summer or winter game range, or any great number of botanical resources. It was suggested that they may well be task specific sites associated with such activities as travel, hunting and blackberry harvesting. It is likely that game migration routes from the lowlands to the uplands attracted early summer and late fall hunting parties.

At the regional level it seems that the aboriginal occupation of the Oregon Cascades can be directly related to environmental variation. The coincidence of the unique hot dry "southern climate" of the Upper Middle Fork of the Willamette with its Ponderosa and Sugar pine stands and the presence there of Colt Phase narrow necked points, reminiscent of Connolly's (1986) Siskiyou Pattern, cannot be ignored. This is especially evident since the McKenzie River not only marks the southern boundary of the cooler, wetter environment common in the northern Oregon Cascades, but also appears to be the northern extent of Colt Phase materials. The foliate and broad neck points which are common in that area may well be the remains left by Staley Phase peoples who continued their ancient Glade tradition (Connolly 1986) in that colder and wetter portion of the Cascades. Since Colt phase peoples are thought to be the Molala, the areas ascribed to the Northern and Santiam bands of the Molala need to be investigated. Further survey of the area to bolster the present limited artifact distribution data, and the radiocarbon dating of other assemblages are clearly needed.

Archaeological research in the Western Cascades is even more intriguing than it was before the excavation of the four sites discussed in this study. While a separate upland tradition from that in the Willamette Valley seems no longer to be hypothetical, the possibility of an ancient tradition displaced by a later intrusion leaves much to be investigated.

APPENDIX

ARTIFACT CLASSIFICATION

The stone artifacts recovered from the Upper Middle Fork of the Willamette River were divisible into three major categories including: the Chipped Stone Industry, the Heavy Tool Industry, Ground Stone Industry.

The Chipped Stone Industry

Projectile Points:

The Unnotched Series:

Type 1: Unnotched foliate points

Type 2: Unnotched, triangular with straight to concave base

Type 3: Unnotched, triangular with convex base

Narrow Necked Series:

Type 4: Corner to basal notched with contracting stem and often assymetrical barbs which reach to, or past, the base.

Type 5: Corner notched, expanding to straight stem with pointed or square barbs.

Type 6: Corner to basal notched, straight stem, pointed barbs.

Broad Necked Series:

Type 7: Corner notched, expanding stem, concave base, with pointed tangs.

Type 8: Contracting stem, sloping to straight shoulders

Type 9: Straight stem, straight shoulders to slight barbs, straight base

Type 10: Stemmed lanceolates

Type 11: Corner notched, convex to straight base, barbed, sometimes serrated

Type 12: Corner notched, pronounced expanding stems, straight shoulders, straight to convex base

Type 13: Large side notched points, straight to concave base.

Type 14: Small triangular side notched points, straight to concave bases, some with central basal notch which form distinctive tangs

Type 15: Small side notched points, short and broad with a straight to convex base

The four sites have all been reported previously, and this study represents a synthesis of much of that work. Each individual report attempted to refine the techniques and analyses used during the previous studies, but since the assemblages were not exactly similar, typologies, especially for the projectile points, varied somewhat. Accordingly, this study developed an encompassing typology. The following table groups the old types under the new numbers. The old reports were for Rigdon's Horse Pasture Cave (Baxter et al. 1983), Vine Rockshelter (Baxter and Connolly 1985) and the Colt and Saddle Sites (Baxter 1986).

Table 21. Conversion of Previous Types to Those of the Present Study.

This Study Type	Horse Pasture Type	Vine Type	Colt Type	Saddle Type
1	-	1	1	1
2	2	-	2	-
3	9	-	3	-
4	-	-	4	-
5	3,4,5,6,7,10	9,10	5,6	5,6
6	8	-	7	-
7	15	6	-	-
8	12,14	2	8	8
9	-	3	9	9
10	21	-	10	10
11	13	7	11	11
12	11,20	4	12	-
13	17,19,22	-	14	14
14	1	8	13	-
15	18	5	-	-

Unifaces:

Type 1: straight edges
2: disc-shaped with unifacial flaking around the periphery
3: convex edge on the end of elongate flakes, with proximal end of the flake sometimes altered, presumably for hafting
4: sharp projection suitable for graving or scoring
5: roughly flaked purposefully forming a rough denticulated edge
6: concave edges

Bifaces:

Bifacially worked pieces, often larger than projectile points; some are finished tools, others are bifacially retouched flakes

Drills/Perforators:

Generally round to diamond shaped in cross section; these can be finished tools or flakes, usually bifacially retouched so as to provide a bit for puncturing

Utilized Flakes:

Unshaped flakes, altered only through use in various cutting and scraping tasks

Cores:

Irregular chunks or nodules of lithic material from which flakes have been removed. The cores recovered from the Upper Middle Fork area are not prepared, but are reduced by random flake removal.

Heavy Tool Industry

Hammerstones:

Cobbles exhibiting battering scars on one or more protruding surface

Anvils:

Cobbles, usually flat exhibiting batter scars on one or more flat surface

Choppers:

Cobbles exhibiting either a unifacial or bifacial cutting edge due to the removal of flakes and usually no other alteration to the cobble

Ground Stone Industry

Grinding Slabs:

Flat basalt cobbles or slabs with flat surface, roughened by pecking, and often exhibiting a smoothed surface from use

Handstones:

Hand-held grinding stones with one or more flattened surfaces showing use wear from grinding on a grinding slab

Mortars:

Large cobbles, shaped into a bowl by pecking and smoothing inside and out, with a flattened base and a tapered rim

Pestles:

Cylindrical cobbles with a smoothed end used to grind materials in a mortar

Edge-Ground or Battered Cobbles:

Cobbles exhibiting a faceted edge often smoothed through grinding or left roughened by battering. The facet edges are 90 degrees to the other cobble surfaces, forming a flattened, not rounded, edge

Abrader:

This single, flat specimen of pumice is flattened on one edge and concave on the opposite edge.

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