LATE ARCHAIC VARIABILITY AND CHANGE ON THE SOUTHERN COLUMBIA PLATEAU: ARCHAEOLOGICAL INVESTIGATIONS IN THE PINE CREEK DRAINAGE OF THE MIDDLE JOHN DAY RIVER, WHEELER COUNTY, OREGON

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A DISSERTATION

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Title: LATE ARCHAIC VARIABILITY AND CHANGE ON THE SOUTHERN COLUMBIA PLATEAU: ARCHAEOLOGICAL INVESTIGATIONS IN THE PINE CREEK DRAINAGE OF THE MIDDLE JOHN DAY RIVER, WHEELER COUNTY, OREGON

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A major concern of Columbia Plateau archaeology has been the development of the ethnographic "Plateau pattern." Observed during historic times, this lifeway focused on permanent riverine winter villages and intensive use of anadromous fish, with ephemeral use of interior tributaries and uplands for hunting and root gathering. Constrained by a salvage-driven orientation, past archaeological research on the Plateau has been biased towards major rivers, leaving aboriginal lifeways in the interior to be interpreted on the basis of ethnographic analogy, rather than archaeological evidence.

The present study utilizes museum collections from the Pine Creek basin, a small tributary of the John Day River, to provide information on prehistoric lifeways in a non-riverine Plateau setting. Cultural assemblages and features from two sites, 35WH7 and 35WH14, were described, classified, and analyzed with regard to temporal distribution, spatial and functional patterning, and regional ties. At 35WH14, evidence of semisubterranean pithouses containing a rich and diverse cultural assemblage suggests long-term and repeated residential occupation of this site by about 2600 B.P. This contrasts with the ephemeral use predicted for the area by ethnographic accounts. Faunal remains identified from 35WH7 and 35WH14 show a persistent emphasis on deer, and little evidence for use of fish; this non-riverine economic base represents a further departure from the ethnographic "Plateau pattern."

At both 35WH14 and 35WH7, large pithouses are not evident in components dating after 900 B.P., reflecting a shift to shorter sojourns at these sites. Use of the Study Area as a whole persists, however, and is marked by a proliferation of radiocarbon-dated occupations between 630 and 300 B.P.

Clustering of radiocarbon dates from ten sites in the Study Area shows correlations with regional environmental changes. Both taphonomic and cultural factors are discussed. Reduced human use of the area after 300 B.P. is reflected in an abrupt decline in radiocarbon-dated occupations and the near-absence of Euroamerican trade goods. The role of precontact introduced epidemics is considered.

Further consideration of spatial and temporal variability in Late Archaic Plateau prehistory is urged.

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1980 Natural Setting. In A Cultural Resource Overview of the BLM Coleville, Bodie, Benton, and Owens Valley Planning Units, California, by C.I. Busby, J.M. Findlay, and J.C. Bard, pp. 3-36. Cultural Resources Publications, Anthropology-History. Bureau of Land Management, Bakersfield.

1981 Natural Setting. In A Cultural Resources Overview of the Carson and Humboldt Sinks, Nevada, by J.C. Bard, C.I. Busby, and J.M. Findlay, pp. 3-12. Cultural Resource Series No. 2. Bureau of Land Management, Carson City.

1985 35 GM 22: Culture Contact on the John Day River. Unpublished Master's paper, Department of Anthropology, University of Oregon, Eugene.

1987 Review of: Pottery of the Great Basin and Adjacent Areas, edited by S. Griset (1986). Utah Professional Arch. Council News: 5(1):10-11.

1989 Of Pots, Pipes, and People: Prehistoric Ceramics of Oregon. In Contributions to the Archaeology of Oregon, 1986-1987, edited by Rick Minor, pp. 157-177. Occasional Papers 4. Association of Oregon Archaeologists, Eugene.

1991a "Vast many canoes full of Indians... were constantly along side"--Chinookans of the Lower Columbia. Article on file, Columbia River Bicentennial Commission, Oregon Historical Center, Portland, Oregon.

1991b "In traffic they are keen, acute, and intelligent..."--Chinookans in the maritime fur trade. Article on file, Columbia River Bicentennial Commission, Oregon Historical Center, Portland, Oregon.

1991c Current Investigations in the Pine Creek Basin, North-Central Oregon. Current Archaeological Happenings in Oregon 16(1):4-8.

1992 Canyons and Crests: An Archaeological Survey of the Pine Creek Basin, North-Central Oregon. Oregon State Museum of Anthropology Report 92-2. University of Oregon, Eugene.

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CHAPTER 1

INTRODUCTION

Background

An ongoing problem in reconstructing the adaptive strategies of prehistoric southern Columbia Plateau peoples on the basis of subsistence and settlement patterns has been the reservoir-oriented focus of archaeological research in the region. Investigations have centered on the major river valleys, leaving the uplands to be interpreted on the basis of ethnographic analogy, rather than archaeological evidence. Ethnographic accounts based on informants' memories from the second half of the 19th century show a focus of village life along the Columbia and Snake rivers, with a rather ephemeral seasonal use of interior tributaries and uplands for hunting and the gathering of roots and berries. This pattern is documented during historic times for the John Day Tenino, who occupied the lower watershed of the John Day River, a major southern tributary of the Columbia (Murdock 1958, 1980; Suphan 1974).

The archaeological record, however, suggests a pattern not predicted by current ethnographic interpretations. Of particular relevance is the surface identification of numerous habitation sites along the lower reaches of the John Day (Polk 1976) and Deschutes (Hibbs et al. 1976) rivers. Work in the drainage basin of Pine Creek, an eastern tributary to the John Day River, has similarly revealed some 90 sites representing considerable functional diversity (Atherton and Houck 1976; Endzweig 1992). Together, these findings support the impression of a considerably more intensive prehistoric use of the "hinterlands" than was the case during the historic period. An understanding of the function of sites away from the major river valleys is essential to the treatment of broader processual issues regarding the prehistory of the southern Plateau. It is particularly crucial to the resolution of questions regarding the development of permanent winter villages and intensive use of root crops and anadromous fish.

The Present Study

The Pine Creek drainage basin of north-central Oregon is located in the southwestern portion of the southern Columbia Plateau (Figure 1), at the boundary between the Blue Mountains Province and the Deschutes-Umatilla Plateau (Baldwin 1976). The climate is semi-arid, with hot dry summers and moderately cold wet winters. Biotically, the area spans both Upper Sonoran and Transition life zones, with vegetation characterized by shrub-steppe and steppe communities (Franklin and Dyrness 1973).

From 1968 through 1981, the Oregon Museum of Science and Industry (OMSI), Portland, conducted fieldwork in the Pine Creek basin. During

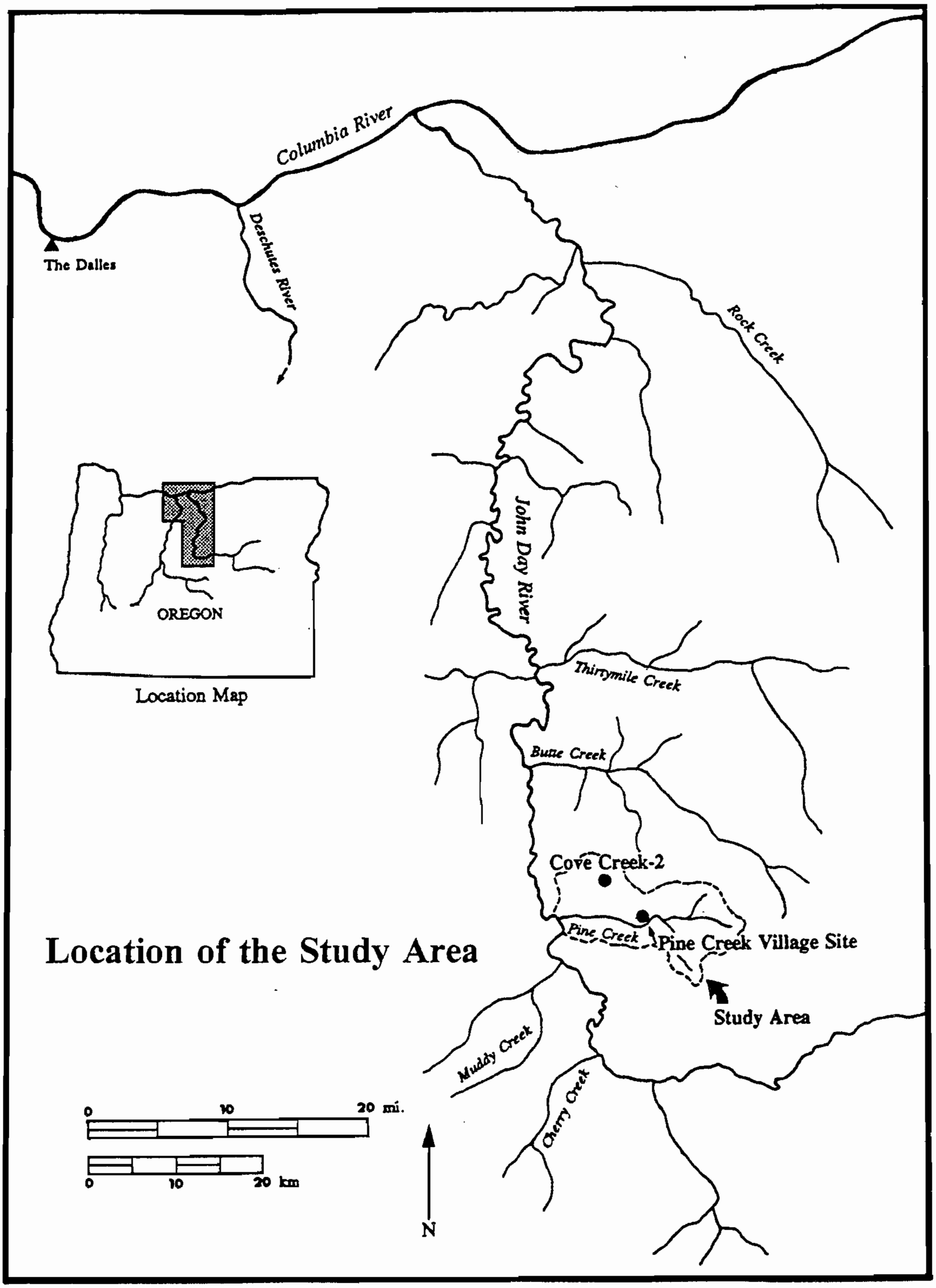


Figure 1. Location of Study Area.

the course of this program, which was run as a field school for high school students, four sites were excavated intensively. In addition, at least 57 sites were recorded, including rockshelters, housepit sites, lithic scatters, talus pits/cremations, quarries, and pictographs (Atherton and Houck 1976). The work undertaken by OMSI has been summarized in a series of unpublished descriptive reports (Gannon 1968, 1970, 1972, 1975, 1978, 1979; Johnson 1972; Atherton and Houck 1976; Knapp 1979; Mazany 1980), but in-depth data analyses and cultural syntheses were never completed. In 1987, the collections from OMSI's investigations were transferred to the Oregon State Museum of Anthropology at the University of Oregon for curation. The potential of the material for further study was evident and a portion of it was selected to become the core of the present dissertation.

The two least thoroughly reported sites excavated by OMSI, 35WH7 and 35WH14, were chosen for analysis. 35WH14, also known as the Pine Creek Village Site, was the only large habitation site recorded in the drainage basin, and had produced the earliest radiocarbon dates on subsurface remains from the OMSI investigations (2450 ± 40 and 2580 ± 40 B.P.). Site 35WH7, also known as Cove Creek 2, appeared to represent a different site type, namely an open site situated against a sheltering cliff. Its earliest subsurface dates overlap with the most recent radiocarbon-dated feature of 35WH14, and occupation continued to late prehistoric times. A cache of dart shafts recovered from a rock crevice overlooking the site is, in addition, broadly contemporaneous with the early occupation at 35WH14, providing an added temporal focus. It was hoped that these two sites would, in combination, provide a relatively continuous picture of Late Archaic occupation in the Pine Creek basin while offering the opportunity to sample two functionally distinct site types.

Preliminary inspection of artifacts from 35WH14 at the commencement of this study revealed a richness and diversity of materials that seemed inconsistent with the type of ephemeral occupation suggested by the ethnographic record, indicating instead the sort of assemblage to be expected from a long-term or permanent residential base, i.e. a winter village. A major objective of this study, was, therefore, the elucidation of site function, subsistence, and seasonality, utilizing information on artifacts and features, as well as faunal and botanical remains. As fieldwork had not been directed specifically towards this end, the results have sometimes been less than satisfactory, and this is discussed in the text where relevant. Chronology is addressed, in particular, in connection with the peculiar clustering of radiocarbon dates in both the Study Area and adjoining regions, and possible correlations with extra-regional cultural developments and environmental change are examined. While cultural affiliation is not a major focus of this study, external relationships are explored through stylistic analysis of certain artifact types, through source identification of "exotic" raw materials such as obsidian and marine shell, and through non-artifactual features such as rock art, which are characterized by ties to broader regional design styles.

A different, and perhaps the most challenging, methodological aspect of the present analysis has been the archaeological study of existing museum collections, which would otherwise, as put by an anonymous National Science Foundation reviewer, "spend the next century gathering dust on the shelves...." The tremendous information potential of such collections has been observed, as has their generally under-utilized and often ignored status (e.g. Cantwell et al. 1981; Miller 1985). Only the continued study of curated collections can justify and necessitate their care and conservation in this age of spiraling curation costs and under-funded museums.

Working with the present material has not always been easy, and a good measure of creativity has often been necessary to reconstruct not only the activities of prehistoric occupants but also those of archaeologists in the field. Some questions could not be addressed, and it is likely that some information has been misread or overlooked. It is the author's belief, however, that the broader conclusions of this study are nonetheless valid.

Organization

The present study is laid out in nine chapters. After the Introduction (Chapter 1), Chapter 2 describes the natural setting of the Study Area. This discussion includes general background on geology and physiography, climate, vegetation, and wildlife. Chapter 3 summarizes the cultural setting. A brief historical outline is followed by a more extensive synthesis of ethnographic information, based on published regional ethnographies, as well as unpublished local material obtained during the course of the present research. Both Sahaptin and Northern Paiute use of the area are discussed, addressing, in particular, questions of settlement, subsistence, and social organization. Chapter 4 presents the archaeological context for the following analyses. Proceeding from the general to the specific, this chapter reviews southern Plateau prehistory, highlighting major regional cultural developments. This broad-brush synthesis is followed by an overview of archaeological research in the John Day River drainage, much of it based on small-scale cultural resource management (CRM) reports of limited distribution. The archaeological background concludes with a summary of previous archaeological investigations in the Pine Creek basin, including excavations undertaken by OMSI, and archaeological surface reconnaissance (the Pine Creek Archaeological Survey) conducted by the author prior to the present study.

Chapters 5 and 6 present, respectively, the major data analyses and interpretation conclusions for excavated sites 35WH7 and 35WH14. Chapter 7 contains results from the x-ray fluorescence analysis of 90 obsidian specimens from the Pine Creek basin and discusses implications for source use over space and time. Chapter 8 compares archaeological and ethnographic records and addresses apparent incongruities between the two, first for the Pine Creek basin, then for the lower John Day and Deschutes rivers. Site assemblages and distributions are related to the available resource base. Building on the previous discussions, Chapter

9 explores the question of Late Archaic spatial and temporal variability across the southern Plateau. The application of a single "Plateau pattern," formulated on the basis of ethnographic accounts, to the Late Archaic of the southern Columbia Plateau, is rejected and the importance of considering local conditions in order to assess the applicability of broad, regional generalizations is underlined.

CHAPTER 2

PHYSICAL SETTING

The Pine Creek drainage of north-central Oregon is located in the southwestern portion of the southern Columbia Plateau, at the boundary between the Blue Mountains and the Deschutes-Umatilla Plateau physiographic provinces (Baldwin 1976). It drains into the John Day River, which, in turn, flows northward to the Columbia River. As recently described,

> The Deschutes-Umatilla Plateau Province is a broad upland plain formed by floods of molten basalt overlain with wind-deposited loess. In contrast, the Blue Mountains Province is a diverse assemblage of older sedimentary, volcanic, and metamorphic rock which was uplifted, tilted and faulted to form rugged hills and meanders (State of Oregon Water Resources Department 1986:23).

The transitional physiographic location of Pine Creek afforded its native human inhabitants access to steeply dissected mountains and canyons, as well as gently rolling tablelands. Available resources are, as a result, similarly diverse. The following overview provides an environmental baseline for human occupation of the Study Area, including background on local geology and physiography, and present climate, vegetation, and wildlife. These topics are taken up again in future chapters, in particular as they relate to questions of prehistoric settlement and subsistence in the Pine Creek basin and the southern

Plateau as a whole. Portions of this discussion are based on Endzweig 1992, Chapter 2.

Geology and Physiography

The Study Area lies within the Clarno Basin, a broad dissected lowland of approximately 207 square miles, developed on old tuffs and partially surrounded by highlands of lava (Taylor 1960:1). Centered on the east-west trending course of Pine Creek, the Study Area ranges in elevation from about 398 m (1,305 feet) at the John Day River to 1416 m (4,647 feet) at Twin Buttes near its eastern end.

Due to the paleontological significance of the region, its Tertiary geology has been studied in great depth (Taylor 1960; Baldwin 1976; Hanson 1977; Manchester 1977; Walker 1977). Less is known about the area's Quaternary past.

Three major Tertiary formations are exposed in a series of "tiers," which roughly parallel Pine Creek. The entire southern portion of the drainage basin, along with an area of approximately equal width along the north side of Pine Creek, is made up of Eocene to early Oligocene Clarno Formation. Represented by rhyolite, andesite, basalt flows, breccia, multicolored tuffs, and waterlaid sedimentary rock, its "ridges and summits are sharp and angular, canyons are generally narrow, and valley sides are irregular" (Taylor 1960:144).

In the northwestern corner of the Study Area, the basin known as the "Cove" is made up primarily of the younger John Day Formation, overlain in spots by Quaternary landslide and debris flow deposits. Of late Oligocene and early Miocene age, this less resistent formation consists primarily of waterlaid ashes or tuffs, along with welded tuffs and basalts, and is recognized by its redddish, green, and buff to cream-colored members.

On the north, the drainage basin is rimmed by Columbia River basalts which make up Iron Mountain and the adjacent uplands. Extrusion of the Columbia River basalt group took place in middle to late Miocene times, depositing between 15 and 25 sheets of lava to a depth of 1,000 to 2,000 feet (Taylor 1960:164).

Quaternary deposits in the area include Pleistocene terrace remnants along and above the John Day River, and patterned ground attributed to Pleistocene periglacial freeze-thaw activity (Taylor 1960:140). A "discontinuous and inconspicuous covering of very fine, light brown, silty soil" associated with these stone features is tentatively interpreted as a thin deposit of Pleistocene loess (Taylor 1960:142).

Holocene deposits include recent alluvium of Pine Creek and the John Day River. Pockets of Holocene volcanic ash are conspicuous along many of the drainages in the Study Area. As of 1960 their source was unknown (Taylor 1960:143), but they may be attributable to the eruption of Mt. Mazama some 6,800 years ago.

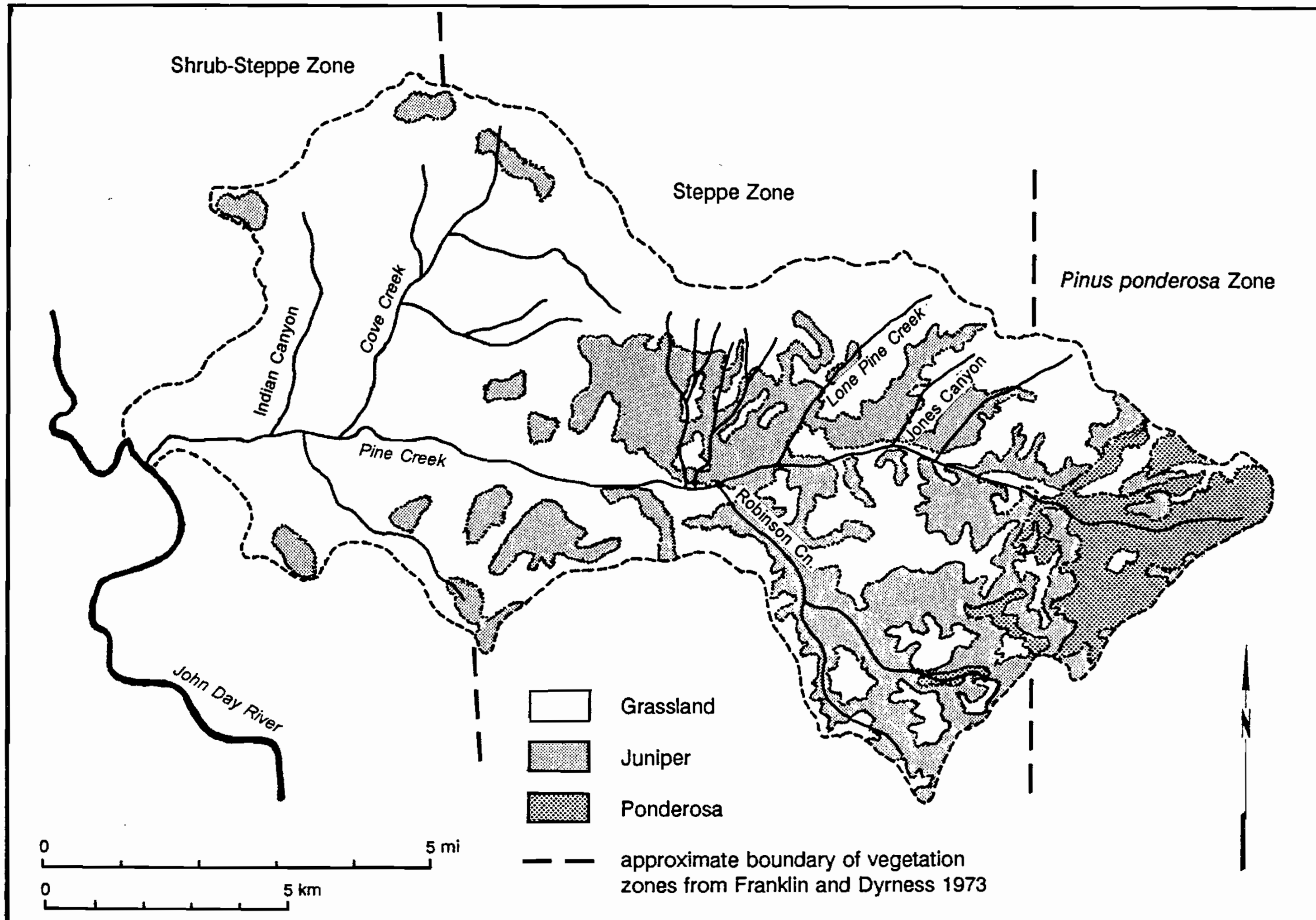
Climate

The Study Area is characterized by a semi-arid climate with hot summers, cold but not severe winters, and low annual precipitation. Average July temperatures range from 18-20°C in the east to 20-22°C in the west, while January temperatures average between 0° and -2°C (Loy 1976:130-131). Mean daily temperature ranges are 9-12°C for January and 21-24°C for July (Loy 1976:132). Because of its location in the rainshadow of the Cascades, the Study Area receives little precipitation, averaging 200-500 mm annually, with totals rising from west to east with increasing elevation. Fossil receives an annual total of 363.6 mm (Roberts 1989:392), most of which falls between October and June (Houck and Atherton 1977:32).

Paleoenvironmental reconstructions have been undertaken for adjoining regions on the basis of pollen records, sequences of floodplain development, and glacial histories, and limited information on climatic change is available from woodrat middens in the Study Area itself. These studies are discussed in detail in Chapter 9. Together, this research supports the general sequence of a mesic early postglacial, followed by increasing aridity during the mid-Holocene, and a return to somewhat cooler and wetter conditions within the last 4,000 to 5,000 years, punctuated by periodic droughts. These trends are broadly equivalent to the Anathermal-Altithermal-Medithermal division proposed by Antevs (1948) and generally probably also apply to the Study Area. Local variability, the imprecision in dating both cultural and paleoenvironmental change (Madsen 1982:103), and the effects of non-climatic events, such as volcanic eruptions, must, however, be accounted for when specific correlations and causal relationships between humans and their environment are proposed. The role of environmental factors in prehistoric culture change is discussed in the final chapter of this study.

Vegetation

The vegetation of the Pacific Northwest has been divided into zones on the basis of their potential (climax) communities or climax-dominant species (Franklin and Dyrness 1973:46). Each implies an area of "essentially uniform macroclimate." The Pine Creek Basin is characterized from west to east by successive belts of Shrub-Steppe (perennial grassland with big sagebrush), Steppe (perennial grassland without sagebrush), and *Pinus ponderosa* (Franklin and Dyrness 1973:44-45). Within these zones, topography and substrate interact with climatic variables and various kinds of disturbance to create a mosaic of communities, the diversity of which is masked by broader zonal classifications. As Bailey (1936:14) has remarked, "The colored map is at best but a feeble guide to the actual areas which are far more detailed and graphic when spread before one in the garb of their native plant and animal life." The distribution map shown in Figure 2, albeit coarse-grained and incomplete, reflects this variability.



from: Forest Type Map of Wheeler County (USFS 1953)

Figure 2. Generalized vegetation zones, Pine Creek basin.

As defined by Franklin and Dyrness, Steppe and Shrub-Steppe occupy the basins in the rainshadow east of the Cascades, and are characterized by bunchgrasses (e.g. Agropyron spicatum, Festuca idahoensis, Poa sandbergii [spiked wheatgrass, Idaho fescue, Sandberg bluegrass]) and sagebrushes (Artemisia tridentata, A. arbuscula, and A. rigida [big sagebrush, low sagebrush, and stiff sagebrush]) (Franklin and Dyrness 1973:51). They note that overgrazing has wrought major changes in these environments, causing the replacement of the less tolerant native bunchgrasses by more hardy introduced species, such as Bromus tectorum, Poa pratensis, and Elymus caput-medusae (cheatgrass, Kentucky bluegrass, and medusahead grass), a pattern also observed in the Study Area (see also Chapter 3).

Primary species (other than those listed above) observed during the Pine Creek Archaeological Survey (see Chapter 4) within the Steppe and Shrub-Steppe zones include Achillea millefolium (yarrow), Lupinus sp. (lupine), Eriogonum spp. (buckwheats), Purshia tridentata (bitterbrush), Sphaeralcea sp. (globe-mallow), Oenothera caespitosa (desert evening primrose), Allium sp. (wild onion), Aster sp. (aster), Chrysothamnus nauseosus (rabbitbrush), Tragopogon dubius (yellow salsify), Balsamorhiza sp. (balsamroot), Cirsium vulgare (common thistle), Cercocarpus ledifolius (mountain mahogany), Bromus brizaeformis (rattlesnake grass), Sitanion hystrix (squirreltail grass), and Calochortus macrocarpus (mariposa lily). Cacti were noted on a single slope in the southwestern portion of the Study Area. The completion of fieldwork between mid-July and the end of August, at which time many plants have dried up and are difficult for the non-specialist to recognize and identify, may account for the almost complete absence of observed biscuitroots (Lomatium spp.).

Ponderosa pine (Pinus ponderosa) is limited to the more mesic and higher easternmost portion of the drainage basin, where it forms a mosaic with Shrub-Steppe and Steppe communities (Franklin and Dyrness 1973:183). In addition to many of the species listed above, plants observed in this zone include Rosa sp. (wildrose), Collomia sp. (collomia), Aquilegia sp. (Columbine), Apocynum sp. (dogbane), Pseudotsuga menziesii (Douglas fir), and Populus tremuloides (quaking aspen). Juniperus occidentalis (western juniper), while outside of its zonal range to the south of the Crooked River, and excluded from the Columbia Province Steppe and Shrub-Steppe of Franklin and Dyrness (1973), is widespread across the Study Area (Figure 2). It is found in varying proportions with sagebrush and bunchgrasses and their associated plant communities.

Although they make up only a small part of the total vegetation, riparian communities are critical components in this semi-arid region. Narrow strips of riparian vegetation fringe perennial streams, providing nutrients, shade, and protecting cover for a variety of wildlife, as well as slowing stream evaporation and bank erosion. It has been noted (State of Oregon Water Resources Department 1986:15) that "75% of the terrestrial species known to occur in the Blue Mountains are either directly dependent on riparian habitats or use them more than any other habitat." Riparian species observed during the survey include Salix sp.

(willow), Populus tremuloides (quaking aspen), a variety of berries, mint (variety unknown), Urtica sp. (nettle), Rorippa nasturtium aquaticum (watercress), and Mimulus sp. (monkey flower). Species recorded around springs and seeps include Juncus sp. (rushes), Equisetum sp. (horsetail fern), Carex sp. (sedges), Solidago sp. (goldenrod), and Rumex sp. (sorrel or dock), among others.

Wildlife

The fauna of the Pine Creek Basin is generally representative of the Upper Sonoran lifezone, grading into the semiarid Transition zone with the appearance of ponderosa pine at its eastern end (Bailey 1936).

Artiodactyls present in the area include pronghorn (Antilocapra americana), mule deer (Odocoileus hemionus), and elk (Cervus canadensis). The region is also within the former range of bighorn sheep (Ovis canadensis) (Bailey 1936:65). Carnivores include cougar (Felis concolor), bobcat (Lynx rufus), coyote (Canis latrans), raccoon (Procyon lotor), weasel (Mustela frenata), spotted and striped skunk (Mephitis mephitis and Spilogale putorius), river otter (Lutra canadensis), and badger (Taxidea taxus). Other mammals include jackrabbit (Lepus sp.), cottontail (Syvilagus nuttallii), ground squirrel (Spermophilus sp.), marmot (Marmota flaviventris), beaver (Castor canadensis), porcupine (Erethizon dorsatum), muskrat (Ondatra zibethica), bushy-tailed woodrat (Neotoma cinerea), and shrew (Sorex vagrans). Bats and a variety of small rodents may also be encountered (Janes 1977; Riggs 1968).

A variety of birds have been reported for the Clarno Basin and adjacent Antelope Valley. These include 94 non-predatory species, 62 of which are said to breed in the area. The Clarno Basin, in addition, supports eight resident raptor species (Janes 1977). Amphibians include three species of frog, two toads, five lizard species, western skink, and eight species of snake (Riggs 1977). Anadromous fish found in the John Day River include steelhead trout (Oncorhynchus mykiss), coho salmon (Oncorhynchus kisutch), and Chinook salmon (Oncorhynchus tshawytscha) (see Chapter 9), though their numbers have been severely reduced by mining, grazing, and irrigation (Fulton 1968, 1970). A number of resident fish are also present (Loy 1976:160-161).

Conclusion

The preceding overview attests to the diversity of resources which were available to prehistoric inhabitants of the Study Area. The proximity of multiple environmental zones, conditioned by physiographic variability, affords access to plants and animals from steppe grasslands, pine forests, riparian communities, and the nearby John Day River. Sedimentary and igneous parent rock provide raw materials for tools and pigments, as well as crevices and overhangs which were used for storage and shelter. Further expansion of the local catchment was achieved through trade and travel, as reflected in the presence of non-local obsidian and other "exotic" materials. A consideration of the available resource base is essential for the understanding of prehistoric human occupation of the Pine Creek basin and will be returned to in future chapters.

CHAPTER 3

CULTURAL SETTING

Introduction

Although the mouth of the John Day River was described as early as 1805 by Lewis and Clark, and its upper reaches were traversed by trappers like Peter Skene Ogden beginning in the 1820s (Elliott 1909), Euroamerican settlement of the river was not begun in earnest until the 1860s. Even then, most of the activity centered on the mining districts of the upper John Day, to which early communities farther north played a supporting role in farming, ranching, and logging.

The discovery of gold in the Blue Mountains in 1861, the blazing of new roads, and a number of federal land policies, including the Homestead Act of 1862, served to transform the area overnight. Other reasons for the influx of settlers included the publicity sparked by such explorations as Fremont's in 1845, diminishing availability of farmlands west of the Cascades, the winter of 1861-62, which brought heavy snows and flooding to the Willamette Valley, the end of the Civil

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[1] Portions of this chapter are based on Endzweig 1992, Chapter 3.

War with its attendant displacements, and construction of a trans-continental railroad (Beckham 1987; Nedry 1952). By the height of the mining boom in 1883 (Nielsen et al. 1985), Canyon City boasted a population of 5,000 (Toepel et al. 1980), with 150 new miners arriving from The Dalles each day (Nielsen et al. 1985), often over what was to become the Dalles Military Road. The lure of gold brought thousands to the camps, their "trains winding up the hillside like huge serpents" (Nedry 1952:242).

The pressure on the native population in this land of limited water and fragile ecology must have been considerable and it is no small wonder that clashes between Euroamerican settlers and Native Americans became increasingly common throughout the 1860s (Huntington 1865, 1887). In July of 1864, Camp Watson was established some 20 miles southeast of Mitchell to protect the road between The Dalles and Canyon City. Along with Camp Lincoln, Camp Logan, Camp Dahlgren, Camp Maury, and Camp Gibbs, it served as a base for relentless military campaigns against Northern Paiute raiders. Camp Watson was decommissioned in 1869, two years after the death of Walpapi Paiute "Chief" Paulina signaled the end of the Indian wars in central Oregon (Beckham 1987; Brogan 1977; Shane 1950). The Bannock War of 1878, representing the last major Native American uprising in the region, appears to have bypassed the immediate Study Area (Wells 1975).

In 1867, the arrival of the Clarno family near the mouth of Pine Creek with 350 head of cattle (A. Campbell 1990) marked the beginning of Euroamerican settlement in the Study Area. It also initiated the intensive grazing that would characterize the region throughout the coming years. With the exception of a few merchants, bankers, "professionals," and lumbermen, virtually all newcomers to the Pine Creek and adjacent Butte Creek valleys engaged in cattle, sheep, or horse ranching (Buhl 1975b; Reinhart 1975). By 1901, buyers are said to have traveled hundreds of miles to view Andrew Clarno's stock, which ranged "over a thousand hills," or for "20 miles in every direction" (A. Campbell 1990:32, 54).

It is difficult to estimate the degree of environmental change wrought by grazing on the landscape and vegetation of this area. Reminiscences of the early days repeatedly refer to bunchgrass "as high as a horseman's stirrups" (Buhl 1975a). By 1905, Wheeler County grazing lands supported 200,000 sheep, 15,000 cattle, and 8,000 horses, in spite of periodic severe losses due to harsh winters, floods, scabies, and predators (Buhl 1975a:86). According to A. Campbell (Campbell 1990:26-5), a study from the 1970s showed that it took 2,000 acres of open rangeland to support 10 cows with their calves. When Andrew Clarno arrived, only 125 acres would have been required. It is necessary to keep these changes in mind when extrapolating to the land use in the prehistoric past. As has been pointed out:

> The biotic components of landscapes, especially, are sensitive to minor adjustments in water, temperature, and the selective pressures of animals and men. Reduction or intensification of any of these factors may result in substantial modification in the species composition of native communities, the disappearance of certain species or even of entire associations, and the proliferation of species previously rare or absent (Corson 1979).

Ethnography

The Question of Boundaries

The ethnographic record suggests that the Study Area was at the boundary between Tenino in the north and Northern Paiute in the south (Figure 3). The area may periodically also have been used by the Umatilla (Ray 1936). The upper John Day region is known to have been utilized by Cayuse, Nez Percés, and Walla Walla, as well as those groups already mentioned, and Umatilla and Cayuse shared the Tenino fisheries along the Columbia River near the mouth of the John Day (Suphan 1974). These apparent inconsistencies in territorial ascription need not be seen as inadequacies of the ethnographic record. They may, rather, reflect the typical Plateau pattern of mutual "cross-utilization" of resources (Walker 1967).

Extensive interaction between Plateau peoples has been noted for social, economic, and religious spheres of life, and encompassed intergroup exchange, a variety of cooperative alliances or task groupings (Anastasio 1975), larger-scale ceremonial integration (Brunton 1968), and intermarriage. Communication was facilitated by mutual intelligibility of Sahaptin dialects, and Sahaptin multilingualism (Rigsby 1965:38, 62-65). Rights of exclusive use pertained only to fishing stations in the immediate vicinity of a village (Suphan 1974:33-25), and even this may be a result of commercial fish exploitation after Euroamerican contact (Walker 1967:15). Hunting and gathering areas away

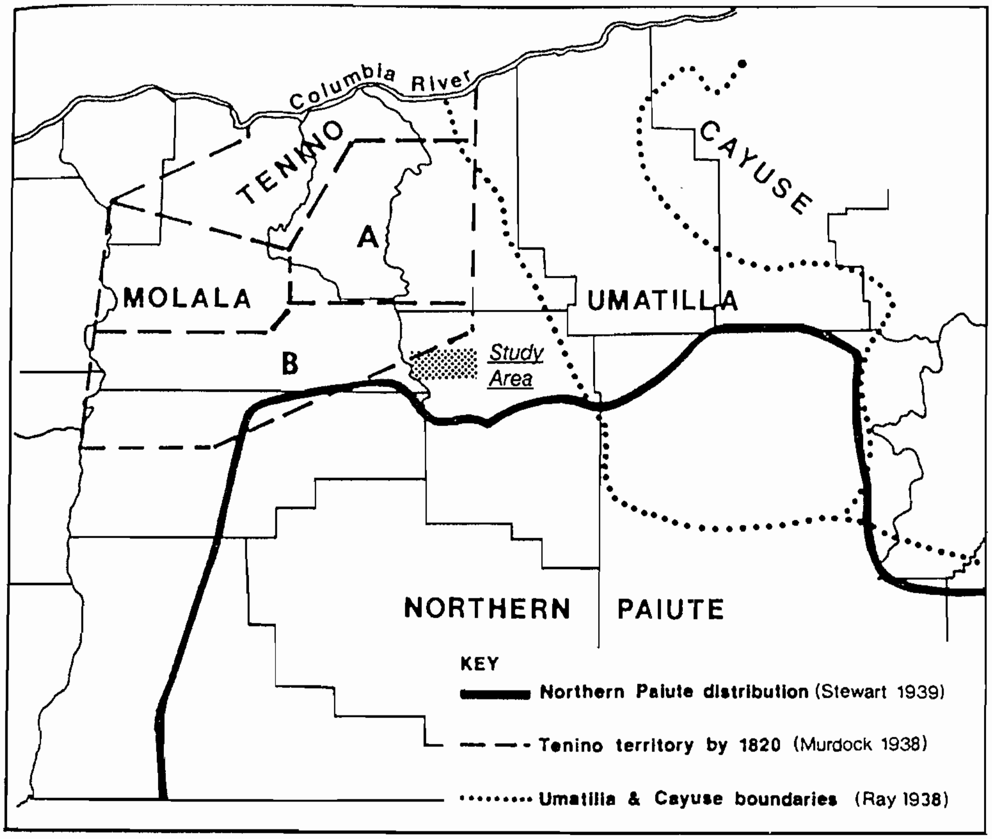


Figure 3. Territorial boundaries in north-central Oregon as given by ethnographic sources (after Suphan 1974). "A" refers to "disputed territory of Paiute, used by Tenino for hunting;" "B" denotes area which was "originally Paiute territory, from which the Paiute were displaced by Tenino" in post 1810-20 period according to Murdock (1938). From Toepel, Willingham, and Minor (1980:33).

from the village were "considered free and open to all friendly peoples caring to exploit them" (Suphan 1974:35). With regard to territorial definition, therefore, "it is not surprising to learn that a concept of boundary and trespass was entirely lacking in these cultures [Wasco and Tenino], save perhaps with regard to the village site itself" (Suphan 1974:35).

The delineation of boundaries and their projection into the prehistoric past are complicated by the likelihood that they have changed over time. Systematic ethnographic fieldwork was not conducted in the area until the early 20th century, well after the introduction of Euroamerican diseases, horses, and firearms forever altered the lives of Plateau peoples. Major epidemics erupted in the 1770s and at the beginning of the 19th century, leading to a population loss of possibly 45% from smallpox alone, even before the arrival of Lewis and Clark (Boyd 1985). Recent research has raised the possibility that introduced diseases may have affected the Columbia Plateau even earlier, before the first face-to-face contacts between Native populations and Euroamericans (S. Campbell 1990). The social and physical dislocations of a population decline of this magnitude could have been considerable (cf. Ramenofsky 1987). As Campbell has suggested with regard to the Northern Columbia Plateau,

> even if radical change in social content did not occur, it is highly likely that population decline in the early 16th century resulted in a redistribution of population and possibly changes in the subsistence focus. Some important social and economic activities may have required minimum group sizes and had strongly preferred locations, thus population movements would have occurred in response to changed population densities (S. Campbell 1990:187-188).

The near-absence of Euroamerican trade goods from sites excavated in the Study Area, as well as a decline in radiocarbon-dated occupations between two and three hundred years ago, are suggestive of a late prehistoric or protohistoric settlement shift in the region. The high density of archaeological sites recorded along the John Day River as contrasted with its limited treatment in ethnographic and historic accounts supports the impression of a population reorganization, although the lack of fieldwork in this area hampers temporal placement of these occupations.

The fluidity of territorial boundaries and the potential disjunction between prehistoric and historic Plateau lifeways should be kept in mind when the ethnographic record is used to explore archaeological questions.

Tenino Subsistence and Social Organization

In pre-reservation times, the Sahaptin-speaking Tenino (also referred to as Wayampam, e.g. Ray 1936) are said to have comprised four dialectically distinct local groups or sub-tribes: the Dalles Tenino or Tenino proper, the Tygh, the Wayam or Deschutes Tenino, and the John Day Tenino. Each of these was centered on a pair of villages,

> one occupied in the winter months (November to March) and located at a protected interior site where water and wood for fuel were available, the other inhabited during the warmer months and located at a site on the Columbia River or one of its tributaries where salmon fishing was especially productive (Murdock 1980:129).

Each village had a recognized headman who was often succeeded by his eldest son, though succession was not necessarily hereditary. The headman's office was advisory and judicial in nature (Suphan 1974:27), his power dependent solely upon the respect he achieved by generosity, kindness, and wisdom. Authority was additionally diffused by intermediaries such as "spokesmen," "whippers," shamans, and task-specific leaders (Hunn 1990:216-217). Local groups, which typically consisted of winter and summer villages (Murdock 1980:129), were autonomous. Larger groupings were, as Ray has emphasized, ethnic, social, or linguistic units, but never political entities (Ray 1939:9).

The John Day Tenino are said to have occupied twin winter villages on opposite banks of the lower John Day River and two summer villages to the east along the south bank of the Columbia. Another village site was located near present-day Arlington (Murdock 1980; Rigsby 1965:52-53). Their number was estimated at 150 in 1854 (Thompson 1855). Suphan (1974:55) comments on the rarity of references to this group or its village sites in historical sources. Murdock (1980:133) places two reoccupied sites along the east bank of the John Day River upstream in the vicinity of Cottonwood Canyon and at the mouth of Butte Creek. Temporary camps are indicated near the mouth of Rock Creek and north of Butte Creek. Two major sites are also located west of the John Day River on a line between Butte Creek and Shaniko. Several sites not indicated on Murdock's map have been reported by Ray (Suphan 1974:Petitioner's Exhibit #403). These include two sites located in the vicinity of Clarno, one along Pine Creek, and one even farther east, as well as three sites farther south, on Cherry Creek, the John Day River, and Bridge Creek, respectively. The four more permanent sites located by Murdock were utilized by the John Day Tenino in spring, summer, and autumn, in the course of root- and berry-gathering and hunting (Murdock 1980:135). The three southern sites recorded by Ray, similarly, provided chokecherries, game, and roots. Red ochre was, in addition, obtained at the Bridge Creek site (Petitioner's Exhibit 403A, Docket

#198, Indian Claims Commission records, National Archives and Records Administration). The four remaining sites identified by Ray are discussed below.

The Indian Claims Commission in 1960 outlined the territory "exclusively used, occupied and held under original Indian title" by the John Day Tenino as follows (however, see discussion above regarding exclusivity of use):

> Commencing on the Columbia River at the townsite of Grant, Oregon, or if it be south of the Columbia River, then to a point due north of Grant, Oregon, and running thence up said river to the mouth of Blalock Canyon; thence south up said Canyon to its terminus and then by a straight line to the townsite of Rock Creek; thence by a straight line southerly to the mouth of Cove Creek; thence to the mouth of Currant Creek; thence northwest to the headwaters on Long Hollow Creek; thence west and northerly to a point 6 miles due east of Grass Vally, Oregon, thence northerly to DeMoss, Oregon, thence northwest to Grant, Oregon, or if that townsite be south of the Columbia River then to a point on said river due north of Grant, Oregon, which is the place of the beginning (Suphan 1974:210).

Regarding the John Day River, Suphan (1974:56-57) concluded that

> other than the fact that two Tenino villages were at its mouth and that the inhabitants of these settlements used the lower valley for hunting about as far as Clarno (Murdock [1938], p. 396) nothing more is known of the manner in which the Tenino used this portion of the river. That the upper course of the John Day (beyond Clarno) figured but little in Tenino economy seems evident from examining historical sources....

It should be noted that a small group of John Day Tenino resided at Clarno until 1878, even after other Tenino had settled on the Warm Springs Reservation (Suphan 1974:207).

Like other Plateau people, the Tenino followed a seasonal round carefully scheduled to take advantage of spatial and temporal variation in quantity and quality of resources. Men engaged in hunting and fishing, and manufactured most of the necessary equipment, while women gathered roots and berries, processed food, and cared for the younger children (Murdock 1980:138; Hunn 1990:206). Shortages were mitigated by sharing and gift-giving, as well as by trade at such centers as The Dalles. The historic subsistence round is described as follows by Murdock (1958:300-301):

> From November to March the Tenino occupied their winter villages, where each extended family had two houses - an oval or elliptical, semi-subterranean, earth covered lodge used for sleeping and a rectangular frame dwelling with mat-covered walls and roof used for cooking and daytime affairs. The winter was spent in the manufacture of artifacts, in stream fishing and fuel gathering, and in hunting and trapping.
>
> Late in March the Tenino dismantled their winter dwellings and removed to their summer villages, where each extended family erected a rectangular shed of poles and mats with a flat rather than gabled roof. Half of this structure was used for drying salmon, the other half as living quarters. Special parties ritually gathered roots and caught salmon for an important first-fruits ceremony in early April. Neither salmon nor roots could be eaten until after these rites had been performed.
>
> Following the spring festival, about half the families of a village departed for a series of expeditions into the interior, where the women gathered roots and the men hunted. They lived in temporary camps of mat-covered tipis. The rest of the population remained in the summer village, catching and drying salmon. In July all returned to the villages for another first-fruits ceremony, this one featuring berries and venison ritually obtained by a special party of six men and six women.
>
> After the summer festival the Tenino again divided, part remaining in the villages to continue the salmon fishing and to trade, while the rest visited the mountains to gather berries and nuts, with incidental hunting. In September, at the conclusion of the berry season, parties set out on long hunting expeditions up the Deschutes or John Day River, camping in tipis. The women smoked the meat

> which the men caught and gathered late-ripening roots and berries. In October a special party collected tule reeds for mats. The drying sheds were now dismantled, and the people moved to their winter villages, reconditioning their semi-subterranean dwellings to initiate a new seasonal round.

Recent personal accounts such as that given by James Selam, a John Day River Tenino from táwás at Blalock, to Eugene Hunn (1990:119-134), document a seasonal round of 600 to 1000 miles -- on foot, horseback, and by horse and wagon -- that extended from "Indian Heaven" between Mt. Adams and Mt. St. Helens, to the Blue Mountains in the south.

Northern Paiute Subsistence and Social Organization

Ethnographic and historic reconstructions point to Clarno not only as the southern limit of the Tenino "primary subsistence zone" (Suphan 1974:76), but also as the northern range of the Northern Paiute, a Numic-speaking people with broader affinities to the Great Basin. According to a Deer-Eater Paiute, "their fishing sites were strung along the Deschutes as far as Sherar's Bridge, on the Metolius, and along the John Day upstream from Clarno" (Suphan 1974:64). Testimony by a second Paiute informant supports this placement:

> The Paiute hunted along the John Day River, at Canyon City, at Prineville, over to Mt. Jefferson, and throughout the reservation sector. Fishing was done along the Deschutes, Metolius and John Day rivers. Paiute root grounds were chiefly at Shaniko and out along the John Day in spots extending to Canyon City; this sector was jointly exploited with the Tenino (Suphan 1974:65).

Ethnographic maps limiting Paiute range south of the Study Area are thought to reflect their displacement by southward-expanding Tenino during the early to middle 19th century (contrary to the now generally discredited Teit-Berreman hypothesis; cf. Ray et al. 1938).

In their discussion of Northern Paiute bands, Stewart (1939) and Blyth (1938) place the Hunipuitöka (hunibui-, or root-eaters, also known as Walpapi) or Hu'nipwitïka, respectively, closest to the Study Area. According to Stewart (1939:Table 1), there were 98 Hunibui-Eaters at Klamath in 1870 and 76 at Warm Springs in 1870. As applied here, Northern Paiute bands should be conceived of as loosely affiliated "semi-annually united clusters of individual families ... who seasonally occupied a home tract or district" (Fowler and Liljeblad 1986:436). They are roughly equivalent to the "regional band" as defined by Helm (1965, 1968). These groupings, twenty-one of which Stewart recognized for the Northern Paiute of the western Great Basin, were often identified with a local food-source; thus the "Root-Eaters" of the Study Area, and the "Seed-Eaters" to their south. Hunibui-Eater territory extended over 7,000 square miles, making this the second largest of all Northern Paiute districts. Boundaries were loosely defined, and membership flexible.

The main socio-economic face-to-face units within this larger grouping were individual households or "camps," and "camp groups" (Helm's "local band") of changing size and composition. Residence units were cross-cut by a person's bilateral kindred, "an informal linkage of primary relatives where ties could be activiated if need be" (Fowler and Liljeblad 1986:446). Political control resided first and foremost in the family. Beyond this, local camp groups also had headmen who were selected by consensus. Serving in an advisory role only, they were "focal points for group discussion of matters of mutual concern" (Fowler and Liljeblad 1986:450). Temporary leaders were selected for specific tasks, e.g. antelope or rabbit drives, dances, and battles (Fowler and Liljeblad 1986:451).

Like the Tenino, the Northern Paiute moved with the seasons to exploit resources as they became available. While the seasonal round for this general region is best documented for the Harney Valley Paiute (Whiting 1950:17-19; Couture 1978:27-31), it was probably comparable for Paiute peoples occupying the Study Area father north.

Winter saw groups of families settled in permanent camps around Canyon City, the town of John Day, and the John Day River valley to the west (Blyth 1938:403). Here people lived in domed or conical structures of willow poles, covered with tule or grass mats or bundles, and sunk in the ground 4-6 inches. Such structures generally measured 8-14 feet in diameter and 6-10 feet in height (Stewart 1941; Whiting 1950:93-94 gives a diameter of 10-12 feet).

In early May, winter sites were abandoned and families assembled at root-gathering areas, where women dug edible roots and prepared them for storage, and men readied their traps for the salmon runs. This was a time for socializing, information exchange, and trade. When fishing ended, families dispersed to hunt game and gather seeds and roots as they ripened. During the warm months of the year, people usually lived in cooler brush windbreaks or shades (Fowler and Liljeblad 1986:443), sometimes circular with a diameter of ten feet and a height of four to five feet, sometimes flat-roofed and mat- or brush-covered. Domed sweathouses which were made of a willow frame topped with grass and earth or skins, or canvas, and could a accommodate up to four people, were also built, as were menstrual huts and birth houses. Caves were sometimes used as temporary dwellings (Stewart 1941:380). According to Fowler and Liljeblad (1986:443),

> Houses seem not to have been closely spaced in a "village" pattern in any area within the region. Rather, winter camps and houses of two or three related families were dispersed in favored camping spots, so as not to put undue pressure on fuel or water supplies. Figures on the size of typical winter camps are infrequently recorded, but something on the order of 50 persons at a good site was typical. Summer camps were smaller, reflecting separate foraging rounds for related families.

In mid-July, families once again congregated, this time near Harney to gather crickets. Families then dispersed for the rest of the summer in search of groundhogs, seeds, and berries, while generally hunting. In early fall, sometimes, Hunibui-Eaters joined other groups near Malheur Lake to harvest waada seeds. This was another time for festivities, as well as communal antelope and rabbit drives. By early November, families once again began to to collect their cached foods and settle into their winter villages.

The Pine Creek Basin

Other than the already-cited reference to Clarno as the northern boundary of fishing for Northern Paiute (Suphan 1974:64), nothing is known about the utilization of this area by Numic-speaking peoples.

Limited information is, however, available on its use by Sahaptin-speaking Tenino. A map presented by Verne Ray to the Indian Claims Commission regarding former territories and village locations of Warm Springs Indian groups (Suphan 1974:Petitioner's Exhibit 403) shows four sites, identified as numbers 26 through 29, which appear to be located in the vicinity of Pine Creek. Information on these localities, which is not published in the Commission Findings, was obtained by the author from the National Archives and Records Administration (Petitioner's Exhibit 403A, Docket #198, Indian Claims Commission records). The four sites, all of which are attributed to the Wayampam (the term used by Ray prior to 1938 in reference to Tenino, cf. Ray 1938:385), are described as follows (punctuation has been copied from the original records):

> 26. *Smz'ux*: Located on the bench west of the John Day River, above present Clarno, was this hunting village. Chokecherries were gathered here, also.
>
> 27. *Kátsamtunzka'was*: This village at the mouth of Pine Creek was used for diversified hunting and chokecherry gathering.
>
> 28. *Pla'cplacpa*: On Pine Creek, near Cove Creek, this village was a place where white clay, for household and industrial use, was gathered and where roots were dug and deer hunted.
>
> 29. *Sawi'tki*: Of major importance was this village at the foot of the wooded area of the Blue Mountains. Roots were gathered and antelope were hunted to the east in the mountains. Two or three other permanent sites were maintained in the hills to the east, those being closer to the actual hunting operation. They were occupied throughout the hunting season.

Eyewitness accounts by local residents document continued seasonal use of the area well into the 20th century (Gannon 1975:n.p.):

> In a personal communication, Charles Conlee has recounted that Indians were still moving through the area as recently as the 1940's. They would usually camp along Pine Creek or up in the timbered areas during the summer and fall, moving on to the Columbia River for the winter. In the spring, they would migrate west to the "flatlands" (Deschutes River area?), then back into the Clarno Basin, thereby completing the circuit. Several groups, however, also passed through the area in the spring. The trading and breaking of horses was apparently the main livelihood among the men. The women would acquire deer skins from local ranchers in trade for a pair (or pairs) of gloves made from them and returned the following year. Sometimes these and other leather goods were sold at nominal prices. The women would also gather sheep wool from the fences, which they would utilize in weaving. The diet consisted chiefly of deer and the meat of smaller mammals (including rodents) which, along with "Indian Root," were made into a stew. "Cous" (*Lomatium*) was also gathered and ground into flour, and probably pressed into cakes. Habitations consisted of "tipis" with canvas coverings replacing the hides of earlier times, and erected over shallow depressions in the ground.

A hand-written note from December 19, 1975, which was found among OMSI project records (project files, Oregon Sate Museum of Anthropology), and presumably refers to an interview with the same informant, places a somewhat greater emphasis on a spring presence in the drainage:

> Charlie told me that they would [come] through mainly in the spring time. They would gather "Indian root" (a long 'tuber') and cook by boiling. They also gathered "cous" which was ground to flour and 'baked', etc. They would winter and fish on the Columbia River in the winter -- presumably at Celilo. Also in the spring, wool was collected around the Clarno area, after lambing. Charlie said they would be all over the place. During the fall on the Columbia River, was the time when many 'tribes' got together to fish and smoke meat (for the winter). Charlie wasn't sure where they went in the summer, but presumably "on the Columbia" (?).
>
> Charlie told me some Indians he met, when he was young ... the woman was cooking eel woven on a stick. Charlie said it smelled and looked like bacon (good).

Conclusion

This brief summary suggests that the Study Area was used in a similar fashion by both southern Columbia Plateau and northern Great Basin peoples during historic times, although seemingly with greater regularity by Plateau groups. Its roots, berries, and game were shared by Tenino and Northern Paiute, and possibly occasionally by neighboring groups as well. There appears to have been less local emphasis on salmon fishing by the Tenino, possibly because of scheduling conflicts, and probably due to more productive fisheries downstream. During the historic period, at least, the Study Area was seasonally utilized by people who wintered in permanent villages and camps outside its boundaries. It is clear that the Pine Creek Basin was in no way a closed system at this date. Whether this pattern held true during prehistoric times is a question which will be further addressed in later chapters of this study.

CHAPTER 4

ARCHAEOLOGICAL BACKGROUND

The present chapter is divided into four parts. First, a general overview of Plateau and Northern Great Basin prehistory is presented in order to provide a regional explanatory framework for local events. The second part reviews archaeological investigations in the John Day River drainage. Most of this discussion has been abstracted from unpublished CRM reports of limited distribution and is intended to provide a local context for further discussions as well as to expand the available database for the area. This is followed by a more detailed overview of Pine Creek basin prehistory, including a synopsis of prior fieldwork conducted by the Oregon Museum of Science and Industry and a synthesis of archaeological surface reconnaissance undertaken at the inception of the present study. Portions of this discussion draw on Endzweig 1992, Chapter 3.

Regional Synthesis

The prehistory of North America has been conceptualized as a sequence of general integrative stages (Willey and Phillips 1958), which are distinguished by characteristic adaptive strategies, and represented by local phases, patterns, periods, horizons, and traditions. The present broad-brush review of Columbia Plateau and Northern Great Basin prehistory, like recent syntheses which incorporate the Study Area (Toepel, Minor, and Willingham 1980; Minor et al. 1987; Lebow et al. 1990), retains the customary divisions of Paleo-Indian and Archaic. Selected areal chronological sequences are represented in Figure 4.

Paleo-Indian (11500-11000 B.P.)

The Paleo-Indian occupations of the Great Basin and Columbia Plateau are represented by the Western Clovis, "a Clovis-age cultural tradition uniquely adapted to Far Western environments" (Willig and Aikens 1988:3). In the Northern Great Basin, Western Clovis follows the lone, allegedly pre-Clovis assemblage at Fort Rock Cave, which is radiocarbon-dated to 13200 B.P. (Bedwell 1970, 1973). Lasting from roughly 11500 to 11000 B.P., Western Clovis is associated with the terminal stage of the Pleistocene era. It is characterized by fluted points and a technology comparable to Clovis-Llano complexes defined on the Plains and in the Southwestern United States. Because of the scarcity of Clovis finds from the Columbia Plateau (see citations, Willig and Aikens 1988:Table 4), it is at this point not possible to characterize a Clovis adaptive strategy for the region. A more generalized, broad-spectrum adaptation than the specialized big-game-hunting

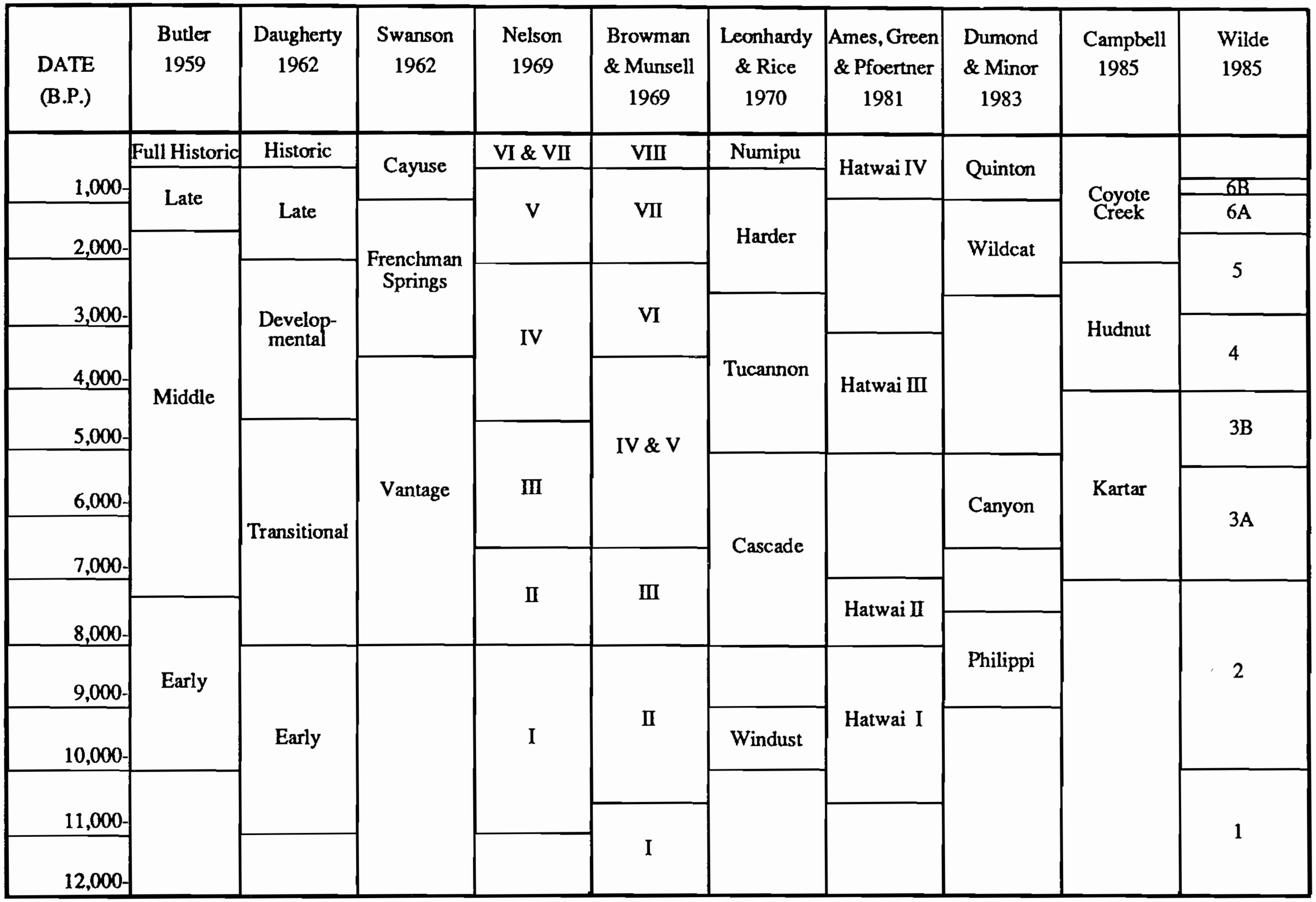


Figure 4. Developmental frameworks for the Columbia Plateau (adapted from Toepel et al. 1980).

lifeway traditionally described for the Plains and Southwest seems at this point more likely (Willig and Aikens 1988:26-27).

Archaic (11000 B.P. to Euroamerican Contact)

The Archaic, in keeping with usage by Jennings (1955, 1964), Caldwell (1958), and Cleland (1976), denotes a gradual diversification of economic, social, and technological spheres of life, and the development of distinctive cultural traditions as a result of specialized adaptations to locally available resources (Minor et al. 1987:37). Throughout the Archaic, evidence of human presence becomes increasingly visible, suggesting growing population sizes, densities, and decreasing ranges. The Archaic is divided into Early (11000-7500 B.P.), Middle (7500-2500 B.P.), and Late Archaic (2500 B.P. to historic contact) for the purpose of this discussion. The Middle Archaic is subdivided into Early and Late phases (7500-4000 B.P. and 4000-2500 B.P., respectively).

The best-known southern Columbia Plateau manifestation of the Early Archaic is represented by the Windust Phase, first defined in excavations along the Lower Snake River (Leonhardy and Rice 1970; Rice 1972). Its homologue at the Wildcat Canyon Site, near the mouth of the John Day River, is the Philippi Phase (Dumond and Minor 1983). Both phases are regional expressions of the Western Stemmed Tradition which encompasses a variety of complexes characterized by large stemmed projectile points (Willig and Aikens 1988). While it has sometimes been classified as Paleo-Indian (e.g. Minor et al. 1987), based on temporal or technological criteria, it is here considered as part of the Archaic on the basis of its presumed adaptive continuity with succeeding manifestations (cf. Lebow et al. 1990).

Ames (1988a) has used site distributions, assemblage structure, and technological analysis to address questions of mobility and subsistence in the Pioneer Period (Windust and the succeeding Cascade Phase). He concludes that Early Archaic peoples were broad-spectrum foragers who generally favored the more mesic environments of the Plateau. Their technology was, with the exception of projectile points and bone implements, expedient and maintainable (Bleed 1986) and geared towards maximum flexibility. According to Ames, all sites are characterized by a set of "basic" extractive, manufacturing, and processing tools (Ames 1988a; also Schalk and Cleveland 1983). Sites are said to "display a clear hierarchy from least diverse streamside occupation to a most diverse rockshelter occupation" (Ames 1988a:354). Populations are thought to have been small and dispersed.

In the Northern Great Basin, the local expression of the Western Stemmed Tradition is often referred to as the "Western Pluvial Lakes Tradition" (Bedwell 1973). Recent work however, indicates a broader subsistence base than implied by this designation. The existence of sites and artifacts from this period in dry basin areas, as well as uplands (Musil 1984), and the identification of traditionally "Archaic" subsistence pursuits such as large-scale rabbit drives at this early date (Oetting 1993b) attest to a broad-spectrum utilization of resources.

The division between Early and Middle Archaic, placed here at 7500 B.P., is marked by environmental and cultural change (cf. Ames 1988a). The Early Middle Archaic (7500-4000 B.P.) encompasses the climax of mid-Holocene aridity observed throughout the Intermontane West as well as the eruption of Mt. Mazama. It is represented on the Columbia Plateau by the Cascade Phase of the Lower Snake River (Leonhardy and Rice 1970) and the Canyon Phase at the already-mentioned Wildcat Canyon Site (Dumond and Minor 1983). Diagnostic artifacts are foliate "Cascade points" and edge-ground cobbles, along with large, side-notched projectile points (Leonhardy and Rice 1970:11-14). The subsequent Tucannon Phase of the Lower Snake River is broadly, though not precisely, coextensive with the Late Middle Archaic, and is represented by a variety of broad-necked stemmed, corner- and side-notched projectile point types. The onset of the Late Middle Archaic marks the transition to the cooler and wetter conditions of the Medithermal as defined by Antevs (1948).

A high frequency of processing tools in relation to weapons, with grinding stones becoming increasingly common, is postulated for the Early Middle Archaic (Ames 1988b:5-6) of the Columbia Plateau. Intensification of root exploitation is suggested for areas like the Calispell Valley, where camas was utilized regularly by about 5500 B.P. (Thoms 1989). In the Late Middle Archaic (4000-2500 B.P.) and Late Archaic (2500 B.P. to Euroamerican contact), fishing gear and projectile points become more common. The appearance of pithouses by 4000-5000 B.P. along the upper Middle Columbia (Campbell 1985; Chatters 1984) and the lower Snake River (Ames and Marshall 1980; Brauner 1976) suggests a decrease in mobility and "settling in " of local populations.

While the Middle Archaic marks the inception of pithouse construction, it is not until sometime in the Late Archaic that the so-called "Ethnographic Pattern" (Swanson 1962), "Plateau Pattern" (Warren 1968), or "Winter Village Pattern" (Nelson 1969, 1973) is thought to have become established. As recorded by the first Euroamericans to pass through the region, this was a semi-sedentary lifeway which involved winter occupation of permanent riverine villages coupled with a more dispersed pattern of spring, summer, and fall hunting, gathering, and fishing which was pursued by much of the population in the adjacent uplands. This topic will be addressed in greater detail in Chapter 9. Subsistence organization becomes increasingly logistical (as defined by Binford 1980), and exploitation of anadromous fish, expanded during the last millennium of the Middle Archaic, is further intensified thoughout the Plateau (Leonhardy and Rice 1970; Campbell 1985; Schalk 1987). A dramatic increase in the numbers of housepits is attributed to shorter periods of occupation (Ames 1988b). Concurrently, increased superposition of floors is attributed to decreased mobility on a supra-annual scale (Chatters 1989). The earliest evidence for house construction in the Pine Creek drainage coincides with the inception of the Late Archaic.

Changes in Plateau village structure after ca. 1500 B.P. "include a larger number of houses per community, a slight increase in average dwelling size, the inclusion of large communal structures, and a larger number of features most likely representing attendant structures" (Galm 1990:4). Galm also identifies more extensive use of non-riverine uplands as characteristic of his "Late Period" (equivalent to the present Late Archaic). In addition to these changes in settlement and subsistence, the Late Archaic is charaterized by the expansion of long-distance trade including marine shells, obsidian, nephrite, soapstone, and steatite (Galm 1990:6). The increased presence of narrow-necked projectile points reflects the spread of bow and arrow after its introduction during the Late Middle Archaic. Euroamerican contact marks the termination of the Late Archaic.

In the Northern Great Basin, the aridity of the Altithermal has been associated with a dispersed and mobile population comparable to the "Desert Culture" described by Jennings (1957, 1964). The drying of pluvial lakes and reduction of marshes necessitates a diversified subsistence base that makes increasing use of upland resources (Toepel, Minor, and Willingham 1980:71-74). Improved conditions during the Medithermal correspond to the inception of relatively permanent habitation around the lakes and marshes of the Lake Abert-Chewaucan Marsh Basin (Oetting 1989), the Fort Rock Basin (Bedwell 1973), the Harney Basin (Musil 1992; Oetting 1990a, 1990b, 1992), and the Warner Valley (Weide 1968). It has been suggested that larger populations in the lowlands led to even greater use of adjacent uplands (Jenkins and Connolly 1990). Connolly and Jenkins point further to a correlation between decreased use of lowland basins during a warmer and dryer interval between 2000 and 1500 B.P., followed by another peak in use between 1500 and 900 B.P. A subsequent drying trend coincides with a repeated decline in radiocarbon-dated occupations in the respective basins, though some areas may have seen continued occupation until the displacement of resident Penutian-speaking populations by Northern Paiute 120-300 years ago (Oetting 1989:327). The arrival of Numic-speaking Northern Paiute sometime after one thousand years ago (Miller 1986 and references; however, cf. Grayson 1993:268 ff.) makes up the last chapter in the prehistory of the Northern Great Basin and sets the stage for the historic period.

Archaeological Investigations in the John Day River Drainage

For the purpose of this discussion, the John Day River is separated into upper and lower portions, with the division placed at Clarno near the mouth of Pine Creek. The lower portion of the John Day River thus defined flows north to the Columbia River through the Deschutes-Umatilla Plateau. The upper John Day River comprises the upper portions of the mainstem, as well as its North, Middle, and South forks, and drains the Blue Mountains. Selected archaeological sites in the John Day River region are shown in Figure 5.

Archaeology of the Lower John Day River

From 1967 through 1981, the Oregon Museum of Science and Industry (OMSI), Portland, conducted a program of archaeological fieldwork in the

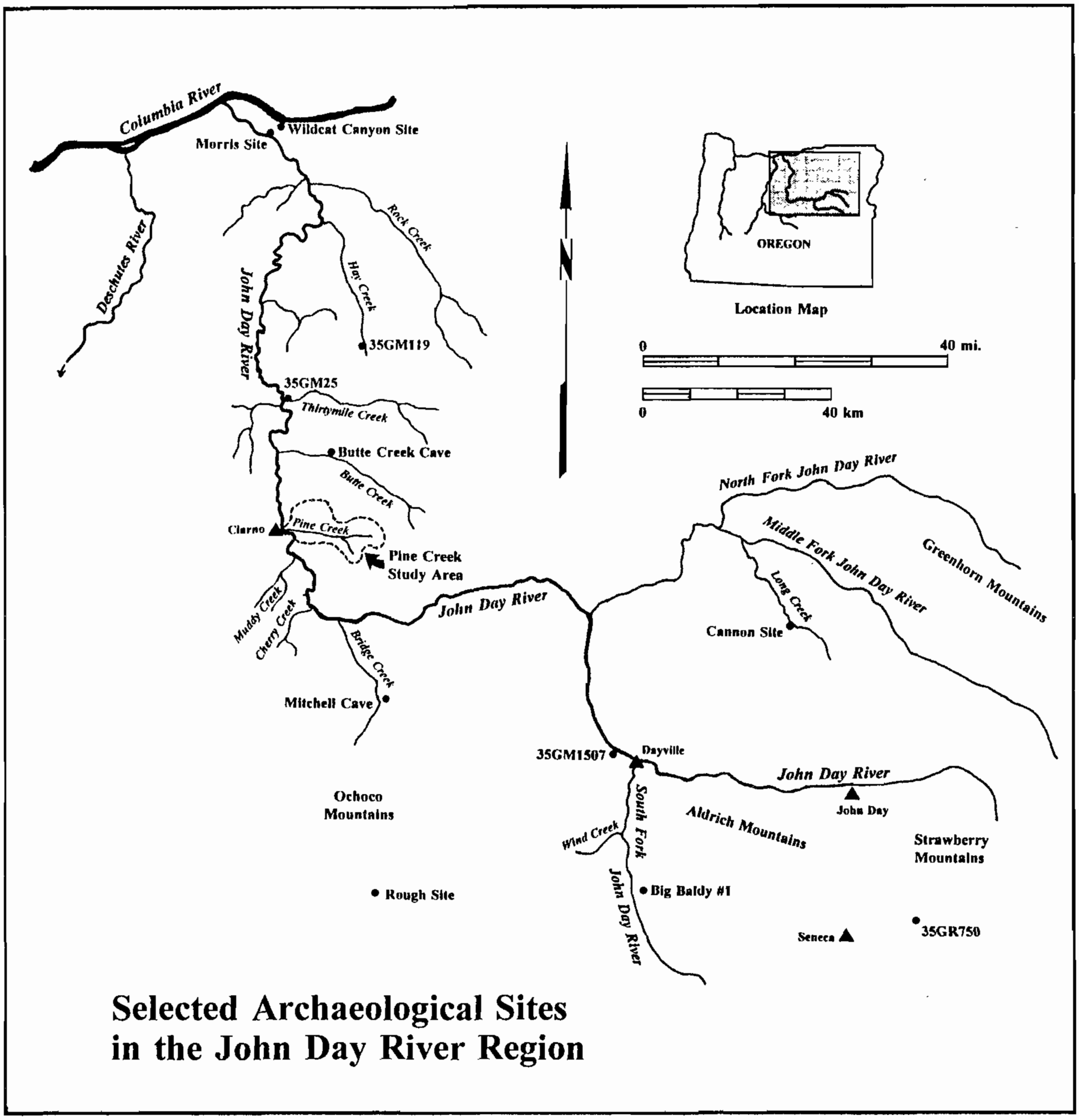


Figure 5. Selected archaeological sites in the John Day River region.

Pine Creek Basin. In the course of this program, which was run as a field school for high school students, five sites were excavated intensively, including a rockshelter (35WH2), two housepit sites (35WH21 and 35WH14, also respectively known as Jones Canyon-2 and the Pine Creek Village Site), and two open sites (35WH13 and 35WH7, also known as Indian Canyon-2 and Cove Creek-2). In addition, at least fifty-seven sites were identified in the Pine Creek drainage and adjacent areas, including rockshelters, housepit sites, lithic scatters, talus pits/cremations, quarries, and pictographs (Atherton and Houck 1976). Excavated sites range in age from 2580 ± 40 B.P. to 300 ± 75 B.P. The virtual absence in them of Euroamerican materials testifies to their exclusively prehistoric nature. The work undertaken by OMSI has been summarized in a series of unpublished descriptive reports (Gannon 1968, 1970, 1972, 1975, 1978, 1979; Johnson 1972; Atherton and Houck 1976; Knapp 1979; Mazany 1980). In-depth data analyses of sites 35WH7 and 35WH14 form the core of this dissertation.

Other than OMSI's work, the Study Area has to date seen little systematic fieldwork and study. Alex D. Krieger was the first professional archaeologist to report on the area (Krieger 1938). After touring sites and collections near the mouth of the John Day River, Krieger visited three rockshelters (two of them with pictographs), a housepit site, a pictograph site and possible burials in the Rock Creek area. Twenty-three depressions were counted at the pithouse site (Rock Creek #3), ranging from 10-27 feet in diameter and from 1-3.5 feet in depth. An isolated group of four small pits of 5-6 feet in diameter east of the larger grouping is interpreted as menstrual seclusion huts (Krieger 1938:9). This description represents one of the few archaeological accounts of a housepit site located in a tributary canyon of the John Day River.

After a sojourn in the Spray-Service Creek area (see Upper John Day River), Krieger investigated what is now known as Butte Creek Cave (35WH1) near the town of Fossil. Three grass- and rock-lined pits measuring about seven feet in diameter were observed in the cave, with closer investigations producing a variety of perishable artifacts, including a large twined basketry tray, sewed tule matting, cordage, rope, and worked wood. Additional materials from Butte Creek Cave were viewed in a private collection, including a bison horn cup, four mountain sheep horns, an antler digging stick handle, as well as "a good variety of points and blades" (Krieger 1938:12-13).

Krieger's archaeological account of the lower John Day drainage concludes with his description of two caves in the Pine Hollow or Pine Canyon area on the left bank of the river. Pictographs and a burial were observed in one of these, Pine Hollow #1, as well as three pits which were initially considered large enough to be housepits, though Krieger seems to have subsequently decided that they were probably "only sleeping pits made to cut off some of the force of the winter winds" (Krieger 1938:18). The depressions measured from 8-14 feet in diameter and between 2 and 2.5 feet in depth. All were lined with grass, and several boulder metates had been piled between two of the depressions.

Luther S. Cressman visited the John Day region eight years later in 1946 to investigate the possibility of a southward movement of Paleo-Indians from the Columbia River to the Great Basin via a John Day River corridor. While his reconnaissance contributed little towards the resolution of this particular problem, it did result in further excavations at Butte Creek Cave which produced a human burial in association with a rabbitskin blanket or cape, wolverine fur, feather-wrapped string, a large Catlow Twine basketry plaque, and a dog burial (Cressman 1950). The latter was subsequently dated to 400 ± 150 B.P. (Chatters 1968). Cultural affinities to the rest of the Columbia Plateau were proposed on the basis of certain triangular scrapers and physical characteristics of the burial, while other traits suggested connections to the Southwestern United States (burial style, rabbitskin cape, and feather-wrapped cord) and the Northern Great Basin (Catlow Twine style basketry) (Cressman 1950:378-382).

In the following two decades, work along the John Day focused near the mouth of the river where the University of Oregon, under contract with the National Park Service, conducted an extensive salvage program in connection with the construction of the John Day Dam. Following the initial survey of the reservoir area under the Smithsonian Institution's River Basin Surveys program (Shiner 1950), 33 sites threatened by the proposed dam construction were tested or excavated over the course of eleven field seasons prior to the filling of the pool in 1968 (Toepel, Willingham, and Minor 1980:94-104). The most important of these, the Wildcat Canyon Site (35GM9), produced a cultural record spanning at least 8000 years, and more than 450 cultural features, including housepits and other occupation surfaces, human and dog burials, hearths, ovens, and thirteen deep prehistoric wells excavated to provide access to ground water during the arid Altithermal (Dumond and Minor 1983). Artifacts include a wide range of chipped and ground stone, as well as worked bone and shell. Because of the importance of this site in establishing a chronology for the lower John Day River and its immediate relevance to the present investigation, this study will be now treated in somewhat greater detail.

On the basis of stratigraphic relationships, an extensive array of radiocarbon dates, and a large sample of projectile points, Dumond and Minor propose a temporal sequence of four phases with characteristic artifact assemblages, features, and subsistence activities. Pre-Mazama occupation at the site is represented by the Philippi Phase, dated to between 9000 and 7500 B.P., and considered to be homologous with the Windust Phase of the Lower Snake River (Leonhardy and Rice 1970). Food resources utilized include artiodactyls and some plant foods (Dumond and Minor 1983:155-157). The Canyon Phase, a homologue of the Cascade Phase as identified along the Lower Snake River, is dated to about 6500-5000 B.P. Postulated subsistence activitites include the hunting of artiodactyls, gathering, and milling (Dumond and Minor 1983:157-158). The Wildcat Phase (2500-1000 B.P.) follows the Canyon Phase after an occupational decline or hiatus of 2500 years. A cemetery is assigned to the early subphase of the Wildcat Phase (2500-2000 B.P.), while all evidence of dwellings appears to be associated with its middle subphase

(2000-1500 B.P.). Both winter and summer houses are inferred for the site. Foods include bison, deer, mountain sheep, mountain goat, freshwater shellfish, and fish, as well as possibly dogs (Dumond and Minor 1983:158-162). Block and slab milling stones, as well as pestles also suggest the preparation of plant foods. A shift in cultural orientation from the Snake River downstream towards the Lower Columbia River is postulated for the Quinton Phase, which begins at about A.D. 1000 and is thought to terminate with the appearance of substantial Euroamerican influence. Subsistence activities include the hunting of bison, deer, and mountain sheep, as well as probably elk and mountain goat. Fishing is in evidence along with with gathering and milling (Dumond and Minor 1983:162-163).

While Euroamerican trade goods are all but absent at 35GM9, they represent a major proportion of the assemblage at 35GM22, located on the right bank of the John Day River about 1.5 miles upstream from its confluence with the Columbia. Two housepits of a total of between eight and ten were excavated at this site in 1960 in conjunction with the John Day Reservoir salvage project. A mix of Native American and Euroamerican artifacts, including, among others, such cross-cultural analogs as shell disc beads and shell buttons, a leather shoe and a leather legging, an abalone shell pendant and a locket, and a linoleum-covered house floor, suggests closely spaced occupations in the 1860's or 1870's and is thought to reflect the social changes experienced by native peoples at this time (Endzweig 1985).

The 1970s saw renewed efforts along the lower course of the John Day River. An archaeological survey, covering a 10-20% sample of the lower 160 miles of the river, was conducted in 1975 by the Bureau of Land Management (Polk 1976). This investigation recorded 76 prehistoric sites, including rockshelters, open sites, a quarry, and sites with rock features (talus pits and rock piles) and rock art. Of particular interest was the identification of 47 habitation sites with more than 200 housepits. Other work included a small survey of the proposed John Day Fossil Beds National Monument (Davis 1977), and the testing of site 35GM25 at the mouth of Thirtymile Creek in conjunction with a Pacific Gas Transmission Co. pipeline relocation project (Cole 1973). During the former undertaking, a pictograph site and an isolated hopper mortar base were found. The testing at 35GM25 produced 59 tools (flaked stone, cobble tools, and hammerstones), five of which were classifiable projectile points. These were felt to date to between 500 B.C. and A.D. 600, based on comparisons with points from other sites in the general area.

It was not until the 1980s that archaeological work was carried out in the region with an explicit problem orientation and research design. A survey of the Narrows area of the lower John Day, in 1982, located nine previously unrecorded sites and tested nineteen (Wilde et al. 1983). An age range of 7000 B.P. to late prehistoric times was suggested for those sites from which temporally sensitive projectile points and/or datable charcoal samples were recovered. Based on the absence of housepits, it was proposed that the residential sites were occupied during the spring and summer months by people who spent their winters at the Wildcat Canyon site, at least during the Wildcat Phase (2500-1000 B.P.), when pithouses appear at Wildcat Canyon. It was further suggested that this seasonal relationship may have been established prior to this date. After 1000 years ago, both areas were apparently utilized during the summer, possibly by ancestral Tenino (Wilde et al. 1983). More extensive excavation in 1984 at the Morris Site (35GM91), one of the sites recorded at the Narrows, confirmed a spring to fall occupation based on faunal and macrobotanical remains. It failed, however, to provide the desired evidence for intensification of salmon fishing, which was felt by the authors to be causally linked to the development and spread of pithouse villages in the region (Schalk 1987).

Archaeological fieldwork conducted during the present decade, finally, includes test excavations at site 35GM119 in the upper canyon of Hay Creek west of the town of Condon (Oetting 1993a), and testing and data recovery undertaken in conjunction with contruction of a gas pipeline which will cross the John Day River in the vicinity of Thirtymile Creek (Jackson et al. 1990; Moratto et al. 1991). Investigations at 35GM119 revealed a dense prehistoric component of up to one meter in depth which produced 151 tools, including projectile points, bifaces, used flakes, cores, an incised carnivore canine, and several pieces of polished bone, as well as cobble tools and ground stone. A radiocarbon date of 820 ± 70 B.P., recovered on a composite sample of charcoal, together with the exclusively narrow-necked projectile point assemblage, supports a Late Archaic age assignment for this single-component site. It is interpreted as a "short-term camp, used as a temporary residential base for hunting and acquiring foods but not for extended stays" (Oetting 1993a:iii). Evaluation and analysis of pipeline excavations are ongoing and are expected to contribute further information on this relatively unknown part of the southern Plateau (Moratto et al. 1990, 1991).

Investigations on the lower John Day River have been intermittent and generally either haphazard or salvage-driven. This has resulted in a rather patchy picture of the prehistory of this region. The more comprehensive studies of the last two decades suggest its potential, however, and indicate considerable time depth as well as a relatively high density and diversity of sites. Of particular interest is ample evidence of habitation sites well upstream from the Columbia River. This picture differs substantially from that for the upper reaches of the John Day.

Archaeology of the Upper John Day River

Even less systematic archaeological research has been undertaken in the dissected Blue Mountain uplands upstream from the Study Area. Fieldwork, with few exceptions, consists of testing and mitigation projects conducted by federal and state agencies in compliance with cultural resource protection laws. Circulation of results is limited. The number of prehistoric archaeological sites recorded in this region is, however, indicative of its untapped potential. An inventory of sites on lands administered by the Prineville BLM District (which also includes a number of sites situated on adjacent, non-BLM lands), for example, records 90 sites along the middle mainstem of the John Day River (south from and excluding the present Study Area and extending to the confluence of the North Fork and mainstem), compared to 88 archaeological sites reported from the Lower John Day (Lebow et al. 1990:Table 4.4). Site counts drop dramatically farther upstream, however, with only eight sites recorded for the upper mainstem, and the North, Middle, and South forks. This decline is probably a function of decreased lands under BLM administration, as suggested by counts of 284 aboriginal sites from the Paulina District of the Ochoco National Forest (west of the South Fork of the John Day) (Oetting 1986b:Table A-2), and 767 from the Malheur National Forest to its east (Steggell 1982:12).

A qualitative difference in aboriginal use of this region is indicated by a change in distribution of site types. While "open sites," defined as "sites with features, such as housepits or rock rings" (Lebow et al. 1990:90), make up 48.9% of BLM sites on the Lower John Day, the proportion decreases to 5.6% on the middle mainstem. No sites of this type are recorded on BLM lands in the upper reaches of the river (Lebow et al. 1990:Table 4.4). Of the 456 prehistoric sites recorded in the Ochoco Mountains of the Ochoco National Forest, only four, or less than one percent, represent habitation sites (Minor et al. 1987:Table 6-1). A generally ephemeral use of these uplands is supported by subsurface investigations in the area, as will be seen below. The following summary is far from comprehensive and discussion of CRM projects conducted during the 1980's and 1990's is by necessity biased towards the districts of the agency archaeologists who generously shared reports and research results for this study. The information does, however, provide some insights into prehistoric use of the area and is therefore included in this review. Except for investigations by Cressman and Krieger in the first half of the century, all information presented in the following summary is drawn from studies conducted in the 1980s and 1990s. The discussion therefore proceeds progressively farther upstream, rather than chronologically, as in the previous section.

The earliest professional investigations upstream from Clarno include Luther Cressman's rock art research in the Picture Gorge, Dayville, and Prairie City area (Cressman 1937), and Alex Krieger's archaeological reconnaissance of north-central Oregon, mentioned earlier in the review of lower John Day River studies (Krieger 1938). Krieger reports an examination of three sites in the Spray-Service Creek area which he refers to as Snabel 1, 2, and 3, after the local landowner. Snabel 1 appears to have been an open site, which produced girdled sinkers and pestles, as well as a variety of "points and blades," prompting Krieger to comment on an increase in obsidian over sites on the Columbia River (Krieger 1938:11). Snabel 2 and 3 are both described as pithouse sites, the former represented by four or five depressions measuring ten to fifteen feet in diameter, the second by three depressions for which no dimensions are given, except that they are considered to be "all quite small" (Krieger 1938:11). Nine scrapers and nine arrrowpoint fragments were collected from Snabel 3, while two metates were observed but not retrieved.

Krieger's observation that "It is doubtful that much could be gotten from this area with further work...." (Krieger 1938:11), appears not to have dissuaded Luther Cressman, who returned to the Snabel Ranch in 1946 to excavate two housepits (it is not clear whether at one of the sites described by Krieger) (Cressman 1950:382). Cressman's reaction to the local resources was, however, similarly unenthusiastic, when they "produced little or no material of value" (Cressman 1950:382). Some information is given on the housepits, however, one of which contained three large flat stones or possibly metates which Cressman thought may have served as post supports in the soft tuff deposits of the site, while one pit exhibited "several charred fragments of poles two to three inches in diameter" (Cressman 1950:382). Cressman noted that there were other housepits in the area which might provide information on local dwellings, but further work was not undertaken. Further investigations along terraces of the John Day River, the South Fork of the John Day, and Bridge Creek west of Mitchell produced negative results (Cressman 1950:385).

Survey and testing in the Cherry Creek and Muddy Creek drainages, west of the John Day River and southwest of Pine Creek, were conducted in 1984 and 1985 by the Prineville District Bureau of Land Management in conjunction with a proposed land exchange (Crowley Thomas 1986). No formal report has been published covering the second year's work, which proved to be by far the more productive of the two. Perhaps the most significant finding was the presence of five housepit sites among the 35 sites located during this phase of the project. Radiocarbon dates on charred wood from the floors range from 1550 ± 130 B.P. to 190 ± 60 B.P. (Crowley Thomas 1986).

Testing and data recovery were undertaken at Mitchell Cave (35WH122) in preparation for a highway realignment project (Jenkins 1988; Connolly et al. 1993). Located along a small unnamed tributary to Keyes Creek, itself a tributary to Bridge Creek which drains into the mainstem of the John Day River, the site is interpreted as a specialized hunting camp. Radiocarbon dates of 140 ± 70 B.P., 280 ± 90 B.P., 1020 ± 100 B.P., 1430 ± 90 B.P., and 1430 ± 120 B.P. represent two major cultural components (from 1500 to 1300 or possibly 1000 years ago, and after 300 to 400 years ago). Projectile points, the most commonly recovered tool type, are thought to have been brought to the site in finished form (Connolly and Jenkins 1993:130). Other artifacts include drills, knives, choppers, and cores, boulder anvils, mauls, and a possible abrader or rubbing stone. Stone and shell pendants, and shell, stone, and bone beads complement the otherwise utilitarian assemblage. Artiodactyls dominate the faunal remains, however jackrabbits, cottontails, pocket gophers, ground squirrels, and woodrats also suggest the use of smaller mammals. A cultural affiliation with Columbia Plateau peoples to the north is postulated (Connolly and Jenkins 1993:130-131).

Reid and Gallison (1992) report on the testing of the Crane Flats Site, a lithic scatter situated on the north slope of the Greenhorn Mountain range in the drainage of the North Fork of the John Day River. The presence of two cultural components is indicated by two Rosegate series projectile points assigned by the authors to approximately A.D. 600-1300, as well as a cooking hearth radiocarbon-dated to 2360 ± 90 B.P. A second hearth is thought to have functioned in the heat-treating of chert. Distinct reduction technologies are identified for locally available CCS and exotic obsidians, a similar pattern to that observed below by Flenniken et al. (1992). Five obsidian specimens submitted for x-ray fluorescence analysis are sourced to Dooley Mountain, ca. 65 km southeast of the site. This appears to indicate a reorientation from obsidian sources represented at other sites in the upper John Day region, most of which are located farther south and west (see also Chapter 7). Reid and Gallison observe an increase in numbers of radiocarbon-dated upland camps in the interstade between the two most recent Neoglacial advances, suggesting that temperature and precipitation may have conditioned occupation of these areas (Reid and Gallison 1992:32).

The Cannon Site, at the confluence of Long Creek, a tributary to the Middle Fork of the John Day River, and an unnamed tributary, is situated at an elevation of 3500 feet, some 2000 feet lower than most of the sites discussed so far. Tested as part of a Grant County Talented and Gifted Program (Jaehnig 1985), the site remains the only habitation site investigated in the area. A minimum of 13 house depressions are reported, ranging from three to seven meters in diameter and from 0.10-0.83 m in depth. Portions of three depressions were excavated, and produced 75 formed tools, including 51 projectile points, as well as drills, scrapers, biface fragments, and a few bone items of worked bone. No ground stone is reported, though this could be a function of the limited area excavated (ten 1 x 1 m units). While no radiocarbon dates were obtained from the site, most projectile points are thought to represent Columbia Plateau types dated to within the last 2000 years. A second, earlier component predating 4000 B.P. is tentatively associated with a paleosol underlying the house floors. Multiple floors do not appear to be present. Further inferences regarding the use of the Cannon site are limited, but current information does suggest that occupation of the area was not limited to the temporary camps which make up the majority of sites investigated in the upper John Day drainage so far.

Test excavations at Big Baldy #1, 5 km east of the Middle Fork of the John Day, encountered a hearth with a modern C14 date, as well as a variety of projectile point types, bifaces, unifaces, and ground stone, including mano fragments and a pestle. Repeated and infrequent temporary occupations involving tool production and maintenance, processing of plant foods and game are postulated, beginning after 10000 B.P. and lasting into the last 2000 years (Morris and Goheen 1981).

Testing of 35GR1507 near the confluence of Cottonwood Creek and the South Fork of the John Day River produced evidence of two spatially discrete components. One is represented by a scatter of flaked and ground stone tools and a well-preserved hearth radiocarbon-dated to 1030 ± 70 B.P. The second component, radiocarbon-dated to 4370 ± 70 B.P., is manifested by a concentration of diverse cultural materials, including a grinding slab, projectile points, cores, abraders, and edge-modified flakes, and is thought to represent an occupation surface, possibly a house floor (Byram 1993).

Data recovery at four sites in the drainage of Wind Creek, an ephemeral tributary of the South Fork of the John Day River, produced a variety of cultural materials and an impressive suite of radiocarbon dates, ranging from 4030 ± 190 B.P. to 880 ± 80, with most, however, falling between roughly 1700 and 3000 B.P. (Armitage and Burge 1986). Artifacts include projectile points, bifaces, unifaces, and cobble tools, as well as an assortment of ground stone tools including pestles, manos, possible shaft straighteners, and 34 grinding stones. Three temporal components are postulated, extending from 4000 B.P. to 2800 B.P., 2800 B.P. to 2400 B.P., and from 2400 B.P. to historic times, as evidenced by a glass seed bead and a rolled copper bead. Activities at sites 35GR159 and 35GR147 are thought to have focused on bifacial reduction with secondary subsistence-related activities, while at 35GR148 and 35GR162, a "fuller range of activities is represented as demonstrated by a larger number of tool types, with a strong focus on plant processing, especially at 35GR162" (Armitage and Burge 1988:8).

Nine nearby sites in the vicinity of Beaverdam Creek, technically in the Crooked River drainage, show a complementary pattern, with both hunting-related tools and manos and metates. The Beaverdam Creek sites are interpreted as "short-term camps or day-use locations" which are thought to have been occupied by integrated family groups (Erlandson and Moss 1984:5). Radiocarbon dates place occupation of 35CR29, the focus of investigations, within the last 2500 years (1910 ± 80 B.P., 1950 ± 60 B.P., 2490 ± 70 B.P.). A late prehistoric age is also postulated for the remaining sites, though it is suggested that larger projectile point types may represent earlier occupations.

Archaeological testing and evaluation of the Rough Site (35CR616), on the Big Summit Ranger District of the Ochoco National Forest (also near the headwaters of the Crooked River) produced a diverse assemblage including hopper mortar bases, two matching portions of a pestle, girdled hammerstones, an incised and worked piece of basalt that may represent a pipe fragment, bifaces, projectile points, unifaces, and flake debitage. While a radiocarbon date of 7355 ± 65 B.P. was returned from near the surface of a paleosol, the existence of a pre-Mazama cultural component is considered unlikely by the authors (Flenniken et al. 1992:35), although a slightly bimodal distribution of obsidian hydration rind thicknesses suggests the existence of more than one temporal component. A second date, of 3430 ± 200 B.P., is probably associated with a cultural occupation. Obsidian analyzed from the site by x-ray fluorescence was sourced to Quartz Mountain, Glass Butte, Cougar Mountain, and five unknown sources. The site is interpreted as a "high elevation residential base camp [used] to exploit local floral resources" (Flenniken et al. 1992:ii).

Data recovery was undertaken at the Trailhead Site (35GR573) and the Spring Site (35GR572) on the south slope of the Aldrich Mountains because of proposed trailhead development by the Malheur National Forest. Two flaked stone tool fragments and lithic debitage were recovered from the Trailhead Site (along with a composite charcoal sample radiocarbon-dated to 210 ± 50 B.P.), while excavations at the Spring Site produced projectile points, a knife, several biface fragments, and expedient grinding stones. A large hearth measuring about two meters in diameter may have functioned in heat-treating CCS. Radiocarbon dates from the Spring Site include 960 ± 60 B.P., 1480 ± 60 B.P., 1560 ± 60 B.P., 1780 ± 90 B.P., and 2260 ± 90 B.P. (Baldwin 1993). Twenty-four obsidian artifacts submitted for x-ray fluorescence were sourced to obsidian sources in the vicinity of Seneca (Hughes 1994).

Analysis of obsidian flakes from 35GR750 in the southern Strawberry Mountains, near the confluence of Canyon Creek and the John Day River, included hydration, x-ray fluorescence, and technological study (Jaehnig 1989). While no radiocarbon dates have been obtained from the site, and no temporally diagnostic artifacts were present, hydration measurements suggested to the author a relatively recent age (within the last 2500 years). The obsidian recovered was tentatively associated with nodules collected from the adjacent stream bed. Technological analyses suggested that "prehistoric site occupants were engaged in reducing raw material to blanks and preforms. It appears that more secondary reduction, primarily the manufacture of blanks and/or preforms from cores and flake blanks, took place than primary reduction (Jaehnig 1989:ii). A similar analysis of lithics from site A461-083 in the Bear Valley District of the Malheur National Forest indicated maintenance of hunting tools (as evidenced by the presence of broken and exhausted dart points), as well as the reduction of flake blanks into dart points. A Late Archaic use of the site is suggested by technological analyses and hydration (Flenniken et al. 1988).

A cultural resources survey of Grant County lands north of the Aldrich and Strawberry mountain ranges, finally, was conducted by Eastern Oregon State College in 1980 through 1982 for the Malheur National Forest and Oregon Range and Related Resources Evaluation Area Project (Patterson et al. 1982). A total of 451 management practice areas were investigated with special attention to high probability areas including springs, streams, and rock outcrops. Thirty-five prehistoric archaeological sites were recorded, including ten open lithic scatters, three plant processing sites located on dry ground immediately above small wet meadows (Patterson et al. 1982:52), twenty isolated finds, two cambium-peeled trees, one possible petroglyph site and one rock cairn (multiple feature types occurring at individual sites account for the numerical discrepancy). Of the eleven sites subjected to limited test excavation, only three produced subsurface deposits, which were, however, confined to waste flakes within the upper 30 cm. None were considered to be significant in terms of National Register eligibility. A pattern of low-density use is postulated, with the majority of sites representing hunting-related activities (Patterson et al. 1982:51).

Most of the studies reviewed above suggest a short-term and transitory, albeit probably repeated use of the upper John Day River area. The Cannon Site, with thirteen house depressions, is an exception, and suggests that the full range of site types remains yet to be discovered. Hunting-related activities are most often observed, represented by projectile points and a variety of bifacial and unifacial tools. Increasingly popular technological analyses point towards a prevalence of curated tool kits, including finished projectile points, and blanks which could be further reduced as needed. Obsidian is most common, although locally available raw materials may be utilized in the production of expedient tools, and at least two sites may show evidence of heat treatment of local cherts. Grinding stones, while not ubiquitous, are not uncommon, and probably reflect processing of plant resources, although they may also have been used in the processing of small game and the crushing of longbones for marrow extraction. The question of cultural affiliation remains inconclusive, with projectile points assigned to Great Basin or Columbia Plateau stylistic types according to the expertise of the analyst, although some exceptions have been mentioned. Radiocarbon dates, while not available for all sites, suggest intensified use within the last 2500 years, which account for 24 (80%) of the 30 available dates.

Archaeological Investigations in the Pine Creek Basin

In light of the limited distribution of reports documenting previous archaeological work in the Pine Creek basin, excavations undertaken by personnel from the Oregon Museum of Science and Industry and Oregon State University between 1967 and 1980 are summarized with emphasis on questions of relevance to the present study. This is followed by a synopsis of the Pine Creek Archaeological Survey, a surface reconnaissance conducted by the author prior to the present analysis, reported elsewhere in detail (Endzweig 1992).

Excavations

35WH13

Site 35WH13, or Indian Canyon-II, is located at the head of Indian Canyon about 4 km north of Pine Creek and 4 km east of the John Day River. It is situated adjacent to a 10 m high cliff of ash-flow tuff (Gannon 1975) on the western terrace of an ephemeral stream which is thought to have been spring-fed and perennial prior to the impact of grazing at the turn of this century (Mazany 1980:5). Excavation of this site was begun in 1970 under the direction of Brian Gannon, and continued every year through 1980 except 1972. Fieldwork was directed by Andy Knapp and Terry Mazany during the final years of excavation (Knapp 1979; Mazany 1980). Approximately 172 m^2 of deposits were excavated to an average depth of about one meter during the course of the project.

Two major components were identified at the site, comprised of seven occupation layers. The lower component produced radiocarbon ages of 1545 ± 100 B.P. and 1460 ± 100 B.P. A date of 1020 B.P. marks the transition to the upper component which, in turn, is associated with dates of 570 ± 80 B.P. and 335 ± 90 B.P. A change in subsistence is thought to have taken place between the two major periods of site use. The lower component is characterized by a large number of millingstones, leading to its interpretation as an intensive, communal, seed processing location (Mazany 1980:10).

Red or yellow staining was observed on the grinding facets of 26% of the 110 millingstones recorded at Indian Canyon-II (N=29). This characteristic is, in particular, associated with the lower levels of the site (Mazany 1980:15). Based on this circumstance, Mazany postulates the "presence of festive or ceremonial activities accompanying the communal food processing" (Mazany 1980:15), which is cited as additional support for use of the site by a larger group than merely individual families. The true function(s) of the remaining grinding stones is not known. While Mazany sees them as evidence for seed-processing, Gannon, citing a 1977 oral communication by James Selam, a contemporary John Day Tenino man, alternatively suggests that they may have primarily served in pulverizing roots, berries, and possibly meat (Gannon 1978:n.p.). This may be supported by the large proportion of split long-bone fragments at the site.

In the upper component, on the other hand, millingstones are less prevalent. Instead, concentrations of cobbles are common, many of which incorporate scavenged complete and broken millingstones. These features are interpreted as the remains of cobble-filled pit ovens. An additional characteristic of the upper component is an increase in animal bone. Mazany postulates a shift to a "more balanced economy," featuring both hunting and gathering (1980:10). A segregation of activities is proposed, reflected by a clustering of pit ovens in the north and milling stones in the southern portion of the site.

Faunal remains recovered from Indian Canyon-II include deer, coyote, woodrat, jackrabbit, brushrabbit, bobcat, beaver, porcupine, as well as minor quantities of freshwater mussel (Gannon 1977). Artifacts are dominated by a variety of lithic tools, including projectile points, scrapers, knives, "blanks," drills, cores, a few bone tools, and more than 3,000 utilized flakes (Gannon 1978:n.p., Mazany 1980:16).

The latest occupation of 35WH13 is marked by the presence of Desert Side-Notched points, which occur "in localized parts of the site," or as "a discrete component at the site" (Gannon 1975:n.p.), and a "mildly barrel-shaped" blue glass bead which was recovered together with 15 tubular bone beads resembling the glass bead in size and shape (Gannon 1978:n.p.). An association with nearby Feature 47, a hearth radiocarbon-dated at 335 ± 90 B.P. is suggested. Two rolled copper beads are mentioned, but their provenience is felt to be uncertain (although at least one appears to have been found in close proximity to three Desert-Side-Notched points and the already-mentioned glass and bone beads (project files, Oregon State Museum of Anthropology). An unpublished radiocarbon date of 0 ± 80 B.P. (GaK-3865) from a burned twig or limb in the same general area appears to have been rejected.

35WH2

Site 35WH2, also known as Pentacost Shelter, or Cove Creek-1, is located 30 m west of intermittent Cove Creek, about 2.5 km north of Pine Creek and 4 miles east of Clarno. The site is 11 m long and 1.5 to 2 m wide, and is situated at the base of an eight to ten meter high cliff of welded tuff (Riggs 1968). Because of this, it is designated as a rockshelter by Riggs although it might, alternatively, be referred to as a sheltered open site. The site was excavated in 1967 and 1968 by Jim Riggs, at that time a student at Oregon State University. As of May 1969, 19 m^3 of fill had been removed (project files, Oregon State Museum of Anthropology).

Artifacts recovered from 35WH2 include a large amount of flake debitage, along with projectile points, bifaces, knives, cores, used and worked flakes, scrapers, drills, choppers, grinding stones, a category identified as "microblades," three pieces of incised shale, and a few bone artifacts. A large number of "gravers and burins" make up 23% (N=75) of what appears to be the 1967 tool inventory (excluding unworked flakes) (Riggs 1968). Faunal remains are identified as deer, coyote, woodrat, jackrabbit, brushrabbit, gopher, ground squirrel, large bird, and fish. Features recorded include a large "aggregation of manos and metates," and a hearth encountered approximately 2 m below the present ground surface near the base of the deposits (Riggs 1968, Appendix). A few small pictographs of red ochre, were, in addition, present on the cliff wall, as was evidence of the recent, illicit removal of others. Deposits at 35WH2 were found to be culturally continuous (Riggs 1968:4). No radiocarbon dates appear to have been obtained from this site, but a sample of projectile points illustrated in Riggs' 1968 report is consistent with styles observed at 35WH7 farther up Cove Creek (this study), suggesting a relatively late, although exclusively prehistoric, occupation.

35WH21

Site 35WH21 is located in Jones Canyon, on the western edge of an intermittent stream channel that drains southward into Pine Creek. Situated approximately 1 km north of Pine Creek, the site was recognized by the presence of two house depressions, five meters in diameter and 18 m apart. These were the focus of OMSI fieldwork during the summers of 1971, 1972, 1975, and 1976 (Atherton and Houck 1976; Gannon 1972, 1978), which resulted in the excavation of 52 one-by-one meter units to a maximum depth of 1.2 m, or a combined volume of 35.25 m^3. Work at 35WH21 was subsequently abandoned in favor of 35WH13, which was more immediately threatened by vandalism.

Several distinct living floors were identified in both house depressions based on the coincidence of burned structural members and thatch, milling stones, and concentrations of other types of artifacts. None of the floors were completely exposed, however. In Housepit 1, the southern of the two depressions, a floor was exposed at a depth of approximately 75 cm and radiocarbon-dated to 360 ± 80 B.P. and 300 ± 75 B.P. A date of 140 ± 75 B.P. from Housepit 1 was considered to be contaminated and therefore rejected. In Housepit 2, one floor was identified within 10 cm of the ground surface, and a second at approximately 1 m depth. Dates of approximately 390 ± 65 B.P. and 875 ± 115 B.P. were returned on charcoal from the lower floor (project files, Oregon State Museum of Anthropology). Artifacts recovered include projectile points, bifaces, knives, drills, gravers, cores, core tools, and scrapers, as well as a large amount of lithic debris. Animal bone was not identified in the published reports.

The Pine Creek Archaeological Survey

Previous archaeological fieldwork in the Study Area has been conducted on a largely intuitive basis. Sites have been identified as a result of local word-of-mouth and in the course of forays up selected canyons. The only radiocarbon-dated sites are located along Cove Creek, Indian Canyon, Jones Canyon, and Pine Creek. These range in age from 2580 ± 40 B.P. to 300 ± 75 B.P. (Table 1). At the inception of the present study, it was not clear whether the relative recency of these occupations was a function of cultural factors or of the investigative bias towards canyon bottoms, areas that may have been subject to

Table 1. Radiocarbon Dates from the Pine Creek Basin and Vicinity (based on Gannon 1978 and unpublished sources)

Site	Sample number	Age
35WH1	WSU 300	400 ± 150 B.P.
35WH7	Gak-2727	350 ± 90 B.P.
35WH7	Gak-2176	468 ± 80 B.P.
35WH7	Gak-3309	470 ± 90 B.P.
35WH7	Gak-2726	580 ± 120 B.P.
35WH7	Gak-2728	1160 ± 90 B.P.
35WH7	Gak-2725	2230 ± 90 B.P.
35WH7	Gak-2177	2380 ± 100 B.P.
35WH13	QC-465	335 ± 90 B.P.
35WH13	Gak-3866	570 ± 80 B.P.
35WH13	QC-791	1020 ± 100 B.P.
35WH13	QC-135	1460 ± 100 B.P.
35WH13	QC-137	1545 ± 100 B.P.
35WH14	A-2604	890 ± 20 B.P.
35WH14	A-2602	1500 ± 25 B.P.
35WH14	A-2603	2450 ± 40 B.P.
35WH14	A-2605	2580 ± 40 B.P.
35WH21	QC-464	140 ± 75 B.P.
35WH21	QC-136	300 ± 75 B.P.
35WH21	Gak-3867	360 ± 80 B.P.
35WH21	QC-138	390 ± 65 B.P.
35WH21	QC-134	875 ± 115 B.P.
35WH198	Beta 14338	190 ± 60 B.P.*
35JE223	Beta 14336	1140 ± 70 B.P.*
35WS210	Beta 14335	550 ± 50 B.P.*
BLM OR-05-447	Beta 14337	630 ± 60 B.P.*
BLM OR-05-447	Beta 14339	1510 ± 60 B.P.*
BLM OR-05-452	Beta 14340	1550 ± 130 B.P.*

* Muddy Creek drainage, courtesy of Prineville District BLM

geomorphic processes obscuring an earlier archaeological record. A systematic survey was therefore undertaken in July of 1990 by the Oregon State Museum of Anthropology, funded by a matching grant from the Oregon State Historic Preservation Office and directed by the present author. The results of the survey have been reported elsewhere (Endzweig 1992) and are only briefly summarized in the present context.

In the Pine Creek Archaeological Survey (PCAS), a stratified random sampling strategy was employed in order to provide more representative coverage of the drainage basin. By examining parcels dispersed throughout each of the six represented townships, sample units both north and south of Pine Creek, and at varying distances upstream from the John Day River, were included. To avoid the drainage-based focus of prior work, the sample was, in addition, stratified by distance to permanent water. It was hoped that this approach would provide both new site information, as well as a baseline against which the distribution of previously reported sites could be evaluated. Survey design and methodology have been detailed elsewhere (Endzweig 1992) and will not be discussed here. A synopsis of findings is presented to set the stage for further discussions.

A total of 23 eighty-acre parcels, comprising 4% of the Pine Creek basin's 43,233 acres, was surveyed during the course of this project. Twenty-four previously unrecorded sites were identified, including lithic scatters, lithic and ground stone scatters, quarries, and at least one habitation site with five small house depressions. Eight cairns and ten artifact isolates were, in addition, noted. Table 2 summarizes descriptive information for all sites and isolates currently recorded within the Pine Creek drainage.

The large proportion of sites (63%) and isolates and cairns (37%) recorded along the divide between the Pine Creek and Butte Creek basins clearly attests to the value of a systematic approach to archaeological reconnaissance in the Study Area. This is particularly evident in light of the resulting discovery of two sites exhibiting Early Archaic components. These are the earliest sites presently known from the region. Both are located on the basalt tableland separating the basins of Pine Creek and Butte Creek and both are centered on the same unnamed spring, with one site (35WH166) located to its north and one (35WH168) to its east. In addition to their proximity to the spring, both sites are located within 100 m of the upper reaches of the west fork of Butte Creek. Temporal assignment of material at both sites to the Early Archaic and Early Middle Archaic is based on diagnostic projectile point styles and the presence of edge-faceted cobbles. Volcanic ash exposed in animal burrows together with cultural materials at 35WH168, in addition, exhibits a refractive index consistent with Mazama ash (Will Scott, USGS Cascade Volcano Observatory, personal communication, May 1991). While not exceedingly large (5,000 and 6,400 m^2), these sites exhibit high densities of cultural materials and a substantial range of tool types, including both flaked and ground stone implements, perhaps a reflection of their long history of prehistoric occupation (Early to Late Archaic).

Table 2. Descriptive Information for Sites and Isolates in the Pine Creek Basin[1]

Temp. Number	Perm. Number	Site Type	Elev.	Slope	Aspect	Prim. Landfm.	Veg.	Dist. Water	Water Type	Area	Cult. Mat.	Obs.	Coll.	Age	Recorder	Status
C5-1	35WH157	QUA	1960	30-40	N-NW	RIDGE	SSJ	200	PS	750	C	-	-	?	PCAS	A
C29-1	35WH158	QUA	1920	30-40	NW	RIDGE	SSJ	150	PC	1000	C	-	-	?	PCAS	A
C71-1	35WH159	LS	2960	0-5	NW	RIDGE	SSJ	200	IS	2500	B	-	-	?	PCAS	A
C71-2	35WH160	LS	2720	0-20	SW-W	RIDGE	SJ	30	IS	2100	B	-	-	?	PCAS	A
C71-3	35WH161	LS	2740	0	--	HILL	SSJ	25	IS	1000	C	+	-	?	PCAS	A
C106-1	35WH162	LS	3760	5-10	S	TABLELD	SSJ	80	SPR	6400	C	+	+	?	PCAS	A
C106-2	35WH163	LS	3740	0	--	TABLELD	SS	200	SEEP	1800	B	-	-	?	PCAS	A
C106-3	35WH164	LGS	3730	0	--	TABLELD	SSJ	0	SEEP	14000	D	+	+	C	PCAS	A
C106-4	35WH165	LS	3710	5-10	E	TABLELD	SSJ	0	SEEP	7000	C	-	+	C?	PCAS	A
C106-5	35WH166	LGS	3700	10	NE-E	TABLELD	SSJR	0	SEEP	6400	D	+	+	ABC	PCAS	A
C106-6	35WH167	LGS	3720	0	--	TABLELD	S	0	SEEP	2500	C	+	+	C	PCAS	A
C106-7	35WH168	LGS	3680	0	--	TABLELD	SSJR	30	SPR	5000	D	+	+	ABCD	PCAS	A
C106-8	35WH169	LGS	3720	0-5	W	TABLELD	SS	100	SEEP	1350	C	-	-	?	PCAS	A
C107-1	35WH170	LS	3840	5-10	W	TABLELD	SJ	80	SEEP	2100	B	-	-	?	PCAS	A
E30-1	35WH171	BLS	3770	0-10	NW	HILL	SS	350	SPR	800	B	+	+	C	PCAS	A
E44-1	35WH172	H	3800	0	--	HILL	S	135	SPR	2800	B	+	+	C	PCAS	A
E44-2	35WH173	LGS	3760	0-10	S	RIDGE	S	150	SPR	3000	B	-	+	?	PCAS	A
E44-3	35WH174	LS	3740	10	SE	HILL	SR	0	SPR	2500	C	-	+	BC	PCAS	A
E44-EX	35WH175	LS	3770	0-5	SE	HILL	SS	350	SPR	300	A	-	-	?	PCAS	A
F52-1	35WH176	QUA	3740	10	SW	CANYON	SSJ	170	IS	10200	C	-	-	?	PCAS	A
F97-1	35WH177	QUA	4340	10-15	SW	HILL	SSJ	650	IS	900	C	-	-	?	PCAS	A
F127-1	35WH178	QUA	4160	20-30	S	RIDGE	SSJ	250	IS	1000	C	-	-	?	PCAS	A
F127-2	35WH179	QUA	4170	10-30	SE	RIDGE	SSJP	250	IS	7500	D	-	-	?	PCAS	A
C71-4IF		IF	2730	0-15	NNE	HILL	SSJ	20	IS	-	A	-	-	?	PCAS	A
C106-IF1		IF	3640	0	--	TABLELD	R	3	PS	-	A	-	+	?	PCAS	A
C106-IF2		IF	3680	0	--	TABLELD	SJ	15	PS	-	A	-	+	?	PCAS	A
C107-IF1		IF	3740	5	NE	TABLELD	SS	50	IS	-	A	-	+	?	PCAS	A
E6-IF1		IF	3285	2-5	NNW	HILL	SJ	200	IS	-	A	-	+	?	PCAS	A
E30-IF1		IF	3860	10	S	RIDGE	S	250	IS	-	A	-	+	BC?	PCAS	A
E44-IF1		IF	3860	10	W	HILL	S	200	SPR	-	A	-	+	C	PCAS	A
F44-IF1		IF	3640	30	S	CANYON	SJ	200	IS	-	A	-	-	?	PCAS	A
F72-IF1		IF	3860	20	WSW	RIDGE	SSJ	120	IS	-	A	-	-	?	PCAS	A
D14-IF1		CRN	3170	0	--	RIDGE	S	500	IS	-	-	-	-	?	PCAS	A
D14-IF2EX		CRN	3046	0	--	RIDGE	SJ	350	IS	-	-	-	-	?	PCAS	A
E30-IF2	35WH183	CRN	4050	0	--	RIDGE	S	550	SPR	-	-	-	-	?	PCAS	A
E30-IF3	35WH184	CRN	4050	0	--	RIDGE	S	450	SPR	-	-	-	-	?	PCAS	A
E44-IF2EX	35WH185	CRN	4060	0	--	RIDGE	SSJ	250	SPR	-	-	-	-	?	PCAS	A
D10-IF1EX		CRN	2560	0	--	RIDGE	S	200	PS	-	-	-	-	?	PCAS	A
C107-IF2EX	35WH181	CRN	4010	0	--	TABLELD	S	500	SPR	-	-	-	-	?	PCAS	A
C107-IF3EX	35WH182	CRN	4010	0	--	TABLELD	S	500	SPR	-	-	-	-	?	PCAS	A
42IF		IF	2920	0	SE	HILL	SSJ	200	IS	-	-	-	-	C	PCAS	A

Table 2. (Continued)

Temp. Number	Perm. Number	Site Type	Elev.	Slope	Aspect	Prim. Landfm.	Veg.	Dist. Water	Water Type	Area	Cult. Mat.	Obs.	Coll.	Age	Recorder	Status
C-EX1	35WH180	LS	2920	0	SW	HILL	SSJ	100	IS	1500	C	+	+	C	PCAS	A
CC-4	35WH9	RSP	1780	0	SE	CANYON	SSJ	70	PS	90	A	-	-	?	OMSI	A
C94-IF1EX		LS	2400	0	SE	CANYON	SSJ	10	IS	50	A	-	-	?	PCAS	A
	35WH46	H	2880	5-10	S-SE	CANYON	SSJ	0	IS	525	C	+	+	C	OMSI	A
CC-1	35WH2	RSP	2000	?	E	CANYON	SS	20	PS	150	-	+	+	C	OMSI	B
	35WH3	RSP	1800	?	SW	CANYON	--	120	IS	135	-	+	?	?	OMSI	B
	35WH4	RS	2400	?	NW	HILL	SSJ	200	PS	27	-	?	?	?	OMSI	B
	35WH5	LGS	2320	0	--	FLAT	SS	0	SPR	12150	-	+	?	?	OMSI	B
	35WH6	RSP	3400	?	W	HILL	*	450	IS	83	-	?	?	?	OMSI	B
CC-2	35WH7	LSP	2080	0	SE	CANYON	SSJ	0	PS	300	-	+	+	C	OMSI	B
	35WH12	LS?	2200	?	?	CANYON	?	?	IS	?	-	?	?	?	OMSI	C
IC-2	35WH13	LGS	2060	?	S-E	CANYON	SSJ	0	IS	300	-	+	+	C	OMSI	B
	35WH14	H	2200	?	S	CANYON	JS	200	PC	2800	-	+	+	C	OMSI	B
	35WH15	RS	2400	?	?	CANYON	?	?	?	?	-	?	?	?	OMSI	C
	35WH16	TP	?	?	?	?	?	?	?	?	-	?	?	?	OMSI	C
	35WH17	QUA	?	?	?	?	?	?	?	?	-	?	?	?	OMSI	C
	35WH18	LS?	?	?	?	?	?	?	?	?	-	?	?	?	OMSI	C
	35WH19	?	?	?	?	?	?	?	?	?	-	?	?	?	OMSI	C
	35WH20	H	2820	?	?	CANYON	SSJ	?	IS	?	-	?	?	?	OMSI	B
JC-2	35WH21	H	2940	?	SE		SSJ	?	IS	400	-	+	+	C	OMSI	B
	35WH22	H	2920	?	?		SSJ	200	IS	?	-	?	?	?	OMSI	B
	35WH23	H	3040	?	?	CANYON	?	?	IS	?	-	?	?	?	OMSI	C
	35WH36	RSP	3600	?	SW	CLIFF	?	750	IS	?	-	?	?	?	OMSI	C
	35WH40	RS	2720	?	S	CANYON	?	100	PS	?	-	?	?	?	OMSI	B
	35WH41	P	1480	0-5	S	CANYON	?	80	PC	-	-	-	-	?	OSU	B
	35WH42	H	2840	0	SW-S	HILL	SSJ	40	IS	1225	-	+	+	BC	OMSI	A
	35WH44	IF	1520	?	?	CANYON	SS	?	PC	-	-	-	-	?	OSU	B

1. <u>Site Types</u>: QUA=Quarry; LS=lithic scatter; LGS=lithic and ground stone scatter; B=burial; H=habitation site; IF=isolated find; CRN=cairn; RS=rockshelter; P=pictograph; TP=talus pit.
<u>Elevation</u>: measured in feet. <u>Slope</u>: measured in degrees. <u>Dist. water</u>: measured in meters. <u>Area</u>: measured in square meters.
<u>Vegetation</u>: SS=shrub-steppe; S=steppe; J=juniper; R=riparian; P=ponderosa; *="elderberry thicket."
<u>Water type</u>: PS=permanent stream; PC=Pine Creek; IS=intermittent stream; SPR=spring.
<u>Cultural materials on surface</u>: A=<10; B=10-99; C=100-500; D=500-1000; E=>1000.
<u>Obsidian</u>: present or absent.
<u>Collection</u>: material has or has not been collected.
<u>Age</u>: A=Early Archaic; B=Middle Archaic; C=Late Archaic; D=Historic; ?=preceding assignment questionable.
<u>Recorder</u>: PCAS=Pine Creek Archaeological Survey (Endzweig 1992); OMSI=Oregon Museum of Science and Industry; OSU=Oregon State University.
<u>Status</u>: A=site form present, site field-checked by PCAS; B=site form present, no PCAS field check; C=no site form.

The rarity of early sites like these and their location are consistent with Ames' expectations of low population density and a focus on "more mesic edaphic microenvironments," based on other "Pioneer Period" (Windust and Cascade) sites on the southern Plateau (Ames 1988). Ames proposes a subsistence round which includes seasonal occupation of upland areas and presents a plausible scenario for the two sites in the Study Area (Ames 1988:355):

> During summer and fall, upland areas with both plant and animal resources were more appealing than the canyon bottoms. Thus, major aggregations might form around the root grounds, which had access into uplands containing deer and elk.

In addition to the above location, possible Middle Archaic components were observed at two sites and one isolate. They are located in two environmental settings: the uplands in the northeastern portion of the basin, again along the watershed between Pine Creek and Butte Creek; and to the west in the hills at the foot of the escarpment of Iron Mountain. The sites are situated between 0 and 40 m from the nearest water (an intermittent stream and a spring), while the isolate is 250 m from the nearest water source. Elevations range from 2,840 to 3,860 feet. These occupations support the impression of low density already noted for this time period, and a focus on what are, at least presently, mesic settings.

Late Archaic components were identified at 10 sites and two isolates recorded by the PCAS, as well as at several sites located during OMSI's work. They are represented at elevations ranging from just above 2000 feet to over 3800 feet, and in settings including ridge tops and canyon bottoms. Sites are still situated relatively close to water (200 m and less). A variety of site types are represented, including lithic and lithic/ground stone scatters, rockshelters, a burial, and habitation sites with house depressions. In general, survey findings support the apparent Late Archaic intensification of occupation indicated by radiocarbon dates from excavated sites in the Pine Creek Basin and its vicinity (Table 1).

Conclusion

A major focus of archaeological inquiry on the southern Columbia Plateau, as elsewhere in North America, has been the development, during the Archaic, of semi-sedentary life from a more mobile Paleo-Indian adaptation. By the inception of the Late Archaic at 2500 B.P., permanent riverine villages are found throughout the Plateau and a lifeway is in place which, on the surface, resembles the ethnographic pattern documented in the observations and memories of Indian peoples and early Euroamerican explorers. The preceding review of John Day River archaeology suggests cultural developments which are consistent with those of the greater region. The existence of larger permanent communities at the mouth of the river is exemplified by the cemetery at the Wildcat Canyon Site, dated at 2500 B.P. to 2000 B.P. Intensified use of the upper John Day region is also suggested by a focus of radiocarbon-dated occupations within the last 2500 years, although there is at present little evidence of the kind of long-term occupation characterized by sites farther downstream. As will be shown in Chapter 6, substantial pithouses were also in use in the Pine Creek basin at this date. By historic times, however, no permanent Native American villages are reported in the area, and Euroamerican artifacts which typically reflect late occupations are rare in the archaeological record. It is the Late Archaic utilization of the Pine Creek basin which will be the subject of the following chapters.

CHAPTER 5

EXCAVATIONS IN THE PINE CREEK DRAINAGE BASIN: 35WH7

Background

In the summer of 1967, the Oregon Museum of Science and Industry established an archaeological training program for high school-aged students based out of Hancock Field Station (OMSI's natural history camp, formerly known as Camp Hancock). In its first year, the program was directed by Jim Riggs, then a student at Oregon State University. Excavations were conducted at 35WH2, also known as Pentacost Shelter, with an additional goal being the archaeological exploration of the surrounding area. 35WH7, situated on the west bank of ephemeral Cove Creek about half a mile north of 35WH2 at an elevation of about 2080 feet (644 m), was recorded during the course of this reconnaissance. Lying in the shadow of a sixty foot long, southeast-facing cliff, the site was noted in particular for its pictographs and evidence of "three recent (since April, 1967) potholes totalling approximately two square meters of fill" (Riggs 1968). Cultural debris, which consisted of "an abundance of charcoal, some animal bone, and many chert flakes" was observed to a depth of one meter in the largest pothole and cultural deposits were thought to extend even deeper (Riggs 1968). Excavation was recommended in light of the ongoing vandalism of the site. Riggs' concerns appear to have been shared, and excavation of 35WH7 commenced in June of 1968 under the direction of Brian Gannon, who would guide the project until its conclusion in 1970. The following overview presents a summary of fieldwork during the three years of excavation.

General Field Methodology

Excavation units were laid out along a grid with axes extending from (true) north to south (x-axis) and east to west (y-axis) (Figure 6). The placement of the 0 x-axis across the middle of the site accounts for the assignment of both positive and negative x-coordinates. Standard unit size was generally 1 m x 1 m but squares deviate from this pattern in the extreme east and west around around major potholes, probably due to their irregular dimensions. Groups of units were generally combined into six Test Trenches. Except for Test Pit 1 (TP1), Test Pit 2 (TP2), and Test Balk 1 (TB1), each square is designated by "TT," with a numeral indicating its trench affiliation, and a capital letter identifying the specific unit. Approximately 44.30 m^3 of deposits were removed (Table 3). Excavation units and their locations are listed in Table 4.

Excavations were conducted in twenty-centimeter levels referenced to an arbitrary datum of 10.00 meters; however level breaks were often offset by 10 cm, complicating the correlation of adjacent units. Artifacts were plotted in situ where possible and sediments were

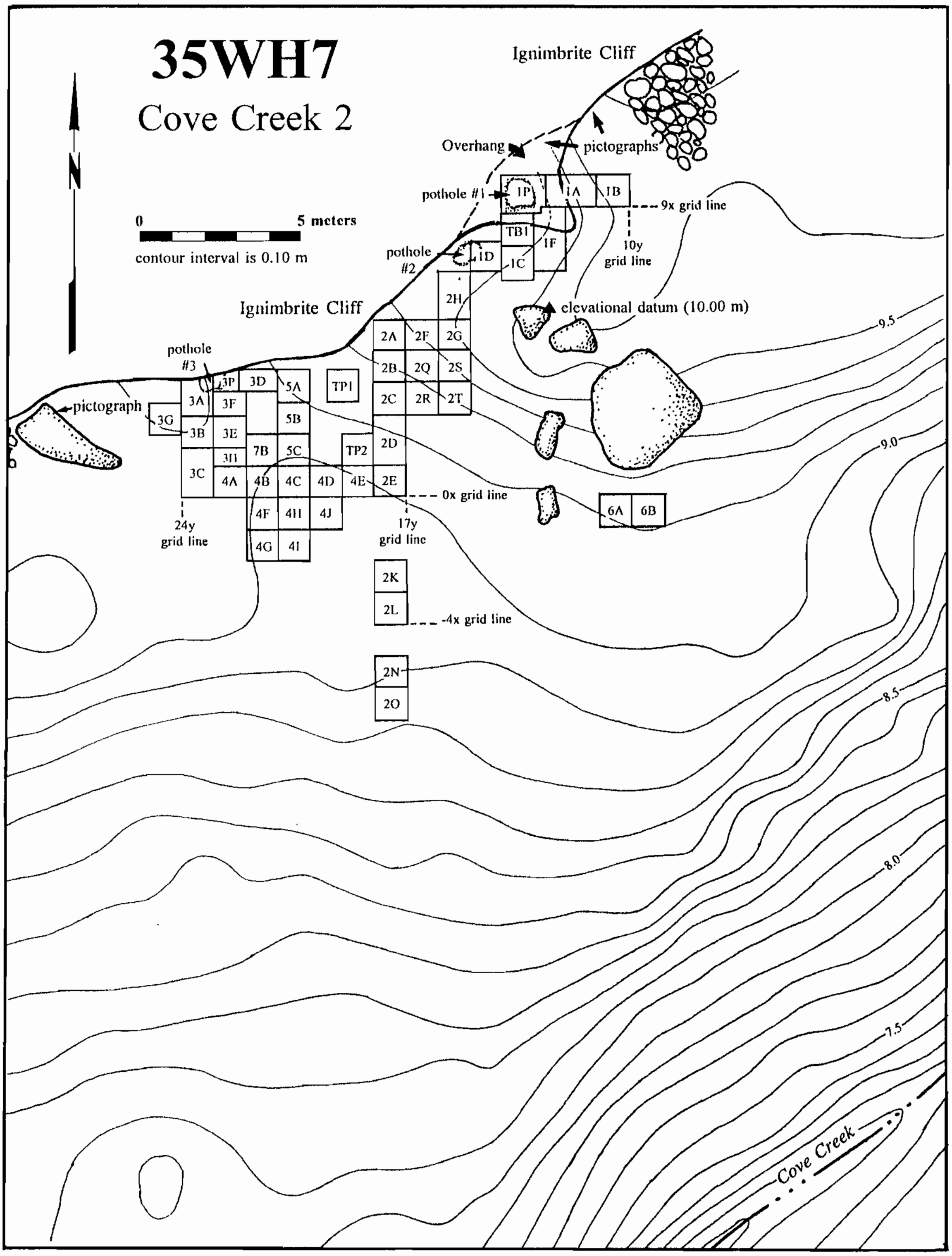


Figure 6. Site plan, 35WH7.

Table 3. Area and Estimated Volume of Excavated Cultural Deposits

	TT1/TB1	TT2/TP1/TP2	TT3	TT4	TT5	TT6	TT7
Area (m^2)	8.88	19.00	8.31	10.00	3.00	2.00	1.00
Volume (m^3)	11.62	9.55	8.68	10.00	3.05	0.60	0.80

screened. On the basis of the size of flakes recovered, a quarter-inch mesh size is inferred, although this is not specified in fieldnotes or reports. In some cases, associations of artifacts or cultural constructs such as firepits were recorded as features, however feature forms were also frequently filled out at stratum breaks and level breaks. Records were additionally kept on excavations record forms and in the crew's field notebooks. Profiles were drawn of selected sidewalls.

Summary of Fieldwork

1968 Field Season

Initial work in 1968 focused on the largest pothole, located in the northeast corner of the site under what was referred to as a cliff overhang. Excavation was extended eastward from here to form one-meter-wide Test Trench 1, with units designated TT1P, TT1A, and TT1B from west to east (Figure 6). It should be noted that the fieldnotes reflect some initial discrepancies regarding unit designations and boundaries in this area of the site, particularly with regard to units adjacent to TT1P.

Table 4. Summary of Excavation Units, 35WH7

Square	X-coord./m	Y-coord./m	Beginning Level/m	Years
TT1A	9.0-10.0	11.0-12.6	9.70-9.50 (L-1)	68/69
TT1B	9.0-10.0	10.0-11.0	9.30-9.10 (L-3)	68
TT1C	6.7-7.8	13.0-14.0	9.30-9.20 (L-1)	69
TT1D	7.0-8.0	14.0-15.0	9.30-9.10 (L-1)	69
TT1F	7.0-8.4/8.8	12.0-13.0	9.45-9.25 (L-1)	70
TT1P	8.8-10.0	12.6-14.0	8.70-8.50 (L-6)	68/69
TT2A	4.5-5.5	17.0-18.0	9.30-9.10 (L-1)	68/69
TT2B	3.5-4.5	17.0-18.0	9.30-9.10 (L-1)	68/69
TT2C	2.5-3.5	17.0-18.0	9.30-9.10 (L-1)	68
TT2D	1.0-2.5	17.0-18.0	9.30-9.10 (L-1)	68
TT2E	0.0-1.0	17.0-18.0	9.10-8.90 (L-2)	69
TT2F	4.5-5.5	16.0-17.0	9.30-9.10 (L-1)	69
TT2G	4.5-5.5	15.0-16.0	9.30-9.10 (L-1)	69
TT2H	5.5-7.0	15.0-16.0	9.30-9.10 (L-1)	69
TT2K	-2 to -3	17.0-18.0	8.90-8.70 (L-3)	69
TT2L	-3 to -4	17.0-18.0	9.10-8.90 (L-2)	69
TT2N	-5 to -6	17.0-18.0	8.70-8.50 (L-4)	69
TT2O	-6 to -7	17.0-18.0	8.61-8.50*(L-4)	69
TT2Q	3.5-4.5	15.0-16.0	9.10-8.90 (L-1)	70
TT2R	2.5-3.5	16.0-17.0	9.10-8.90 (L-1)	70
TT2S	3.5-4.5	16.0-17.0	9.10-8.90 (L-1)	70
TT2T	2.5-3.5	15.0-17.0	9.10-8.70 (L-1)	70
TT3A	2.5-3.5/3.7	23.0-24.0	8.90-8.70 (L-1)	68/69
TT3B	1.5-2.5	23.0-24.0	8.95-8.70*(L-1)	68/69
TT3C	0.0-1.5	23.0-24.0	8.90-8.70 (L-1)	68/69
TT3D	3.2-4.0	21.0-22.2	9.01-8.70*(L-1)	69
TT3E	1.5-2.5	22.0-23.0	8.95-8.70*(L-1)	69
TT3F	2.5-3.2	22.0-23.0	8.90-8.70 (L-1)	69
TT3G	2.0-3.0	24.0-25.0	8.90-8.70 (L-1)	69/70
TT3H	1.0-1.5	22.0-23.0	8.90-8.70 (L-1)	70
TT3P	3.2-3.8/4.0	22.0-23.0	8.90-8.70 (L-1)	68/69
TT4A	0.0-1.0	22.0-23.0	9.00-8.80 (L-1)	68/69
TT4B	0.0-1.0	21.0-22.0	9.00-8.80 (L-1)	68/70
TT4C	0.0-1.0	20.0-21.0	9.00-8.80 (L-1)	68/69
TT4D	0.0-1.0	19.0-20.0	9.00-8.80 (L-1)	68/69
TT4E	0.0-1.0	18.0-19.0	8.90-8.70 (L-1)	69
TT4F	0 to -1	21.0-22.0	9.00-8.80 (L-1)	69
TT4G	-1 to -2	21.0-22.0	9.00-8.80 (L-1)	69
TT4H	0 to -1	20.0-21.0	8.90-8.70 (L-1)	69/70
TT4I	-1 to -2	20.0-21.0	8.90-8.70 (L-1)	70
TT4J	0 to -1	19.0-20.0	8.90-8.70 (L-1)	70
TT5A	3.0-4.0	20.0-21.0	9.10-8.90 (L-1)	69
TT5B	2.0-3.0	20.0-21.0	9.10-8.90 (L-1)	69
TT5C	1.0-2.0	20.0-21.0	8.90-8.70 (L-2)	70
TT6A	0 to -1	10.0-11.0	9.03-8.90*(L-2)	69
TT6B	0 to -1	9.0-10.0	9.00-8.90*(L-2)	69
TT7B	1.0-2.0	21.0-22.0	9.00-8.80 (L-1)	70
TP1	3.0-4.0	18.5-19.5	9.15-9.10*(L-1)	69
TP2	1.0-2.0	18.0-19.0	9.02-8.90*(L-2)	70
TB1	7.8-8.8	13.0-13.9	9.30-9.10 (L-3)	69

* underlying levels 0.20 m each

Boundaries indicated in the present analysis reflect the best attainable fit between site maps, interim reports, and fieldnotes.

Within the first few days of fieldwork, the existence of a firepit or possibly "two fire-pits ... in association with each other" (Gannon 1968:2) was indicated by the presence of ash, charcoal, and fire-cracked rock about 50 cm below the surface. Charcoal submitted for radiocarbon-dating subsequently returned dates of 468 ± 80 B.P. and 580 ± 120 B.P. (Gak-2176 and 2726).

In addition to the exploration at the eastern end of the site, excavation was begun in Test Trenches 2, 3, and 4 in the central and western areas. Little of note was encountered in the units of TT2, though fieldworkers did comment on the presence of an ash lens, some possibly fire-broken rock, and spots of burned soil in Level 2 (9.10-9.30 m) of units TT2A, 2B, and 2C. Highlights reported from TT3 were, in particular, a concentration of metates and manos found primarily in levels 2 and 3 of TT3A and TT3B (recorded as Features 7, 8, 10 and 12). Based on the spatial segregation of hearth(s) and grinding stones, Gannon (1968:2) postulated "two areas of cultural concentration: one associated with the overhang on the eastern end and one associated with the western end."

Finally, four units were excavated along the 0 x-axis in east-west-trending TT4. While Gannon does not discuss these units in his 1968 report, several comments are in order based on project fieldnotes. First, fire-cracked rock was present in TT4B starting at the base of Level 2, accompanied by "a little charcoal" and an increase in animal bone, some of which was burnt. A concentration of rock as well as animal bone was also observed in Level 2 of TT4C and Levels 2 and 3 of adjacent TT4D, respectively, and contributed to the conclusion, regarding TT4C, that this unit "may well be the center of a pit house or something similar" (fieldnotes, B. Gannon, August 9, 1968).

A major finding of the 1968 season was nine wooden dart shafts, which were recovered from a crack in the cliff face about nine meters above the site. By the beginning of the following field season, one of the shafts had been dated at 2380 ± 100 B.P. (Gak-2177).

1969 Field Season

The bulk of excavations at 35WH7 was undertaken in 1969. Work continued in the trenches initiated during the previous year, which were expanded to provide a comprehensive picture of the deposits.

In Test Trench 1, units A and P were excavated to sterile river gravels, which were encountered at 7.70 m, Level 10, and 7.45 m, Level 12, respectively. Unit TT1C was begun and terminated in Level 6, while TT1D and TB1 were begun and excavated to Level 8. A radiocarbon date of 350 ± 90 B.P. was obtained from Level 3 of TT1C on charcoal thought to be associated with the previously dated hearth from TT1A.

Farther to the west, in Test Trench 2, units A and B appear to have been terminated at Level 7, while units TT2F, G, and H were taken down to Level 6 (8.10 m). No features were noted in Test Trench 2, and cultural deposits were shallow, with artifacts and debris restricted to the upper three levels, in contrast to the deeper deposits in TT1. To the south, TT2 was extended by squares E, K, L, N, and O. As along the rest of the 17-18y axis, cultural deposits were found to be shallow, with even lower counts of both tools and debris.

In Test Trench 3, work continued on units A, B, and P, and four adjacent new squares were begun, comprising 3D, E, F, and G. As in the previous year, this area continued to produce a high proportion of the site's grinding stones. In general, a large amount of cultural material was encountered, with TT3E referred to as "probably one of the richest pits in the site" (fieldnotes, B. Gannon, August 5, 1969). Charcoal was collected from a lens in Level 2 of this square and returned a date of 1160 ± 90 B.P. later the following year (Gak-2728). Units in TT3 were terminated as they reached sterile or near sterile, between levels 5 and 7.

As in 1968, excavations were conducted in Test Trench 4. Work continued in units A, B, C, and D, and was extended to include E adjacent to the east and F, G, and H to the south. Fire-cracked rock, already noted during the previous field season, was observed in 4B extending to Level 5, in Level 3 of 4C, Level 4 of 4D, and in Level 2 of 4F, usually associated with animal bone. In both TT4B and TT4H, excavators commented on high frequencies of green "jasper" flakes, possibly suggesting an additional activity in this area. All excavated units in TT4A were closed out by the end of 1969 when sterile or almost sterile deposits were reached, usually after six or seven levels.

Additional excavations during the 1969 field season took place in TT5A, 5B, TP1, and TP2, situated between test trenches 2 and 3. No major new conclusions were drawn on the basis of these explorations, but high debris counts in Test Trench 5 in contrast to TP1 and TP2 supported the impression of horizontal differentiation across the site with at least one dividing line somewhere between 19 and 20y. TT6A and 6B, placed 6 m east of the main excavation block and 9 m south of TT1 produced shallower cultural deposits than the rest of the site. Although debris counts in these two squares were relatively low, several tools were recovered from each of the two squares over the duration of the project. Work was, however, discontinued in this part of the site after the 1969 field season.

In addition to the dart fragments recovered from the cliff crevice above the site in 1968, four more were found in 1969, bringing the total to fifteen. A specimen submitted for radiocarbon dating in 1969 returned a date of 2230 ± 90 B.P. (Gak-2725), supporting the antiquity of the shafts.

1970 Field Season

Work at 35WH7 was completed during a brief two-week session in the summer of 1970. At the eastern end of the site, TT1F was excavated. Like adjacent TT1A, this unit produced ash, charcoal, and burned and unburned bone, presumably part of the previously recorded and radiocarbon-dated hearth feature. Test Trench 2 was enlarged by a 2 m x 2 m block of units, TT2Q, R, S, and T. In TT2Q, R, and T, two levels each were excavated; in 2S, only one. As in the rest of TT2, cultural deposits proved shallow, and debris counts were low.

Farther west, TT4 was expanded by units I and J. While TT4I appears to have produced nothing of note to the field crew, 4J revealed part of a pit feature which continued into TT4H and which contained animal bone, charcoal, fired cobbles and a metate (see Features). A sample of charcoal was radiocarbon-dated at 470 ± 90 B.P. (Gak-3309).

Finally, a series of pits was opened along 1x, comprising, from west to east, TT3H, TT7B, and TT5C, with excavation of TP2 continuing from the previous year. No features were noted, but a particularly high density of green chert flakes was commented upon in TT5C, reminiscent of earlier observations of green "jasper" flakes for TT4B, 4H, 5A, and 5B.

Discussion

A final "preliminary report" from 1970 (Gannon 1970) presented a summary of work at 35WH7 and tentative conclusions regarding the nature of the site. During the three field seasons, excavations had produced approximately 1000 tools of a variety of types, though predominantly of flaked and ground stone. The former included projectile points, gravers, cores, and blades. Gannon (1970:10) concluded that 35WH7 "seems to have been a seasonal camp site inhabited by aboriginal Americans practicing a migratory hunting and gathering economy." Projectile points, while not systematically analyzed, appeared reminiscent of Columbia River styles, while pictograph motifs were thought to resemble rock art from the Middle Columbia and the Willamette Valley. Radiocarbon dates suggested more than one component, however Stratum B, the "cultural stratum," showed no apparent vertical segregation. Apparent differences in the distribution and concentration of artifacts suggested a horizontal partitioning of the site, "with the oldest surficial occupation being located a the western end" (Gannon 1970:11). Gannon's conclusions will be further addressed during the course of the present analysis.

The Present Analysis

All artifacts discussed in the following sections have been examined, reclassified, measured, and analyzed by the present investigator. Some items classified as tools by OMSI personnel have been rejected as non-cultural; in turn, more than 500 formed/utilized tools encompassing most classes represented at the site were pulled from the lithic debris during the present study, catalogued, and analyzed with the rest of the collection. Proveniences recorded in the original artifact catalog have been checked against excavation notes and discrepancies corrected by reference to all available records. Because the fieldwork was conducted as a training project for high school students, field documentation is somewhat more uneven in quality than would otherwise perhaps be the case. This circumstance, and the lack of the author's firsthand experience during excavations at the site, contribute to some interpretive difficulties, and undoubtedly, errors. It is hoped, however, that these are not sufficient to compromise the validity of the final conclusions.

Stratigraphy

Four basic stratigraphic units (A-D) were defined at 35WH7 by the end of 1968 (Gannon 1968:2); Stratum E was added in 1970. The following description from Gannon (1970:8) is quoted in its entirety:

> The stratigraphic format of WH-7 is comprised of five basic strata of which essentially one is culture-bearing. The strata underlying the cultural one were exposed for two reasons: to establish the geologic origin of the site, and to detect any disturbances from the overlying occupation.
>
> The uppermost stratum (A) consists of a thin layer (2-5 cm thick) of sod, fecal material, pothunter debris and wind-blown deposits. Some scattered cultural material is found in this stratum. The second stratum (B) is the main cultural horizon and consists of moderately compacted, grey-brown silt with abundant angular talus from the cliff. The third stratum (C) is a discontinuous, homogeneous, fairly compact, brown sandy silt. The fourth stratum (D) is composed of stream-deposited cobbles with variable size and sorting. The fifth stratum (E) consists of a well-compacted, yellow brown, homogeneous, sandy silt. Strata C, D and E are essentially sterile, with the exception of a little occasional "trickle" from the overlying stratum B. These strata are stream-laid and compare favorably to a section exposed in the present Cove Creek channel.
>
> The environment of deposition of sub-B strata is revealed not only by its general character but by the presence of several breaks in the slope near the edge of the creek.... These breaks suggest that in times past Cove Creek's course has fluctuated on a sizeable scale.

A deviation from this general sequence is noted for the area of TT1A, B, and P, where "the matrix is continuous ashlens material downward to a depth of 1 1/2 meters.... Culture is present (scattered)

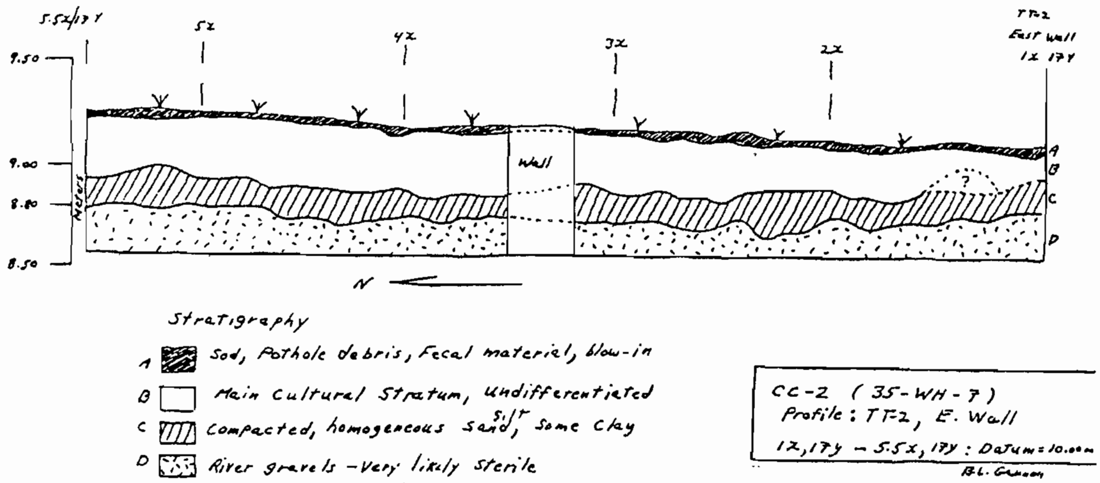


Figure 7. Generalized profile (from Gannon 1968).

in this matrix" (Gannon 1968:2). Figure 7, reproduced from Gannon's 1968 report, represents a generalized profile.

The stratigraphic sequence given above appears broadly applicable across the site, although it is not always possible to correlate profile drawings from different areas (Figures 8-11). Four additional natural strata which underlie those described by Gannon are, in addition, evident in a profile drawing of the east wall of TT4D (Figure 8). These include a layer of subangular to rounded river gravels (here designated as Stratum F), which overlies a layer of compacted and fairly homogeneous brown silt (G), above an additional layer of subangular to subrounded stream gravels (H). These are, in turn, underlain by a fine, compacted, tan to brown silt (I) which extends to the base of excavations at 7.30 m, about 1.6 m below the surface.

Based on profile drawings, Stratum A is variable in thickness, ranging from 5-20 cm, although more often measuring between 5 and 10 cm.

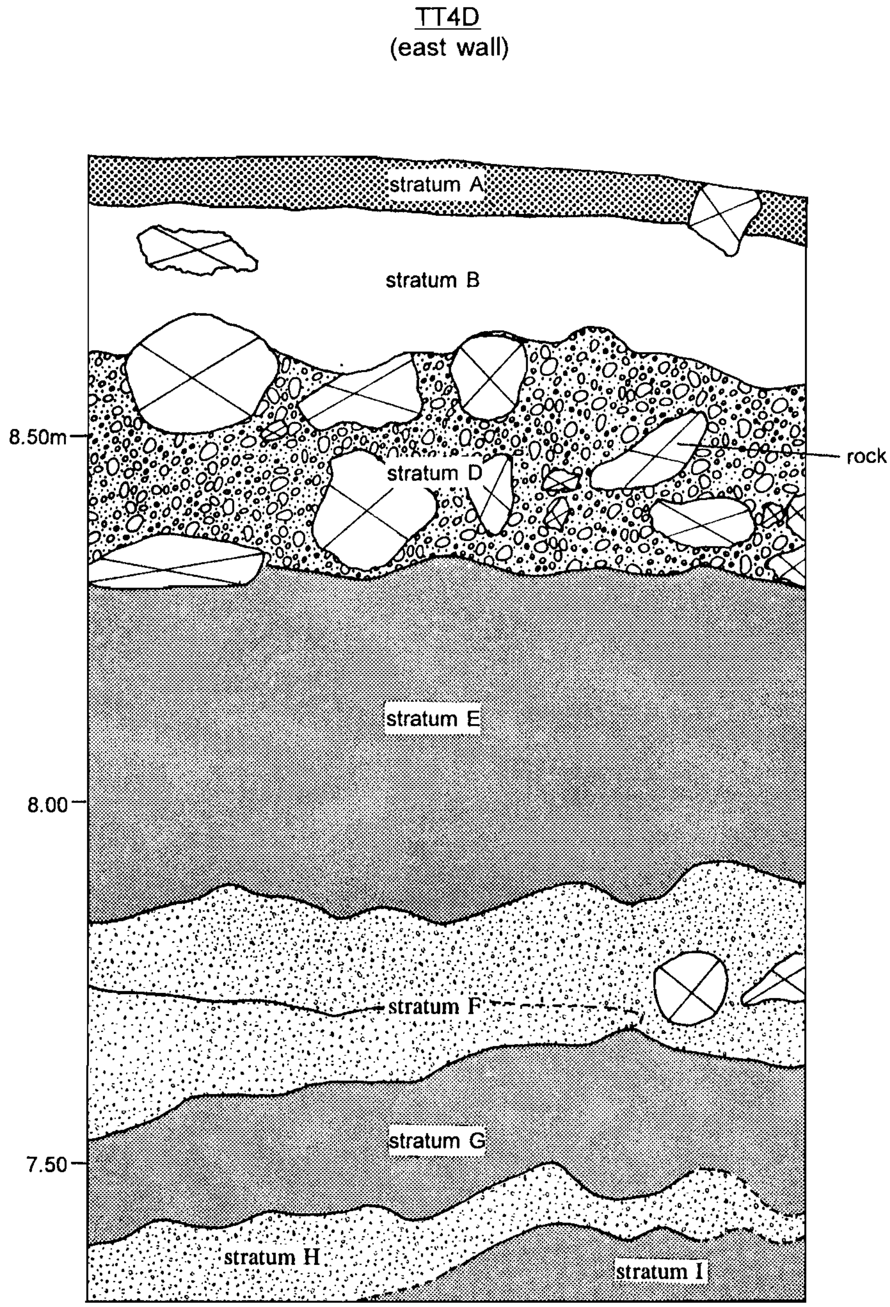


Figure 8. East wall profile, TT4D.

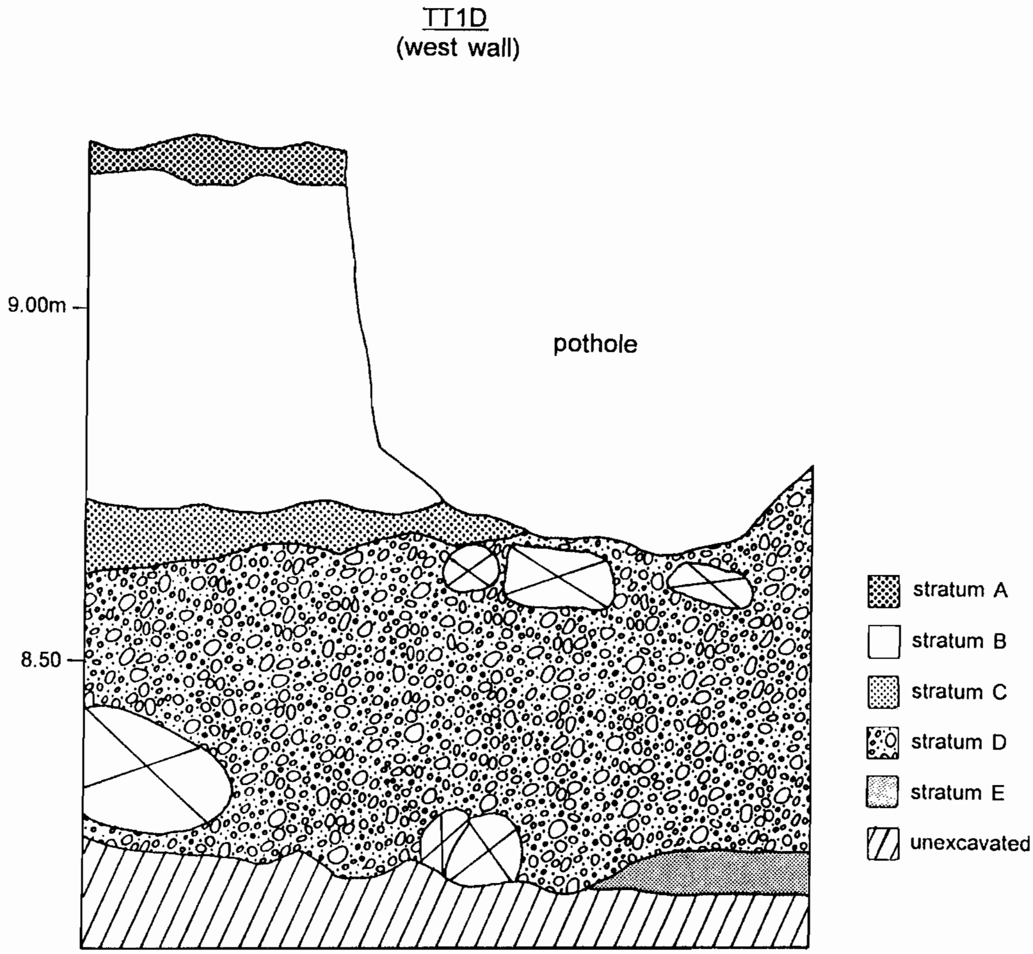


Figure 9. West wall profile, TT1D.

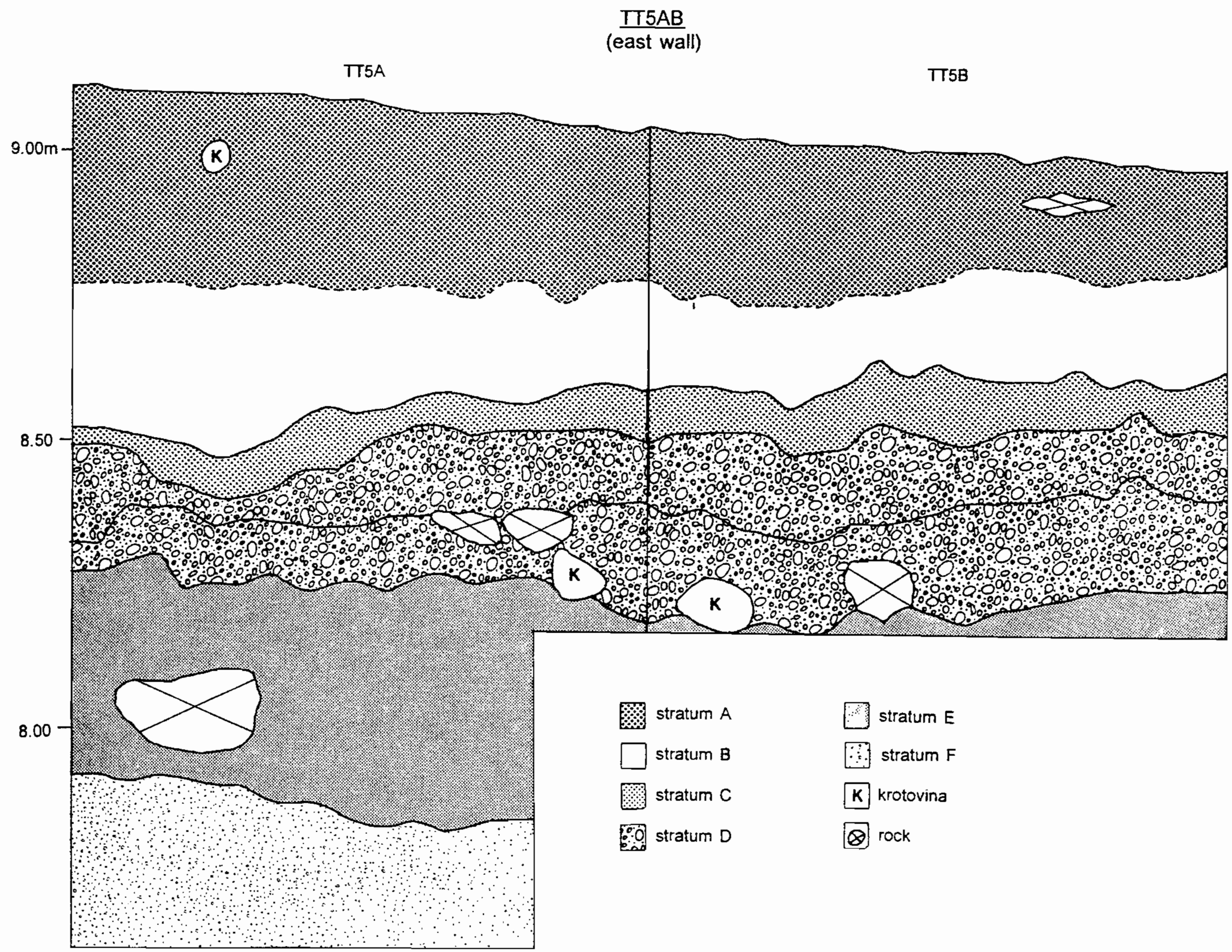


Figure 10. East wall profile, TT5AB.

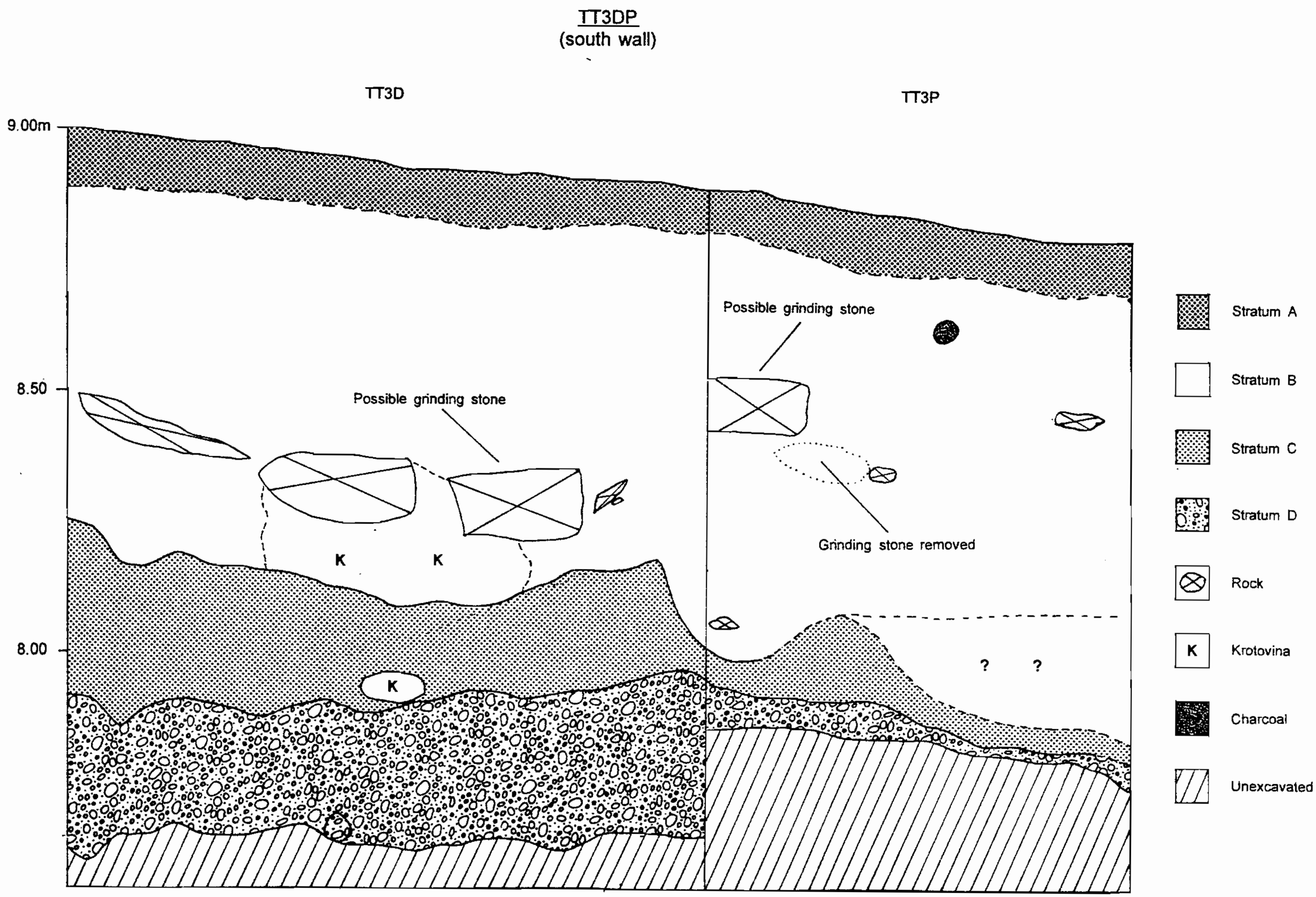


Figure 11. South wall profile, TT3DP.

Stratum B, the cultural stratum, is thinnest in TT2, where it measures from 10 to 30 cm, and thickest in TT3, where it appears to be up to 70 cm thick, though the profile drawings are somewhat ambiguous. Thicknesses range from 20-50 cm across the rest of the site. The silt layer, Stratum C, is between 5 and 30 cm thick, though it appears to disappear or pinch out in parts of TT1 and TT4. Stratum D measures from 20 to up to 50 cm. Stratum E is only indicated on profiles of TT2, TT4, and TT5, where it measures from 40 cm to in excess of 50 cm. Only in TT4 and TT5 are excavations deep enough to encounter Stratum F, which is between 20 and 30 cm thick. Strata G, H, and I are only observed in TT4, and measure 20, 10, and in excess of 10 cm, respectively.

Gannon's assessment of the homogeneity of the cultural deposits is supported by the shallow time depth represented by subsurface radiocarbon dates, and the absence of cultural evidence for a lower temporal component. In light of this, and due to insurmountable difficulties encountered in attempting to meaningfully correlate stratigraphic information with other provenience information across the site, the focus of the present study will be on examining the horizontal patterning of activities postulated by Gannon.

Features

The interpretation of features at 35WH7 is one of the most difficult aspects of the interpretation of prehistoric activities at this site. Digging by vandals, combined with inconsistent field documentation of the OMSI excavations, frustrates a thorough understanding of stratigraphic relationships and associations. The descriptions given below represent the best approximation possible on the basis of available information.

Twelve features were numbered at 35WH7. The nature of Features 1, 2, 5, and 9 cannot be determined from available notes. Feature 3 identifies the pothole in TT1P. Features 4 and 6 both refer to hearth features observed in TT1A. Features 7, 8, 10, and 12 label concentrations of artifacts, mostly ground stone, in TT3A. Feature 11 refers to a metate in TT4C. A more detailed description of these known features follows. In addition, several features are discussed which were not numbered, but are mentioned in fieldnotes and/or reports.

Numbered Features

Features 4 and 6

Features 4 and 6 refer to contiguous ash and charcoal lenses in TT1A and are best described together, as it is not clear if they represent separate activities. Both form part of a firepit which is located in the east of TT1P and the west of TT1A, west of a large boulder which takes up the eastern half of this unit (Figure 12). Feature 4 is an ash lens, centered at approximately 9.5x/12.4y, with a diameter of 25 cm and a surface elevation of 8.88 m (Level 5). It is underlain by Feature 6, a pit containing charcoal centered at

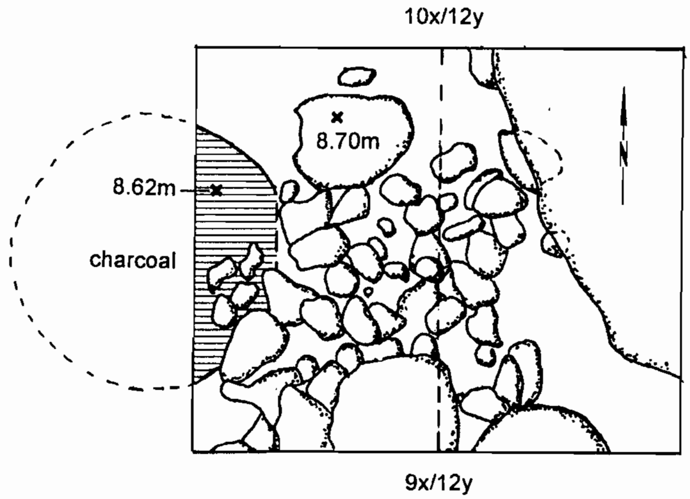


Figure 12. Feature 4/6, planview.

approximately 9.5x/12.6y and extending from an elevation of 8.70 m at the rim to 8.62 m at the base (Level 6). The pit is said to measure up to 40 cm in diameter (Gannon 1970:9), but field sketches suggest a diameter on the order of 60-70 cm. The charcoal lens is underlain by orange, fire-hardened soil or clay at 8.60 m. Field observations suggest that the ash deposit may be excavated into the charcoal.

The hearth was, in addition, associated with 65 fired cobbles (each 8-15 cm in diameter), situated between the already-mentioned boulder and the ash and charcoal lenses. The relationship between cobbles and charcoal is unclear and the records are contradictory: either the "main charcoal lens seems to underlie the main mass of fire-broken cobbles and actually blends in with it" (fieldnotes, B. Gannon, July 10, 1968), or the "lens seems to go up to the fired rocks but does not underlie them as if they were thrown out of the pit itself" (fieldnotes, B. Gannon, July 24, 1968). Artifacts, flakes, burned and unburned bone were found in the vicinity of the firepit, ranging throughout Level 6 (8.70-8.50 m). If the feature is excavated into earlier cultural deposits, it is possible that the artifacts predate the hearth, though this cannot be determined based on the nature of the assemblage. Charcoal collected from the feature was radiocarbon-dated to 468 ± 80 B.P. and 580 ± 120 B.P.

Charcoal, ash, and bone were found at comparable elevations in adjacent units TT1F, 1C (a composite charcoal sample from this unit was dated to 350 ± 90 B.P. and is probably associated with Feature 4/6), 1D, and TB1. Evidence also suggests the presence of earlier hearth features, though the disturbance in this area frustrates a precise interpretation. Gannon (fieldnotes, August 7, 1968) notes that TT1P exhibits an ash lens "appearing ... slightly below the big ash and charcoal pit. It may be separate or it, more possibly, is part of the other." Consistent with this observation is the recorded association of "ash lens" for 21 artifacts which were recovered between 8.55 and 8.30 m (levels 6 and 7) in TT1P. Multiple components are also suggested by the bimodal vertical distribution of point-provenienced artifacts for all of Test Trench 1, which exhibits peaks at 9.00-8.90 m and 8.60-8.50 m and a trough between 8.80 and 8.70 m (Figure 13). It would be unwise, however, to place too much emphasis on this apparent pattern, given the disturbance from prehistoric and recent digging in this part of the site.

The possibility of an additional feature in this area is suggested by a sketch showing three "fired rocks" and "fire-baked dirt" in Level 8

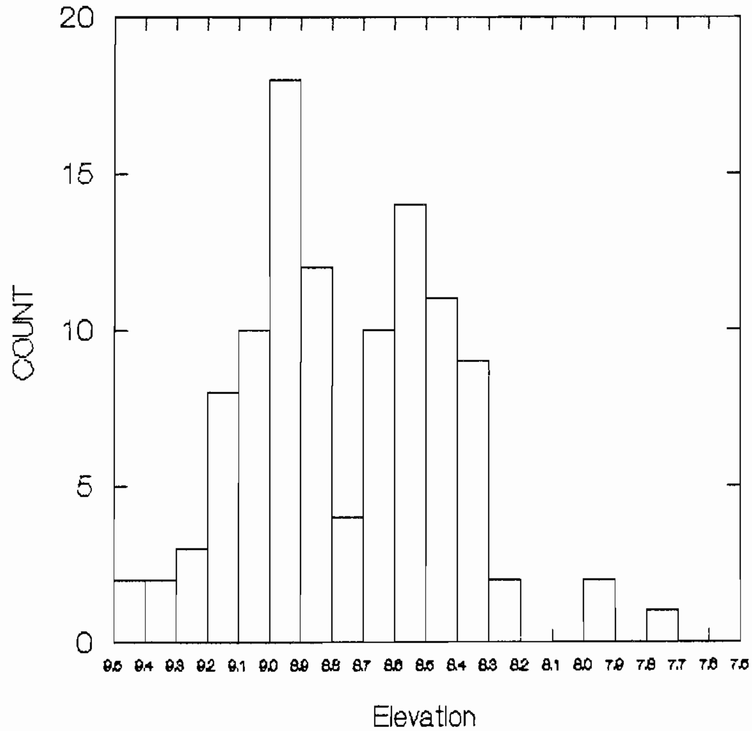


Figure 13. Distribution of point-provenienced artifacts, TT1 and TB1.

(8.30-8.10 m) of TT1P. This feature appears to encompass the southwestern corner of the TT1P, extending from 8.8-9.5x and from 13.50-14.00y. According to fieldnotes, Level 8 contains "quite a bit of scattered charcoal." No other information is available.

<u>Feature 7</u>

This feature is described as a concentration of four metates recorded in Level 2 of TT3A. One, CC2-40, has been reclassified as an anvil by the present analyst. The feature comprises the following artifacts:

CC2-38: 2.5-2.65x/23.80-24.00y; surface 8.58 m; notes: on CC2-104;

CC2-39: 2.95-3.3x/23.45-23.87y; surface 8.64 m; notes: upside down;

CC2-40: 3.15-3.30x/23.05-23.35y; surface 8.58 m; notes: upside down;

CC2-104: 2.5-2.65x/23.75-24y; surface 8.52 m; under CC2-38.

Feature 8

This feature is described as a cluster of two cores and two manos in TT3A, Level 2. The cobbles originally described as manos are unmodified and are not considered artifacts by the present analyst. The feature comprises the following specimens:

CC2-52 (core): 2.95x/23.65y; elevation 8.57 m;

CC2-53 (core): 3.5x/23.8y; elevation 8.56 m;

CC2-54 (cobble): 3.2x/23.65y; elevation 8.58 m;

CC2-55 (cobble): 3.6x/23.9y; elevation 8.53 m.

Feature 10

Feature 10 consists of one metate and an alleged mano in Level 3 of TT3A. The "mano" appears to be unmodified and is not considered to be an artifact by the present analyst. The feature description also mentions a large amount of cultural material, including flakes, scattered charcoal, and bone, most of it charred. The following two items were catalogued:

CC2-81 (metate): in east wall, 2.9-3.2x/23.00-23.22y, surface at 8.45 m; CC2-87 (cobble): underneath metate, 3.9x/23.1y; elevation 8.40 m.

Feature 11

This feature is described as "one metate with best-worked face down," TT4C, Level 2. Provenience is recorded as 0.5x-0.85x/20.43-20.79y, with a surface at 8.83m. There is no record of this specimen in the artifact catalog, and it may have subsequently been rejected as an artifact.

Feature 12

This feature is described as a concentration of two metates and one mano in Level 6 of TT3A. Artifacts are said to have been found in river gravel, over a "yellow hard packed clay sand layer underneath a clay layer." The following specimen was collected:

CC2-137: 3.2-3.35x/23.3-23.5y, elevation 7.90m.

The artifact catalog lists no catalog entry for a second metate or mano in this vicinity. CC2-137 is identified here as a battered cobble, possibly a hammerstone.

Depressions

Three depressions, while not referred to as "features," per se, are mentioned in Gannon's reports, including "one at about 0x,20y; one at about 3x,24y; and a very prominent one under the overhang" (Gannon 1970:8). As two of these depressions, at least, may represent the remains of house features, they are here discussed in greater detail. They will be identified as pits #1, 2, and 3.

Pit #1, "under the overhang"

This discussion refers to the vicinity of TT1. Gannon (1968:2) suggests in his first report that

> earth was removed from along the base of the cliff by the inhabitants and thrown out around the periphery forming a sheltered depression of sorts. This is manifested by a uniform stratum of rock along the periphery. In places the cliff overhangs, thereby offering further protection.

By 1970, there appears to be some doubt regarding the cultural nature of the rock feature: "Excavation, however, revealed that it is primarily the result of talus accumulation outside the brow of the overhang. It is, in other words, a 'rock shadow'" (Gannon 1970:8). The depression was attributed in part to a pit excavated through the cobble stratum (D), resulting in a dipping down of the cultural stratum (B) and its "unconformable contact with the basal silts (Stratum E)" (Gannon 1970:8,10). The precise nature of this "pit" is unclear. A planview of the base of Level 4 (8.45-8.25m) refers to a "truncation rim" which cross-cuts TT1F in an arc from southwest to northeast. This truncation was apparently visible in the south walls of TT1A and the east wall of 1C, though these walls were not profiled and this can therefore not be verified. At 8.50 m, stratum D (river gravels) was also observed to "dip" under the cultural stratum in the western portion of TT1A.

Like the next feature to be discussed, the pit is said to have "contained abundant mammal bones, consisting mainly of longitudinally split long-bones. Presumably, these represent butchering activities for the purpose of extracting marrow" (Gannon 1970:2). Almost half of all animal bone recovered at the site was, in fact, recovered in TT1, largely in units TT1A, C, F, and P. Amounts decline dramatically to the east and west. With the exception of felids, this area produced representatives of all taxa identified at the site, including 91% of all lagomorph elements recovered at 35WH7 (see Faunal Analysis, this chapter). The remains also include two owl bones (long-eared owl, <u>Asio otus</u>, and screech owl, <u>Otus</u> <u>asio</u>). Both of these were provenienced as "pothole" (here assumed to represent TT1P), without vertical association.

It is not clear what proportion of the faunal materials from the northeastern portion of 35WH7 represents the result of human activities, and how many may be attributed to natural causes such as burrowing and the predatory activities of owls (see Faunal Analysis, this chapter, and Mack, Appendix C). As only a few bones from this area were charred, and these range from deer to vole in size, this criterion does not serve as a good discriminator.

Clearly, the sheltered area "under the overhang" represents a preferred portion of the site and was intensively used, probably on more than one occasion. The space--some 3 x 3 m--is large enough to accommodate a wickiup or windbreak built over an shallow pit, though the former presence of such a structure can no longer be ascertained. It would, however, explain the sudden decline in the depth of cultural deposits from 1 m in TT1D to 40 cm in adjacent TT2H. Two grass-lined depressions, measuring 8-9 feet in diameter (2.4-2.7 m), and 2-2.5 feet (0.6-0.8 m) in depth, have been reported from a cave along Pine Hollow, a tributary drainage to the lower John Day River (Krieger 1938:16-19) (see Chapter 4). It is likely that cliffs and rockshelters in combination with wickiup-type structures frequently provided protection from the elements in the absence of more substantial and labor-intensive semi-subterranean pithouses.

Pit #2, 0x/20y

The presence of a pit in TT4 was suggested to excavators by a "truncation" of strata in TT4H and adjacent 4J. A transit map prepared during the first season of excavation indicates a "hollow" for this area which is supported by surface elevations which indicate a slight depression.

The truncation was first observed at the top of Level 3 (8.50 m). A pit appeared to have been excavated through the gravels of stratum D down to the top of the basal silts (Stratum E) at approximately 8.18 m. It contained a metate (CC2-834, surface 8.60 m), cobbles, charcoal and animal bone. As this area was excavated throughout three seasons (1968-1970), with contiguous units opened at different times, the full extent of this feature was not recognized in the field. However, several detailed planviews allow a tentative reconstruction of the feature (Figure 14). Based on these, the truncation appears to continue in an arc into TT4D. When the planview of TT4C is turned 180 degrees from its original orientation (several instances of misoriented directional arrows occur in the fieldnotes), the presence of a circular depression, measuring approximately 2 m diameter, becomes apparent, the western and northern edges of which probably lie in TT4F and TT4C, respectively. Discrete activity areas are suggested by a large concentration of green CCS flakes in adjacent TT5C and an area of scattered bone in TT4H (mostly between 8.53 m and 8.19 m).

As many artifacts are provenienced to a 20 cm level, it is not possible to isolate materials associated with a floor, per se. However, material found below 8.40 m in TT4C, D, F, G, and B, and below 8.50 m in TT4F, H, J, and 5C (different intervals were used by excavators in these sets of units) consists in large part of utilized flakes, utilized chunks, worked flakes, and scrapers, bifaces and knives, as well as projectile points (ES series, both broad- and narrow-necked, PS, CS1, CS6, and CB2). Four metates were, in addition, found in this vicinity.

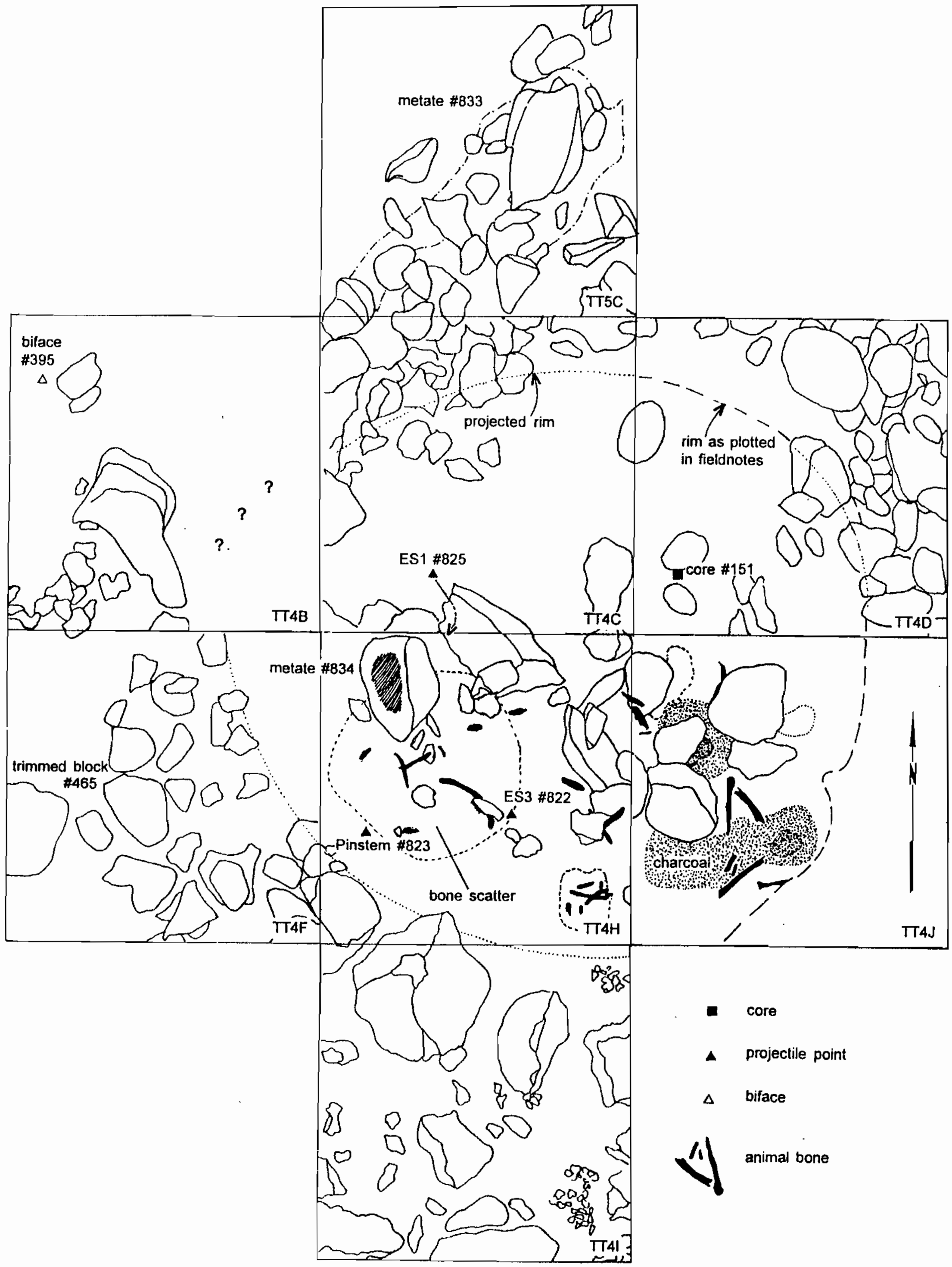


Figure 14. TT4 house floor, planview.

Only one core was recovered, a piece of green chert from TT4D, probably associated with the flake concentration discussed above. Such manufacturing tools as drills and gravers are absent. In general, the assemblage appears to represent lithic reduction, as well as hunting and game processing activities associated with the adjacent concentration of bone.

Most of the faunal remains identifiable to at least the level of order from this area are Cervids, with the majority represented by mule deer (Odocoileus hemionus) (see Faunal Remains: Vertebrates, this chapter). Additional artiodactyls include elk and bighorn sheep (one specimen). Juveniles are represented among both the deer and the elk, including an approximately 1.5 year-old elk and an approximately 18-20 month-old deer. This circumstance suggests a late winter-early spring occupation (see Faunal Remains, this chapter, and Mack, Appendix C). Excluding specimens recovered from levels well above the feature, and rodents which are probably intrusive to the deposits, there remain four scored and snapped carnivore epiphyses (three from bobcat and one from cougar) which appear to represent debris from bone bead manufacture (see Faunal Remains, this chapter, and Mack, Appendix C). Two bones are from an unidentified reptile and from bushytail woodrat (Neotoma cinerea).

A ring of cobbles measuring ca. 70 cm in diameter and located in the northwestern corner of TT4J and the northeastern corner of TT4H is associated with two concentrations of charcoal radiocarbon-dated to 470 ± 90 B.P. This feature may represent a hearth. Rocks mapped throughout the depression include "angular rocks," "river rocks," and "fired rocks," however a note attached to a plan drawing of TT4J (levels 2-4) comments with reference to TT4H,

> charcoal stained soil is top of basal silts--at first a suspected fire-pit, but no fired cobbles to speak of, fired soil, or ash. Charcoal may have been associated with cobbles (fired) to west.

The note ends by suggesting that the feature is "probably a dump (midden)." Earlier field observations for Level 3 of TT4C, suggested that this unit might represent "the center of a pithouse or something similar. The matrix is generally softer than A or B which is considerably rockier" (fieldnotes, B. Gannon, August 9, 1968).

While the function of this feature probably cannot be ascertained on the basis of existing information, the most parsimonious explanation does, in fact, support the presence of a house floor. This inference is supported by the distribution of lithic debris in the area (see Lithic Debitage). Its modest dimensions (no more than 2 m in diameter, and probably no more than 40 cm in depth) suggest a wickiup-shaped structure comparable to those discussed above (see Pit #1). The similarity between this feature and the depresssion in the northeast corner of the site suggest that at least two such structures may have been present.

3x/24y

The third possible depression, which would be located in the vicinity of TT3G and TT3A, is not further discussed in any of Gannon's reports. Excavation notes observe that TT3A was less rocky than TT3B and TT3C because of protection from the adjacent cliff (August 5, 1968).

A rim of cleared rockfall as observed for TT1 could account for the apparent depression in this area. A pothole is reported for the northeast corner of TT3A, suggesting a further source of disturbance.

Charcoal Lens

Charcoal was collected from a lens in the southwest of TT3E, extending from 1.6 to 1.96x and from 22.87 to 23y, at an elevation of 8.67-8.57 m (Level 2, 8.70-8.50 m). An ash lens was noted immediately to the north, extending from the charcoal lens to the north wall of the unit (2.5x). No further information is given for this feature, but it is said to be associated with rockfall and one mussel shell. It is unclear how it relates to adjacent units, and it is not represented on the north wall profile for TT3E. However, "excessive amounts of charcoal" were observed in level 2 of TT3B and the elevation is comparable to Features 7 and 8 of TT3A. A sample of 30 grams of the charcoal was radiocarbon-dated at 1160 ± 90 B.P. A more precise interpretation of this feature, as well as an assessment of the validity of the radiocarbon date is not possible.

Radiocarbon Dates

A total of seven radiocarbon dates were obtained from 35WH7 (Table 5). These include five dates on charcoal from subsurface features and two dates on unburnt wooden atlatl dart shafts from a cache found in a crevice in the cliff face overlooking the site. Notes in the following section regarding subsurface sample proveniences are taken from the radiocarbon Sample Data Forms submitted to the Gakushuin University radiocarbon laboratory. Samples #1, 2, and 5 were collected in 1968, samples 3, 4, and 6 were collected in 1969, and sample #7 was collected in 1970. Table 6 lists dates and age ranges at one sigma after calibration to correct for fluctuations in atmospheric radiocarbon content over time (based on the intercept method of Stuiver and Pearson 1993).

Of the dates on buried material, three are from the eastern edge of the site. GaK 2176 (468 ± 80 B.P.), taken from "a depth of about 50 cms" may be associated with the upper portion of the Feature 4/6 firepit in TT1A. The second sample from this feature, GaK 2726 (580 ± 120 B.P.), is attributed to Level 6, at the "lower level of charcoal lens." Based on an approximated surface elevation of 9.60 m to 9.50 m for TT1A, Level 6 begins at 80 to 90 cms depth. The first date of 468 ± 80 B.P. does, in fact, appear to be younger than the lower date of 580 ± 120 B.P., though they are statistically the same (see below).

The third date from the eastern portion of the site (GaK 2727, 350 ± 90 B.P.) was returned on charcoal from TT1C (9.03-8.98 m). This would place it at approximately the same absolute elevation as as the upper date on the firepit in TT1A and slightly above the elevation given for the firepit rim (8.90 m). At the time of submission, this sample was tentatively identified as possible refuse material which had been thrown out of the firepit.

Table 5. Radiocarbon Dates and Source Information, 35WH7

Sample No.	Lab No.	Radiocarbon Age	Sample Source	Sample Location
1	GaK 2176	468 ± 80 B.P.	Firepit 50cm b.s.	TT1A?
2	GaK 2177	2380 ± 100 B.P.	Dart shaft	Cache
3	GaK 2728	1160 ± 90 B.P.	Charcoal lens 8.67-8.57 m	TT3E
4	GaK 2727	350 ± 90 B.P.	Charc./ash/bone concentration	TT1C 9.03-8.98 m
5	GaK 2726	580 ± 120 B.P.	Firepit "L-6"	TT1A
6	GaK 2725	2230 ± 90 B.P.	Dart shaft	Cache
7	GaK 3309	470 ± 90 B.P.	2 charcoal lenses	TT4J 8.38-8.25 m

Table 6. Radiocarbon Dates and Calibrated Ages, 35WH7

Sample No.	Radiocarbon Age	Calibrated Age[1]	Min. Cal. Age[2]	Max. Cal. Age[2]
1	468 ± 80 B.P.	1439 A.D.	1408 A.D.	1479 A.D.
2[3]	2380 ± 100 B.P.	403 B.C.	756 B.C.	376 A.D.
3	1160 ± 90 B.P.	888 A.D.	779 A.D.	990 A.D.
4[3]	350 ± 90 B.P.	1516, 1591, 1621 A.D.	1446 A.D.	1654 A.D.
5	580 ± 120 B.P.	1400 A.D.	1293 A.D.	1441 A.D.
6[3]	2230 ± 90 B.P.	357, 288, 250 B.C.	392 B.C.	173 B.C.
7	470 ± 90 B.P.	1438 A.D.	1405 A.D.	1483 A.D.

1. calibration based on Stuiver and Pearson 1993
2. calibrated age range at 1 sigma
3. multiple possible intercepts

GaK 3309 (470 ± 90 B.P.) dates two charcoal lenses in TT4H and J. Their elevation of 8.38-8.25 m is consistent with the scatter of bone marking the floor the house feature identified as Pit #2. The final sample, represented by GaK-2728 (1160 ± 90 B.P.), "comes from a well-defined charcoal lens, but may be composite." Little additional information is available on the significance of this last sample, though it seems to lie above the main peak in cultural debris in this and adjacent units.

In order to assess the degree of independence of the radiocarbon dates, Student's t ratios were calculated for each pair of dates using uncalibrated age values (Thomas 1986:249-251). Results are presented in Table 7. Comparison with the expected t-value for a 0.05 level of significance (t=1.96) indicates that the four youngest dates are statistically the same, as are the two oldest dates. While this is to be expected for the dart shafts, it also demonstrates the roughly contemporaneous use of two noncontiguous portions of the site, the area of TT1 to the east and the western area of TT4.

Artifacts Collected

Lithic Debitage

During fieldwork at 35WH7, lithic debris was systematically collected during screening and was bagged by excavation unit and level. For the present analysis, all debitage was counted and separated by

Table 7. Computed t-ratios for Paired Radiocarbon Dates[1]

	Radiocarbon Years B.P.						
RCYBP	350	468	470	580	1160	2230	2380
350	---	0.98	0.94	1.53	6.38	14.80	15.04
468	0.98	---	0.02	0.78	5.77	14.68	14.94
470	0.94	0.02	---	0.73	5.43	13.86	14.15
580	1.53	0.78	0.73	---	3.87	11.00	11.54
1160	6.38	5.77	5.43	3.87	---	8.43	9.04
2230	14.80	14.68	13.86	11.00	8.43	---	1.11
2380	15.04	14.94	14.15	11.54	9.04	1.11	---

1. statistically similar dates are grouped within boxes

material. A more fine-grained, technological analysis of the debitage (e.g. Sullivan and Rozen 1985) was not undertaken because of the probable bias created by the 1/4 inch screen mesh size thought to have been utilized in the field, and the resulting selective retention of large, early-stage reduction flake types.

Flakes of uncertain or questionable provenience and those recovered from wall cleaning and floor-sweeping activities were not included in the present analysis. With one exception, which will be discussed below, no attempt was made to distinguish between different cherts or different mafic rocks. All are referred to as "CCS" (cryptocrystalline silicates) and "basalt," respectively.

In the process of sorting and counting flakes, the present investigator retrieved 543 formed/utilized tools encompassing most classes represented at the site. These were catalogued and analyzed together with artifacts identified by OMSI workers. These 543 tools (identified by catalog numbers higher than CC2-1039 and lower than CC2-9991) constitute slightly more than a third of the total assemblage.

In spite of the coarse screen mesh used in the excavations, a total of 19,191 flakes was recovered from the site. These include 17,307 CCS flakes (90%), 1,674 basalt flakes (9%), and 197 obsidian flakes (1%). The proportions of CCS and basalt among the debitage are essentially identical to those represented among cores, of which 90% are CCS and 10% are basalt (N=106). It is likely that core reduction took place at the site. The small proportion of recovered obsidian flakes (1%) is comparable to its representation among most other artifact classes at 35WH7. Projectile points, almost 15% of which are manufactured of obsidian, constitute an exception. The differential representation of obsidian suggests that it was brought to the site as finished points or preforms. Any obsidian waste material would have been produced in reworking and resharpening activities; the resulting small pressure flakes would not have been retained in the quarter-inch mesh screens used at the site (cf. Towner and Warburton 1990). This may explain its proportionately low representation.

In order to compare materials from excavation units of varying dimensions, flake densities per cubic meter were computed for all levels for which relatively unambiguous flake data exist. Of necessity, this required some degree of extrapolation, particularly in defining surface and bottom levels for which beginning and ending elevations are not always present. Level densities were, finally, averaged by excavation unit, producing a set of values indicating average flake density per m^3 for each square. In spite of the uncertainties in the data, some patterning is apparent in the distribution of the values and will be discussed in the following section.

Flake densities vary considerably across the site, ranging from a low of 20 flakes per m^3 meter to a high of 3,803 flakes per m^3 (Figure 15). The eastern and western portions of the site are, generally speaking, characterized by higher densities, separated by an area of lower density encompassing all of TT2. Three major centers of gravity are present within the eastern and western areas. These are centered on TT1C (with 613 flakes/m^3), TT5C (3,803 flakes/m^3), and TT3P (1,346 flakes/m^3). An apparent peak in TT2L, with 903 flakes/m^3, is probably spurious, resulting from an unsuccessful attempt at reconciling inconsistent surface level assignments. Levels 4 and 5 of this unit are comparable to adjacent squares and probably valid.

In order to investigate more closely the observed areal patterning, flake counts were plotted vertically by level for each unit. Particular attention was given to the presence and patterning of multiple peaks in debris counts which might suggest more than one occupational episode or "component." This analysis is complicated by differing level breaks used for adjacent units (in TT1A, Level 1 extends from 9.70-9.50 m, in adjacent TT1F from 9.45-9.25 m, and in TT1C, immediately to the south, from 9.30-9.20 m. An additional problem is posed by the presence of potholes in TT1P, 1D, 3A, and 3P, and possibly

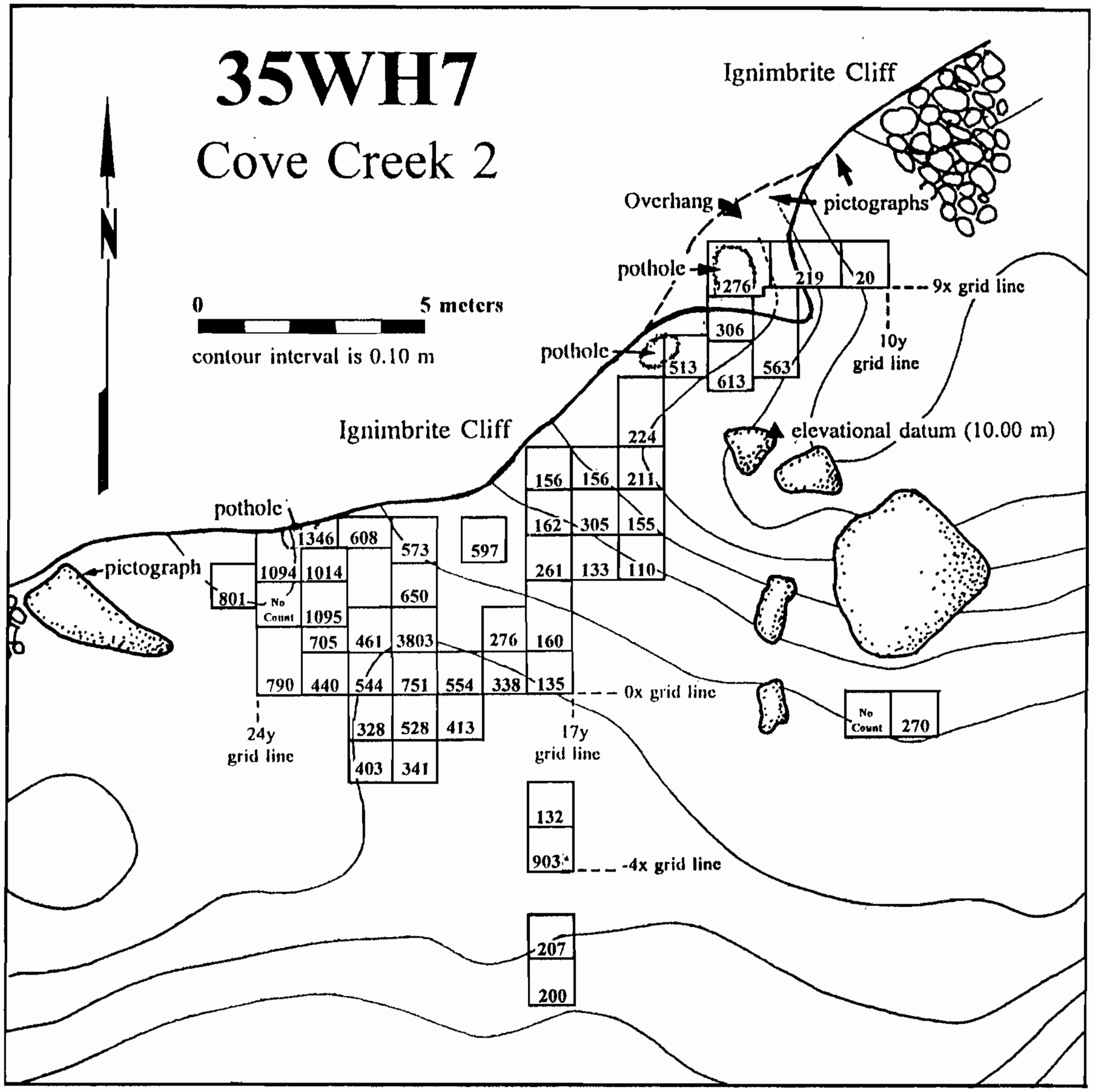


Figure 15. Average flake density (per m³) by excavation unit, 35WH7. "*" indicates problematic value, see text.

also some degree of disturbance in TT1F, making it difficult to assess surface elevations. In spite of these difficulties, some patterning can be discerned and will now be discussed, proceeding from east to west.

Both TT1A and TT1D show dual peaks in flake counts, whereas TT1F, TT1C, TT1P, and TB1 are each characterized by a single maximum. A slight increase in debris in level 10 of TT1P is attributed to the inception of a new field season and the accumulation of debris from higher levels during the intervening winter of 1968/69. Relative to absolute elevation, the distribution of peaks and lows in the various units shows little mutual correspondence (Figure 16). When plotted according to approximate depth below surface, however, individual peaks tend to cluster into two broad groups (Figure 17). The already-mentioned bimodal distribution of point-provenienced artifacts (see Features, Figure 13) lends further support to this pattern.

Flake counts drop off to the east and to the west. TT1B, thought to be rockier than adjacent units because of talus accumulation outside the brow of the overhang (Gannon 1970:8), shows a 91% drop in flakes relative to adjacent TT1A. While not of the same magnitude, TT2 flake densities also show a consistent decrease relative to TT1, ranging from 132 (TT2K) to 305 (TT2S) per m^3. Cultural deposits are shallow in this part of the site, generally not exceeding 40-60 cm. Flake counts decline from a high in the surface levels in units of eastern TT2 (H, G, Q, T, F, S, and R), whereas counts are highest between 20 and 40 cm below surface in the western units of TT2 (A, B, D, E, K, L). The reason for this particular difference is not clear but may reflect a

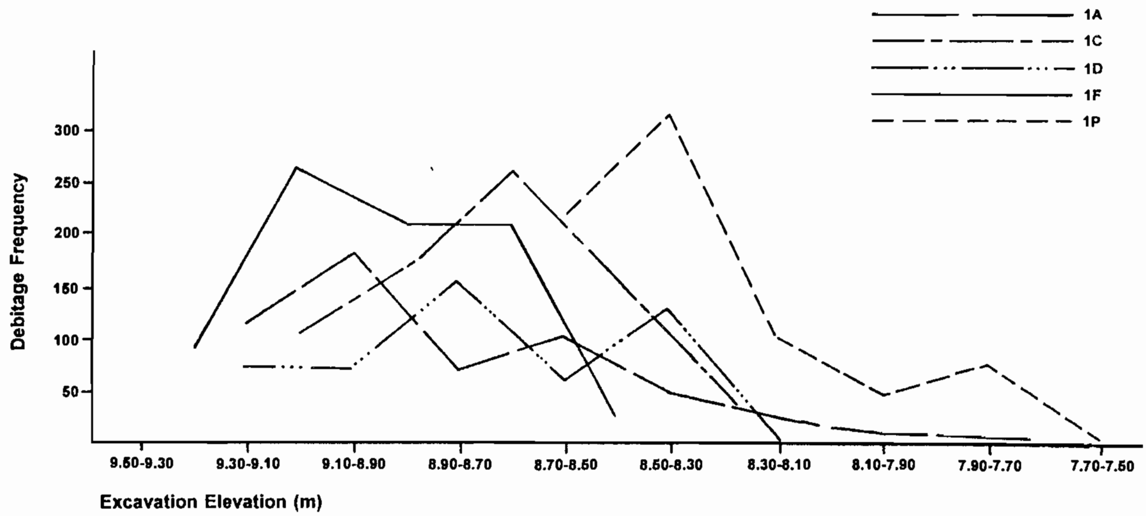


Figure 16. Debitage frequency by elevation, TT1.

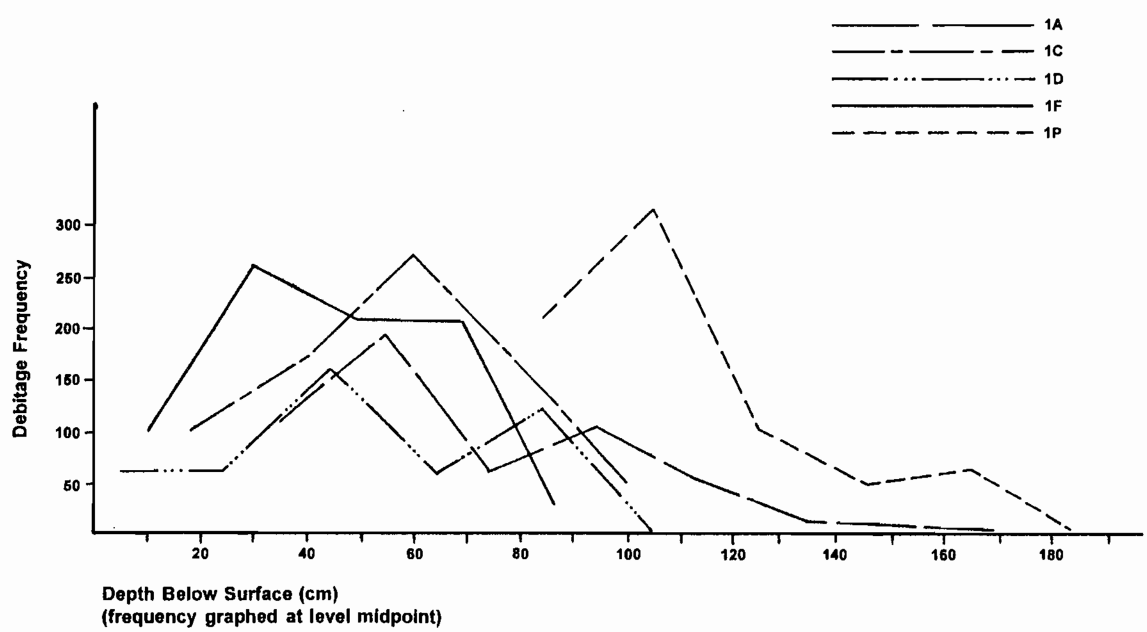


Figure 17. Debitage frequency by depth below surface, TT1.

slope in cultural deposits from east to west. Squares TT2N and TT2O, at the southern end of the excavated block, show roughly equivalent, but low counts throughout the two levels of cultural deposits.

West of TT2, flake counts and average densities increase in TT4 and TT5, with a peak in the vicinity of TT4C and 5C. The peak in TT5C (3,803 flakes/m^3) is attributable to a concentration of green CCS flakes which was noted by excavators in the field, who felt that it clustered around a metate (CC2-833) situated in Level 3. Because of this observation and in order to tease out a possible activity area or living floor, flakes of this material (dark green opaque CCS) were counted separately for this study. Green CCS flakes, which constitute 16% (N=3155) of all flakes at the site, do, in fact, make up the bulk of lithic debris in TT5C (N=987, or 87%), dropping off dramatically in adjacent areas, where they make up percentages ranging from 10% to 26% of the total debris counts (Figure 18).

High overall flake densities were also found in TT4C (751 flakes/m^3). Average densities decrease away from this unit (with the exception of TT5C already discussed), paralleling a decrease in the absolute depth of cultural deposits (Figure 19). Thus, flakes were recorded for seven levels (1.4 m) in TT4C, as compared to four levels in TT3C (Level 4 of TT3C only contained 0.5% of all flakes found in this unit, making the contrast even more pronounced). An inversion in this relationship is, however, noted for level 1, which is characterized by an *increase* in flakes away from TT4C (Table 8). Field observations for level 3 of TT4C suggested that this unit might represent "the center of

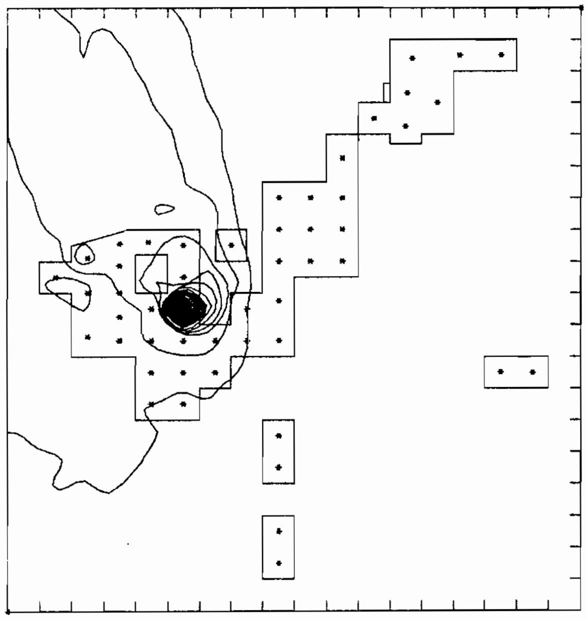


Figure 18. Horizontal distribution of green chert flakes, plotted by SURFER software. Contours outside of excavated units are extrapolated.

a pithouse or something similar" (Gannon, August 9, 1968). The distribution of flakes in TT4 supports this conclusion, which has been validated on the basis of other lines of evidence (see Features, Pit #2).

Finally, a third concentration of flake debris is observed in units of TT3 located adjacent to the cliff face. They encompass, in particular, TT3P, A, F, and E, which exhibit average densities of between 1,346 and 1,014 flakes/m^3. Like TT1, this part of the site was disturbed before inception of fieldwork, and it is difficult to match vertical flake distribution profiles from one unit to the next. As in the eastern portion of the site, however, there is a suggestion of multiple occupation episodes. A major peak is present between 8.50 and 8.30 m (Level 3) of units TT3G, A, P, E, and H. In TT3P, this maximum

Table 8. Debitage Frequencies by Level Across TT4 House Depression

Level	Excavation Unit, TT- 4A	4B	4C	4D	4E	2E
1	107 (25.4)	147 (27.3)	57 (5.7)	84 (16.2)	58 (75.3)	-
2	146 (34.7)	158 (29.3)	384 (38.6)	154 (29.6)	19 (24.7)	8 (16.3)
3	117 (27.8)	118 (21.9)	377 (37.9)	132 (25.4)	-	29 (59.2)
4	19 (4.5)	64 (11.9)	77 (7.7)	47 (9.0)	-	12 (24.5)
5	32 (7.6)	36 (6.7)	58 (5.8)	71 (13.7)	-	-
6	-	16 (3.0)	20 (2.0)	28 (5.4)	-	-
7	-	-	22 (2.2)	4 (0.8)	-	-
Total (%)	421 (100)	539 (100.1)	995 (99.9)	520 (100.1)	77 (100)	49 (100)

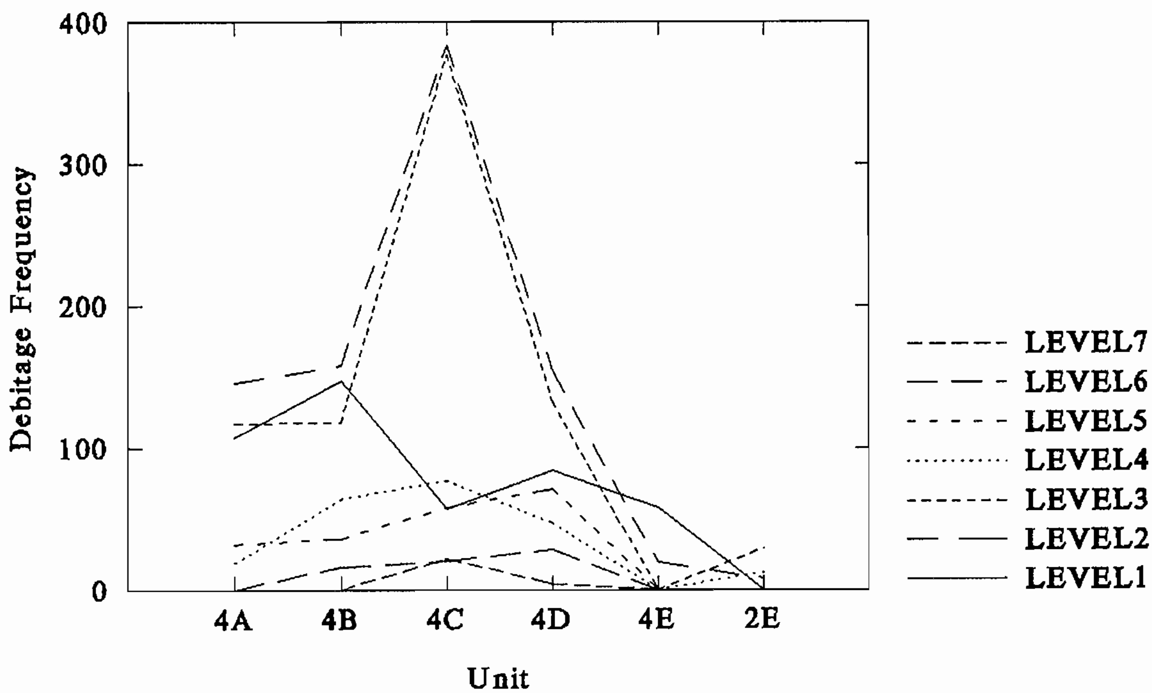


Figure 19. Debitage frequency by level across TT4 house depression.

extends over two levels, from 8.70-8.30 m. Flake counts are also high at the surface in TT3G, D, adjacent TT5A, and 3E. The lower surface counts in TT3A and P may be merely a result of the pothole that extends into both units. A third, albeit smaller, maximum, appears between 8.10 and 7.90 m, in levels 5 or 6, depending on the unit (see TT3A, P, D, 5A). TT3F, with dual peaks between 8.70 and 8.50 m, and between 8.30 and 8.10 m, does not coincide precisely with the patterns noted for the rest of the units, although its average flake density (1014 flakes/m^3), is reasonably close to adjacent units TT3A, E, and P. No reliable counts are available for TT3B.

To summarize, relative flake densities per m^3 calculated for 35WH7 divide the site into three major portions. The east, represented by units around TT1, and the west, comprised of TT3, 4, 5, and 7, show high flake densities radiating from three centers of gravity. The intermediate block comprising TT2 is, in contrast, generally characterized by low flake densities in shallow cultural deposits, as is the outlying TT6. Vertical density profiles are inconsistent and difficult to reconcile. Multiple peaks may, however, suggest multiple episodes of occupation in TT1 and TT3. Their interpretation is confused by recent vandalism at the site. The existence of a habitation floor centered on TT4C is supported by the distribution of flaking debris, as is the presence of an associated activity area, resulting from the reduction of green chert.

Flaked Stone Tools

Projectile Points

Three hundred eighty-nine items from 35WH7 have been identified as projectile points. These include 176 specimens with enough diagnostic features remaining to allow their assignment to recognizable types, and 213 items listed merely as unclassifiable point fragments. Proximal fragments and midsections predominate in the projectile point assemblage, respectively comprising 32.6% (N=127) and 33.2% (N=129) of all specimens. Only smaller frequencies of complete (N=44 or 11.3%) and distal (N=56 or 14.4%) specimens are present. This suggests the importance of retooling as an activity at the site, including the removal of broken bases and the rehafting of new or reworked projectiles. This inference is supported by the paucity of barbs and ears (only two barbs, about half of one percent of the point assemblage, were recovered), although coarse mesh screening may also have limited the recovery of these small elements. The rest of the fragments are lateral or unidentifiable pieces.

While cryptocrystalline silicates (CCS) represent the dominant raw material in the flaked tools at 35WH7, there is a substantial proportion of obsidian in the projectile point assemblage (Table 9). Almost 15% (N=58 or 14.9%) of artifacts of this class are made of obsidian, which contrasts markedly with the almost negligible presence of this material among the debitage.

Table 9. Projectile Point Distribution by Raw Material and Test Trench

Raw Mat.	TT1	TT2	TT3	TT4	TT5	TT6	TT7	TB1	PH	No Prov.	Tot.
Obs.	22	7	15	5	1	-	-	4	4	-	58
%	19.1	6.1	21.7	13.2	7.1	0.0	0.0	33.3	36.4	0.0	14.9
Non-Obs.	93	108	54	33	13	4	9	8	7	2	331
%	80.9	93.9	78.3	86.8	92.9	100	100	66.7	63.6	100	85.1
Tot.	115	115	69	38	14	4	9	12	11	2	389
%	100	100	100	100	100	100	100	100	100	100	100

Viewed spatially, obsidian is unevenly distributed across the site. While about 30% of all projectile points were recovered from TT2 (N=115), this area contributed only 12.1% of obsidian points. The northeastern portion of the site (TT1, TB1, and potholes), on the other hand, while accounting for 35.5% (N=138) of all projectile points, produced almost 52% (N=30) of all obsidian specimens. Similarly, 25.9% (N=15) of all obsidian points were recovered from TT3, which produced 17.7% of all projectile points. This tendency seems to drop off at the eastern edge of TT3, with both TT3D and adjacent TT7 and TT5 exhibiting lower proportions of obsidian than their total point counts would predict. Only in TT4 does the proportion of obsidian used in projectile points approximate the percentage of points found in this area. The distribution of obsidian projectile points supports the spatial partitioning already noted for the site based on lithic debitage densities.

For the purpose of this analysis, all projectile points were weighed and measured by length, width, thickness, basal width, neck width, and stem length. Incomplete measurements were recorded and marked with an asterisk; no attempt was made to estimate complete dimensions. Metric data are given in Appendix A.

Neck widths were graphed for specimens in which this element is complete (N=149). The results are shown in Figure 20. The graph shows the bimodal distribution which has been observed at many sites in the Far West and which is interpreted as the division between dart points and smaller arrow points (Corliss 1972). The division falls at approximately 7 mm, though the boundary is broad and could also be drawn at 6 or 8 mm. The contemporaneity of dart and arrow points has frequently been observed at sites in the Columbia Plateau (cf. Brauner 1976). While the bow and arrow were introduced approximately 2,000 to 3,000 years ago, they did not immediately replace the atlatl and dart. Substantial numbers of broad-necked points are found in late prehistoric times, such as during the later Quinton Phase (A.D. 1400-1750) at the Wildcat Canyon Site (Dumond and Minor 1983:150-151; see also Chapter 4, this study).

At 35WH7, both broad-necked and narrow-necked projectile points (neck widths exceeding 7 mm, and neck widths equal to or greater than 7 mm, respectively) are present in roughly equal proportions (55% and 45%). However, arrow and dart points are not equally distributed across the site. While TT3 and the area around TT1 (including TB1) are characterized by approximately equal neck width ratios (16 narrow-necked

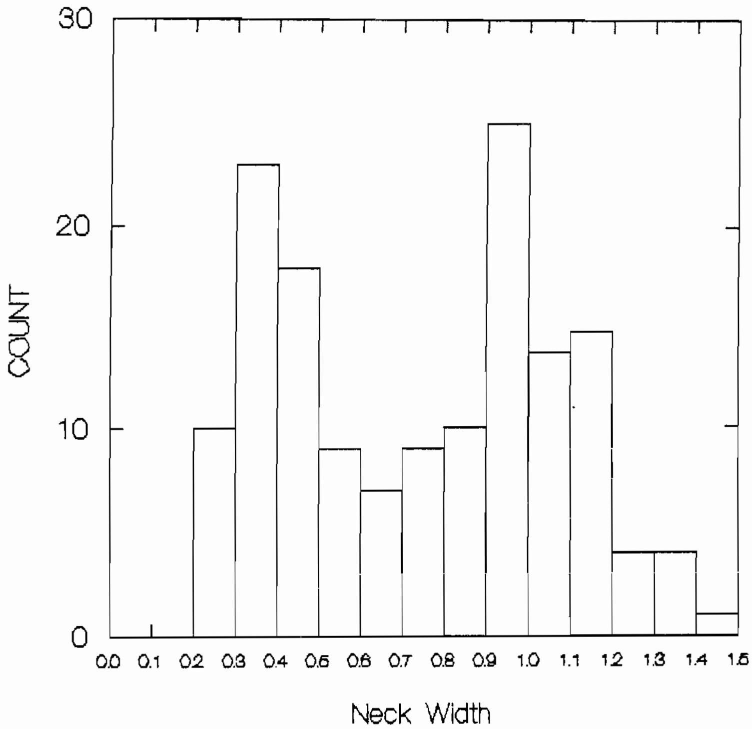


Figure 20. Frequency distribution of projectile point neck widths (complete neck widths only).

to 14 broad-necked points in TT3, and 21 narrow-necked to 21 broad-necked points in TT1), the proportions are skewed towards broad-necked types in TT2 (five narrow-necked to 34 broad-necked specimens) and towards narrow-necked points in TT4 (15 narrow-necked to five broad-necked points). Sample sizes in the other test trenches are too small to be meaningful. The spatial patterning of neck widths supports the horizontal division of the site into components of differing ages, a conclusion which will be returned to later.

Classification

In total, 176 projectile points from 35WH7 were complete enough to allow their assignment to known morphological point types. In order to facilitate regional comparisons and to avoid further proliferation of local typologies, all projectile points were classified according to the system developed by Dumond and Minor (1983) for material from the Wildcat Canyon Site, 35GM9, some 90 km to the north at the mouth of the John Day River (see Chapter 4). Projectile points collected and classified during the Pine Creek Archaeological Survey supported the applicability of the typology to the Study Area. Inconsistencies are, however, noted where present, and new types defined where necessary. In addition, comparisons are drawn to other potentially relevant assemblages.

Expanding Stem series (ES) (Figure 21): Expanding stem series points at Wildcat Canyon are divided into types on the basis of neck width and basal morphology. Numerical designators ranging from 1 to 4 indicate successively larger neck widths, while points with indented bases are designated by the letter "I." All are associated predominantly with the Wildcat Phase (2500-1000 B.P.). Narrow-necked ES series points were found to be somewhat more commom in its middle and later subphases (after 2000 B.P.), although they are also represented in the preceding Canyon Phase (6500-5000 B.P) and the following Quinton Phase (1000 B.P. to Euroamerican contact). According to Dumond and Minor (1983:170),

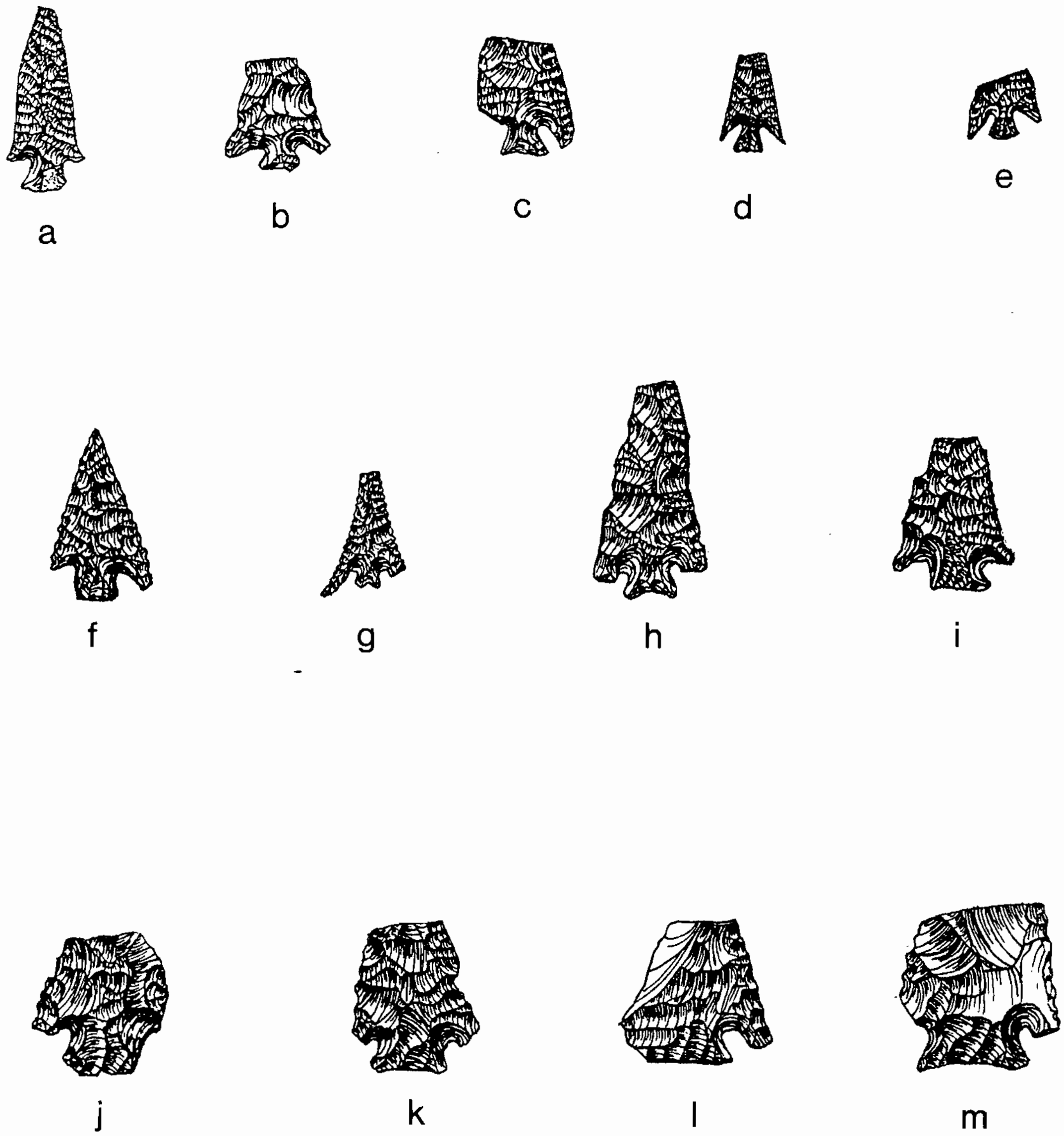


Figure 21. Expanding Stem series projectile points, 35WH7.

a. CC2-196
b. CC2-477
c. CC2-966
d. CC2-544
e. CC2-801
f. CC2-545
g. CC2-942
h. CC2-805/484
i. CC2-199
j. CC2-178
k. CC2-371
l. CC2-849
m. CC2-366

> the smaller two (ES1 and ES2) appear morphologically related to the Eastgate and Rose Spring series of the Great Basin, the larger two (ES3 and ES4) appear similarly related to the Elko Corner Notched points of the Elko series (Heizer and Hester 1978), although at Wildcat Canyon the two subsets appear thoroughly intermingled, whereas the Basin types seem to be more nearly differentially distributed in time or space.

The Rosegate series is generally dated to between 1700 B.P. and 700 B.P. (Heizer and Hester 1978:9; Thomas 1981:18; Holmer 1986:107), although its age range may be broader in the Northern Great Basin (e.g. from 2000 B.P. to contact, cf. Pettigrew 1985:104). This age range is compatible with that indicated for expanding stem points at Wildcat Canyon.

Dating of the Elko series is less clear-cut and problems in its chronological placement have been discussed in length (eg. Holmer 1986:101-104, Oetting 1989:433-434). These include, in particular, the discontinuous distribution of this style over at least 7000 years in the eastern Great Basin, as contrasted to its lesser time depth in the western Great Basin, where it has been dated to between 3300 and 1300 B.P. (Thomas 1981:20).

A pre-7000 B.P. age has, in some instances, also been suggested for the Elko series in the northern Great Basin. One Elko Corner-notched point is, for example, associated with Cultural Zone VI at Dirty Shame Rockshelter. Zone VI is dated to 9500-7900 B.P. (Aikens, Cole, and Stuckenrath 1977:8; Hanes 1977:Table 2; for other examples, see Wilde 1985). Wilde (1985:146) suggests two "chronotypes" for the Elko series. ELK1 (4000-800 B.P.) is represented by "primarily Elko Eared, Side and Corner-notched points from the central and southern Great

Basin," whereas ELK2 consists "primarily of Elko Eared points (7200-4200 B.P.) from the Northern Basin." At Lake Abert, farther to the west and and to the north, Elko points are thought to date to between 4000 B.P. and 1000 B.P. (Oetting 1989:434). A final resolution of this question is probably not possible on the basis of existing data, but the age of this point style in the Pine Creek Basin will undoubtedly fall somewhere between dates established for Wildcat Canyon and Lake Abert.

ES1: These are small, narrow-necked points with expanding stems and either straight or convex bases. They are fashioned on triangular blanks which are notched either from the base or from the corners. This results in the formation of barbs which range in shape from pointed to rounded or squared and which may extend rearward to a point even with the base. Blade shape is usually straight to slightly concave, though one especially finely finished specimen at the present site (CC2-196; Figure 21a) is characterized by excurvate-incurvate margins and short, pointed, slightly outflaring barbs.

ES1 points at the Wildcat Canyon Site measure 15 to 50 mm in length, 7 to 21 mm in width, with length-to-width (L/W) ratios of between 1.25 and 3.5. Neck widths range from 3 to 6 mm, stem lengths from 4 to 5 mm. Dimensions at 35WH7 are compatible with measurements from Wildcat Canyon, with complete specimens ranging in length from 18.7-30.0 mm, in width from 9.5-18.6 mm, while stem lengths range from 3.7-5.1 mm. Neck widths average 4.2 mm, ranging from 2.3-5.5 mm, and are therefore slightly smaller than in the Wildcat Canyon assemblage. Barbs, where complete, are generally pointed, except for one refitted specimen (CC2-274/461). Only four specimens are complete in both length and width, too small a sample to be meaningful, though three of these four do fall within L/W ratios observed at Wildcat Canyon.

The 21 ES1 points from 35WH7 are concentrated in the western portion of the site, especially TT3 and TT4. Only three were found in TT1 (including Pothole #2, which is associated with TT1D), and none were found in any unit of TT2. One was recovered in TT6B in the extreme southeast of the site.

ESI1: Two points from 35WH7, although rather different in shape, fall within this type postulated by Dumond and Minor, though not represented at the Wildcat Canyon Site. ESI1 points are comparable to ES1, except for the presence of an indentation of the butt. One small specimen with concave margins and long pointed barbs was found in TT1F, the second, which is larger, with short, squared barbs and straight margins, was refitted from fragments recovered in TT3E and H. Age ranges for ES points with indented bases are thought to be consistent with their straight- to convex-based counterparts.

The two ESI1 specimens from 35WH7 are compatible with the Rosegate series, although CC2-942 (Figure 21g), with its long, pointed barbs, is atypical for this class (cf. Thomas 1981:21). No similar specimens are illustrated by Leonhardy and Rice for the Lower Snake River (1970), and the presence of an expanding stem excludes them from the Gunther Barbed series as defined from southern Oregon and northern California (Mack 1983:130). A basally-notched point type is proposed by Schalk et al. (1987:6-9) for the Morris Site (on the lower John Day River), but this variety is said to exhibit shoulders which "are markedly barbed and are *square* at the top" (my emphasis) and therefore not identical to the points under discussion. Whether this is purely a local variant can at present not be determined.

ESI2: One specimen of obsidian was classified as ESI2 (Figure 21i). The ES2 type, as defined by Dumond and Minor (1983:170) is comparable to ES1, merely larger in size, with neck widths between 6.1 mm and 7.9 mm, lengths ranging from 25 mm to 46 mm, widths between 13 mm and 22 mm, and stem lengths between 4 and 8 mm. ESI2 is characterized by an indented base, as opposed to the straight-based ES2. The present specimen (CC2-199) falls within the stipulated dimensions for both this type and the Great Basin Rosegate series. It is from TT2D, Level 4. No ES2 type specimens were found at 35WH7.

ES3: Five specimens from 35WH7 were tentatively classified as type ES3. All are extremely fragmentary--incomplete in length, width, and most other quantifiable attributes. Assignment was mainly on the basis of neck width or inferred neck width, which is specified as 8 mm to 9.9 mm for this particular type. ES3 points at the Wildcat Canyon site range from 21-49 mm in length and 15-29 mm in width, with stem lengths of 4-8 mm. Complete dimensions exhibited by the five specimens at 35WH7 fall within the stipulated range. Four are from levels 1 and 2 of TT2 (squares A, F, and Q), where they co-occur with a large proportion of type SN5C specimens with which the ES series intergrades (cf. Dumond and Minor 1983:171). A fifth member of this class, CC2-822, is wider, thicker, and heavier than the others, with a narrower stem in relation to total width, and may represent a different type. It was recovered in TT4H, Level 3. All are of chert. Because of the fragmentary condition of these specimens, it is difficult to assign them to a Great Basin point type, but they can probably be accommodated within the Elko or Rosegate series.

ESI3: Five specimens are classified as ESI3. As defined (Dumond and Minor 1983:170), ESI3 specimens resemble ES3 points except for their indented base. The present points, all made of CCS, are from various parts of the site. Two are from TT6A and B at its western edge. The other three are from TT1D, from TT2R, and from TT4B. All fit comfortably within the Elko series.

ES4: Four specimens are classified as ES4. Dimensions given by Dumond and Minor (1983:170) for this type at Wildcat Canyon include lengths of 28-58 mm, widths of 19-38 mm, neck widths of over 10 mm and stem lengths of 4-9 mm. All four specimens are fragmentary and their assignment represents a best approximation. Two are from TT2 (units A and T), and two are from TT1 (units C and D). All are made of CCS, and are, once again, comfortably subsumed under the Elko series.

ESI4: Dimensions and shape as defined for this type (Dumond and Minor 1983:171) correspond to ES4 except for the presence of an indented base. Once more, all four representatives of this type at 35WH7 are fragmentary, but their classification seems reliable. Two, including one specimen of obsidian (CC2-66), were recovered from TT3C and D, one from TT2Q, and one from TT4C.

Pin Stem (PS) (Figure 22): Pin Stems are small narrow-necked points with straight stems terminating in either rounded or squared butts (differentiated here as varieties A and B, respectively). Stems in variety A specimens tend to be longer and thicker in cross-section, while specimens of variety B are characterized by stems which are shorter and flatter. Shoulder angles are variable (though usually less than 90 degrees), and blade margins generally straight or slightly concave, ending in pointed barbs that may extend as far back as the base of the point. Dimensions for PS points at Wildcat Canyon are given as 11-42 mm long and 7-19 mm wide, with a L/W ratio of 1.5-3.0. Stems are said to range from 3-7 mm in length, neck widths from 2-5 mm. All complete measurements from 35WH7 fall within the ranges observed at the Wildcat Canyon site. Atypical specimens which do not fit all morphological criteria are CC2-898, with convex blade margins (Figure 22i), CC2-69, with a contracting stem (Figure 22h), and CC2-172 (Figure 22j), which is square stemmed and asymmetrically barbed. All but three PS points at 35WH7 are made of CCS.

Twelve, or approximately half of the twenty-three PS points recovered from 35WH7 were found in TT1, including one labeled "PH?" which may have come from TT1P. The rest were recovered from TT3 and TT4, respectively. Only one specimen was recovered from Test Trench 2, unit TT2Q. As with ES1 points, all were recovered from the upper four levels of the site (except for CC2-154, which was associated with Level 6 of disturbed unit TT1P. However, unlike ES1 specimens, five PS points

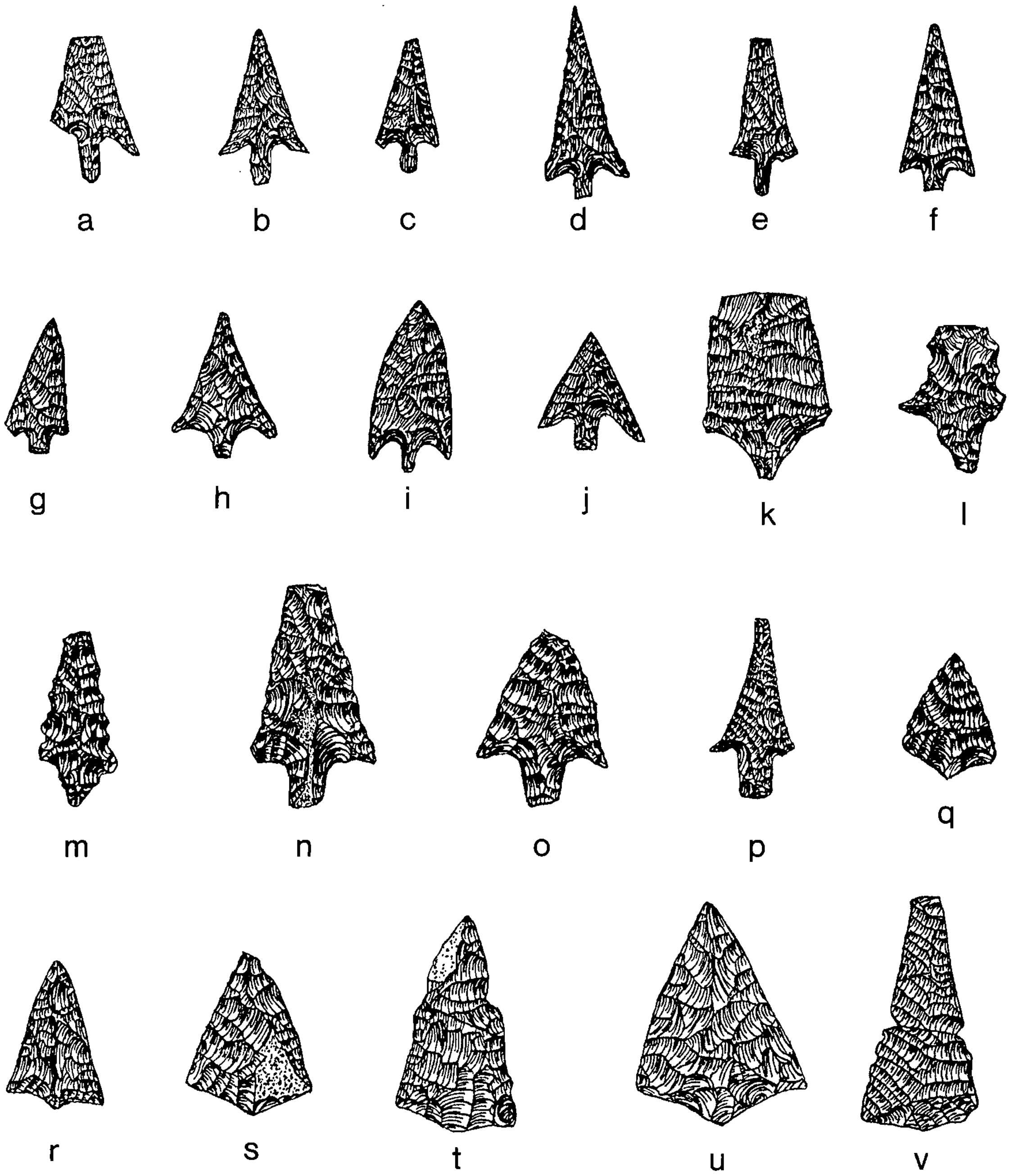


Figure 22. Pin Stems and Contracting Stem series projectile points, 35WH7.

a. CC2-1
b. CC2-268
c. CC2-32
d. CC2-895
e. CC2-906
f. CC2-116

g. CC2-802
h. CC2-69
i. CC2-898
j. CC2-172
k. CC2-817
1. CC2-341

m. CC2-516
n. CC2-146
o. CC2-356
p. CC2-129
q. CC2-95

r. CC2-293
s. CC2-480
t. CC2-177/603
u. CC2-148
v. CC2-212/882

were found in Level 1 deposits, suggesting a somewhat younger age. No spatial separation of the two varieties (PSA and PSB) was noted.

Dumond and Minor note the lower Columbia River affinities of PS points, which are heavily represented in late assemblages at The Dalles (Cressman et al. 1960) and in the Portland Basin (Pettigrew 1981). At Wildcat Canyon this style is associated with the Quinton Phase (1000 B.P. to Euroamerican contact). Small stemmed and barbed points are also represented in the Piqúnin Phase of the Lower Snake River (ca. 700-300 B.P.; Leonhardy and Rice 1970, Figure 11).

In the Great Basin, PS points can generally be subsumed within the Rosegate series, although these are generally characterized by expanding stems (Thomas 1981:19). The Rosegate series has generally been dated to between 1700 B.P. and 700 B.P., though it may have been used longer in the Northern Great Basin (see above under Expanding Stem).

<u>PS/ES</u>: In ten specimens, stems are fragmentary, making their assignment to a specific type impossible. Their morphology suggests a most likely placement with either PS or ES1(I). Neck widths of these specimens range from 2.9 mm to 4.8 mm. While questionable specimens with neck widths of less than 5 mm were classified as PS points at Wildcat Canyon (Dumond and Minor 1983:170), they are here referred to as PS/ES. Like the other two types, PS/ES points are almost completely absent from TT2, where only one was recovered in Level 1 of TT2H. PS/ES specimens, like ES1, exhibit a broad distribution across the site, encompassing TT1P, TB1, TT3F, TT4D, TT5A and B, TT7A and B. All were,

where documented, recovered from levels 1 though 4, except for two specimens from disturbed TT1P.

Contracting Base (CB) (Figure 23): Wildcat Canyon type CB2 is the closest analog for two leaf-shaped specimens, CC2-234 and CC2-29 (Figure 23m-n). This style is defined as leaf-shaped, with a rounded to pointed base and frequently serrated margins. Lengths measure from 30-69 mm, widths from 9-25 mm. Maximum width falls behind the longitudinal midpoint of the specimens (Dumond and Minor 1983:171-172). Of the two specimens at 35WH7, one (CC2-29), from Level 3 of TT3B, is thick and irregularly flaked, and may actually represent a punch or perforator rather than a projectile point. The second (CC2-234), from Level 4 of TT5A (and attributed to the top of Stratum C), is more regularly flaked and narrow, with the widest spot at about the midpoint of the specimen, and a slight, possibly unintentional shoulder. Neither is serrated.

CB2, as defined by Dumond and Minor, is assigned to the Canyon Phase (6500-5000 B.P.) (Dumond and Minor 1983:157-158). Points of this type include those commonly referred to as Cascade points elsewhere on the Columbia Plateau, "as well as some bipointed implements that some classifiers might not allow as Cascade points" (Dumond and Minor 1983:172). Neither of the two present specimens resembles the classic Cascade type (cf. Butler 1961).

Contracting Stem series (CS) (Figure 22): Three point types are included under the Contracting Stem series. These include CS1 and CS2, as identified by Dumond and Minor (1983:172), and CS6, which is defined

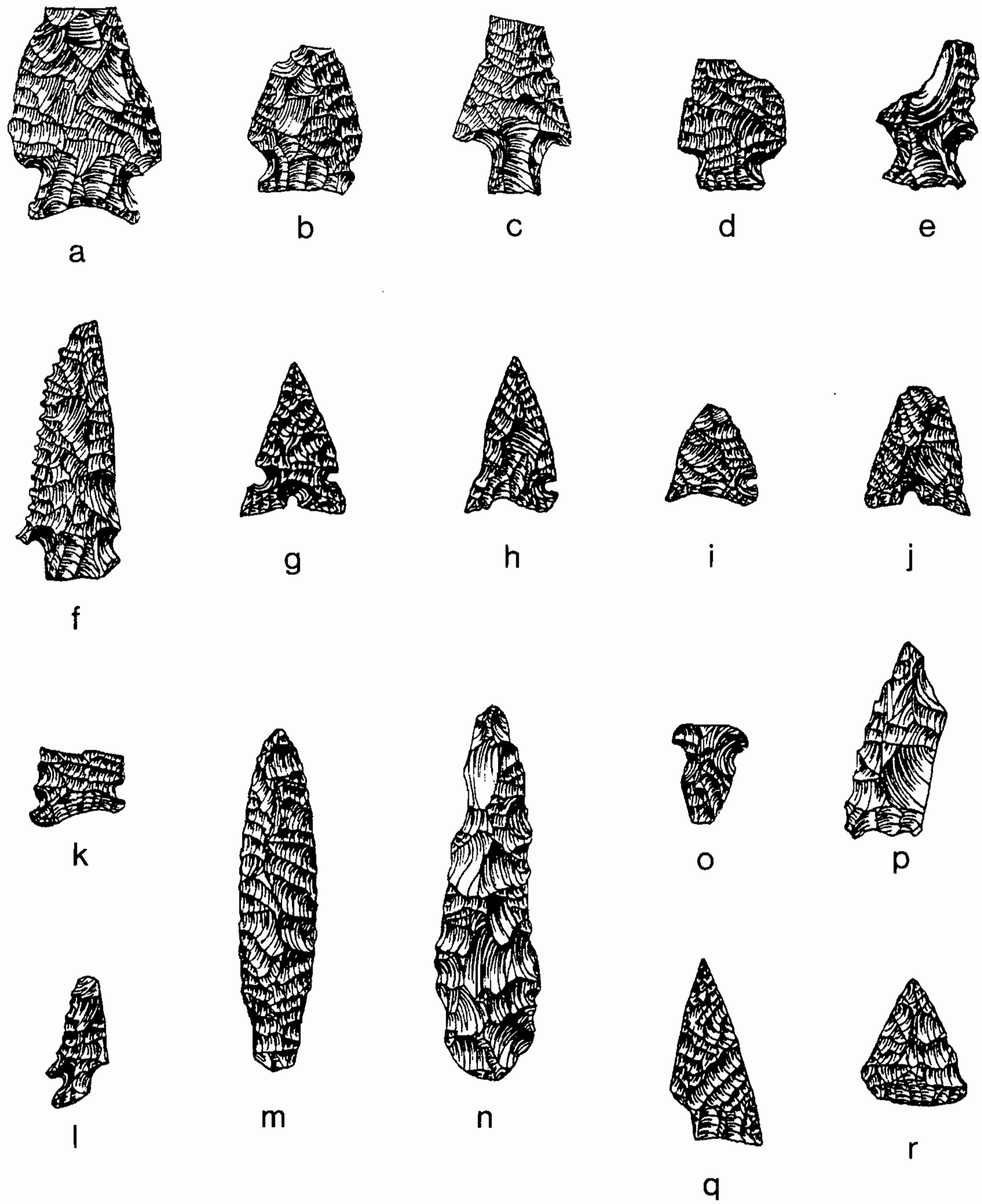


Figure 23. Miscellaneous projectile point types, 35WH7.

a. CC2-171
b. CC2-944
c. CC2-307
d. CC2-880
e. CC2-222
f. CC2-872
g. CC2-900
h. CC2-79
i. CC2-521
j. CC2-3/176
k. CC2-838
l. CC2-566
m. CC2-234
n. CC2-29
o. CC2-60
p. CC2-1154
q. CC2-927
r. CC2-824

at 35WH7 to encompass a point style not observed at the Wildcat Canyon Site.

CS1 (Figure 22k-m): This type, as defined by Dumond and Minor (1983:172), includes points with short, contracting stems which are usually set off from the body by short barbs. Stems are often pointed and constitute about one fifth of the total length, blade margins are straight to convex. Lengths are typically 26-48 mm, widths 9-26 mm, with L/W ratios of 1.3-2.2.

Nine specimens have been assigned to this type with varying degrees of confidence. Seven, all of them fragmentary, fall well within the definitional criteria, though it is difficult to assess the relationship of stem length to total artifact length in the absence of complete length measurements. Proveniences show no patterning, with specimens recovered from TT3G in the west to TT1F in the east of the site. Four are of CCS, two of obsidian. Two additional specimens are more amorphous and appear to be crudely reworked from originally broken specimens. Both are made of chert and come from TT2A and 2Q. Their greatest resemblance is to the reworked SN5C type points discussed below, which also tend to cluster in TT2.

Eighty percent of CS1 and CS2 points at the Wildcat Canyon Site occur in components associated with the Wildcat Phase (2500-1000 B.P.) (Dumond and Minor 1983:Table 7.1), though one isolated specimen of either CS1 or CS2 dates from the Philippi Phase (9000-7500 B.P.). Similar contracting-stemmed points date to between 2600 B.P. and 750 B.P. in the Portland Basin (Pettigrew 1981), and are also present at The

Dalles (Cressman 1960: Fig. 41b,d) and to the north (e.g. Warren 1968:Fig. 13), as well as in the lower John Day River area (Schalk 1987:6-6 to 6-7), where most range from 2000 or 3000 B.P. to Euro-American contact. Large contracting-stem points (Gatecliff Contracting Stem points) are found in the northern and eastern Great Basin, where they occur between 4500 B.P. and 2500 B.P. (Holmer 1986:105-106). This type appears, however, to be characterized by longer, more rearward-extending barbs and narrower, more distinctly set-off stems than displayed by the present specimens (Thomas 1981:Figure 23).

CS2 (Figure 22n-p): Points of this type are characterized by contracting stems with squared bases and distinct shoulders or short barbs. As defined by Dumond and Minor (1983:172), the stem measures less than two fifths of the total length of the piece, and less than half the total width. Lengths range from 26-45 mm, widths from 10-25 mm, with a L/W ratio of 1.5 to 3.0.

Five projectile points from 35WH7 fall within the stipulated size range of CS2, although no complete length measurements are available for the calculation of L/W ratios. Of the five specimens, one (CC2-400) is manufactured on a flake with only minimal retouch along the blade margins, while another (CC2-246) is heat-spalled. Four were found in the western half of the site (TT3C, TT4A, TT5A, 5B). The fifth (CC2-400) was recovered on the southern perimeter of the excavation block in TT2N. All are of CCS.

CS6 (Figure 22q-v): Fourteen points from 35WH7 have been classified as CS6, a category not found at Wildcat Canyon. This type is characterized by a rhomboidal shape, with straight blade margins and a base which forms a slight central projection, rather than a distinctly set-off stem. Basal margins are generally straight to slightly concave. Lengths range from 16.7 mm to more than 33.7 mm, with widths between 12.4 mm and 24.1 mm. Length-to-width ratios are usually around 13, although exceptions are represented by conjoined specimen CC2-603/177 (L/W=1.7), and CC2-350 (L/W=11.5). Thirteen of the fourteen points are of CCS, one is made of obsidian.

Of the fourteen points classified as CS6 (two of which are conjoined and consist of two fragments each), ten were found in the northeastern portion of the site. This includes three specimens (consisting of four fragments) from TT1A, two from TT1C, one from TT1D, one from TT1P, two from TT2H, and two matching fragments from TT2Q and 2F. The four remaining CS6 points are spread across the western portion of the site, with one (the largest, at 5.03 g) recovered from TT4D, one from TT4B, one (the only one made of obsidian) from TT3A, and one from TT3E.

While this point type appears to be absent at Wildcat Canyon, similar specimens are reported for The Dalles (Cressman 1960:43-46) where they are associated with the upper levels of the site.

<u>Drill-like (DR)</u> (Figure 23o): The "DR" or "drill-like" type, as defined at the Wildcat Canyon Site, is characterized by a long, narrow blade "reminiscent of that of a drill, although the point is sufficiently thin as to suggest that use as a drill was unlikely" (Dumond and Minor 1983:171). DR points as illustrated in the Wildcat

Canyon report (Dumond and Minor 1983:plate 5) exhibit outward-flaring barbs and straight stems terminating in a squared to rounded base. Lengths range from 26-51 mm, widths from 9-17 mm, with L/W ratios of 3.0-3.3. Most DR points from the Wildcat Canyon Site are associated with the Wildcat Phase (2500-1000 B.P.), although a small number are attributed to the Quinton Phase (1000 B.P. to contact). Their association with early historic assemblages along the Deschutes River (Hess 1989) supports this extended time range.

One fragmentary specimen from 35WH7 may represent a DR basal fragment, broken just below the barbs. It is made of CCS and was recovered from TT2D.

Side-Notched series (SN) (Figures 23, 24): The SN series encompasses three types defined by Dumond and Minor (1983:171) (SN3, SN4, SN5), and one side-notched type which is defined at 35WH7 (SN6) in the absence of a comparable point style from the Wildcat Canyon Site.

SN3 (Figure 23a-b): Three side-notched points from 35WH7 are classified as SN3. According to the Wildcat Canyon typology, this type exhibits broad shallow notches which extend forward into the body of the point and rearward into the base, resulting in slight barbs and an expanding base that is always narrower than the blade maximum. As defined, lengths measure from 20-42 mm, widths 15-30 mm, with L/W ratios of 1.2-2.2. Neck widths measure between 10 mm and 22 mm, and length of the basal element ranges from 8-11 mm.

The present three SN3 representatives were recovered in TT1F, in TT3E, and on the surface of the site outside of the excavation grid (provenienced as "surface under juniper tree"). Two of the points are CCS, one of obsidian.

At the Wildcat Canyon Site, SN3 type points are found in small numbers during the Wildcat and Quinton phases.

SN4 (Figure 23c-f): Six points are classified as SN4. As defined, this type is characterized by broad side- or corner-notches, and a narrow stem in relation to the blade element. Lengths range from 24-53 mm, widths from 10-32 mm (L/W=1.5-2.5). Neck widths range from 6-18 mm, and length of basal element from 5 mm-12 mm (Dumond and Minor 1983:171).

The six specimens classified as this type at 35WH7 exhibit a considerable degree of variability. Stems range from expanding to almost parallel-sided, with base shape generally straight. It is difficult to evaluate shoulder configuration because of the fragmentary nature of the points, but, generally, short barbs appear to be the rule. One of the specimens (CC2-872) is serrated along one edge (the opposite appears to have been reworked) (Figure 23f). One (CC2-978) is of obsidian; the rest are of CCS. All generally fall within the required size ranges.

Four SN4 specimens were found within the block containing TT2F, TT2Q, and TT2R. The only one made of obsidian, which is also somewhat anomalous because of its laterally projecting barbs and convex base, was recovered from TT3G, at the western margin of the site, while the sixth representative, with an almost parallel-sided stem, is from PH2 (asociated with TT1D).

The SN4 type occurs in small numbers from the Canyon Phase (6500 - 5000 B.P.) through the first half of the Quinton Phase, although proportionately, its highest representation is in the Canyon Phase and the early Wildcat Phase.

SN5 (Figure 24): Forty-two broad-necked projectile points at 35WH7 were classified as SN5, making this the largest class of points recovered from the site. All but one are made of CCS. Based on the internal variation observed in this group of specimens, the decision was made to tentatively subdivide this type into four varieties. The varieties are distinguished by basal configuration, presence or absence of serrated margins, and shape of side notches and shoulders. Many of these points have been reworked; this affects point morphology and is discussed below.

SN series points as named by Dumond and Minor for the Wildcat Canyon Site include both side-notched and corner-notched specimens which "stand apart from the ES series in that they are not so clearly made on triangular blanks which are modified by notching from the corners" (Dumond and Minor 1983:171). Dumond and Minor (1983:171) define SN5 as follows:

> In this type the narrow, deep notch is immediately forward of the basal corner. The blade is almost always serrated, and the base is always strongly indented. The maximum width may fall either immediately ahead of, or behind, the notch. Morphologically, this seems to be an extreme variant of the ESI series, from which it was originally not distinguished; it appears also to relate to the Elko Eared type of the Great Basin....

SN5 points are said to be 24-42 mm long and 17-22 mm wide, with a L/W ratio of 1.1-2.2. Neck widths range from 11-15 mm.

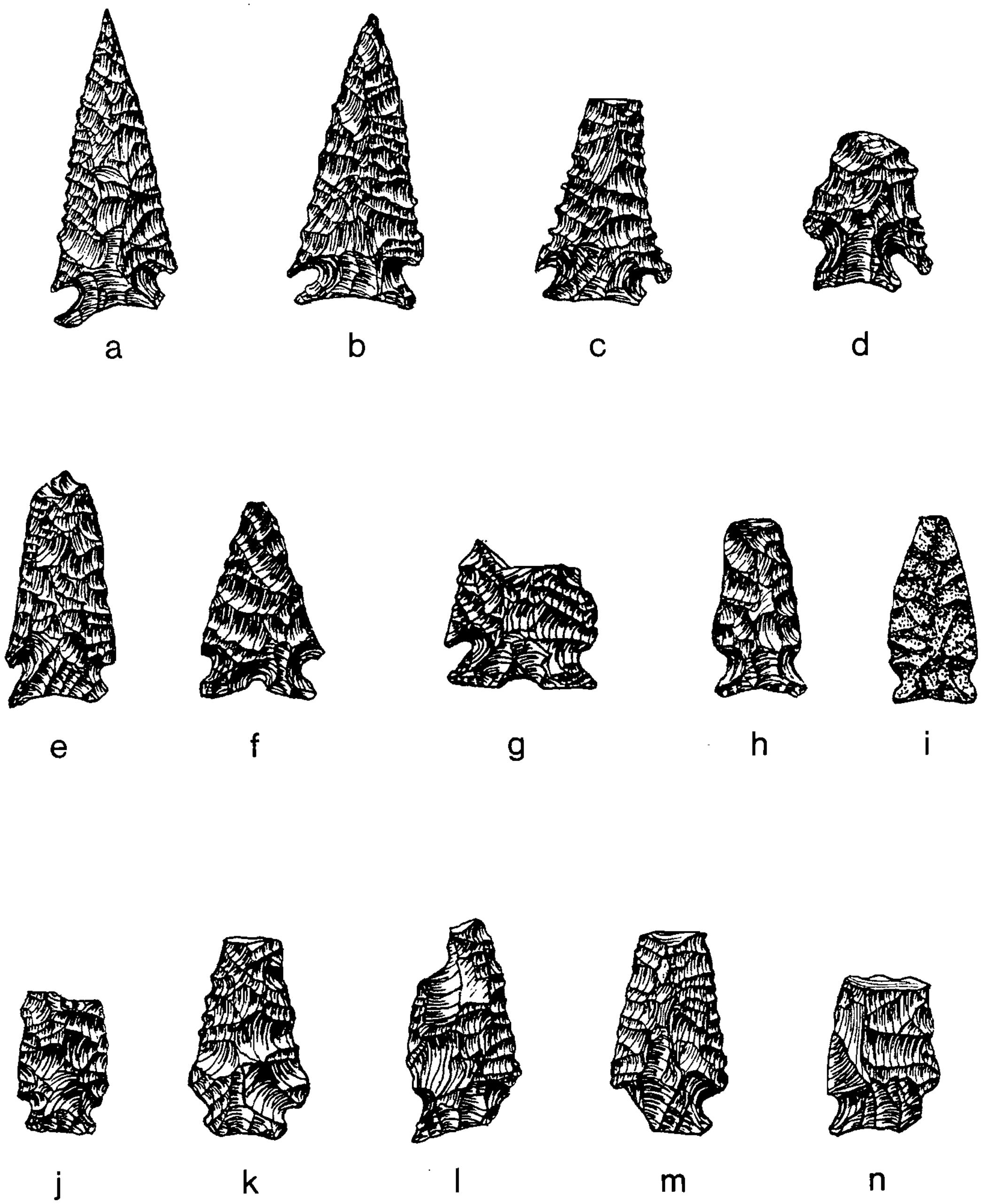


Figure 24. Projectile points, SN5, 35WH7.

a. CC2-512	e. CC2-804	i. CC2-237	l. CC2-868
b. CC2-229	f. CC2-122	j. CC2-887	m. CC2-217
c. CC2-141	g. CC2-406	k. CC2-58	n. CC2-241
d. CC2-873	h. CC2-835		

Fourteen points from 35WH7 fit the description given by Dumond and Minor and are here identified as SN5A. Lengths of the two relatively complete specimens (CC2-229 and CC2-512; Figure 24a-b) are 40.1 mm and 43.3 mm, widths 18.3 mm and 17.2 mm, and L/W ratios are 2.2 and 2.5 (thus somewhat higher ratios than are indicated above). Total range of widths spans 15.1-19.6 mm. Neck widths range from 9.6-13.9 mm, with a mean of 11.5 mm. Bases are concave on all of these specimens.

Three points are classified as SN5B and characterized by central basal notches and eared bases, comparable to Elko Eared points of the Great Basin (Figure 24f-g). Two of these specimens (CC2-122 and CC2-965), both of CCS, appear to have been reworked along the blade margins. The third, made of obsidian (CC2-406), consists of a proximal fragment. Margins are smooth, without the serrations characteristic of SN5A. This variety includes the only SN5 type point from this site that is made of obsidian. Lengths on the almost complete pieces are 27.2 mm and 29.0 mm, widths are 17.4 mm and 16.8 mm, producing L/W ratios of 1.6 and 1.7. Neck widths are 12.2 mm and 10.4 mm, respectively.

SN5C points consist of 17 specimens. All are broken, and lack one or two barbs and/or one or two ears, as well as the original point tip (Figure 24k-n). In most, one or more of these fractures has been reworked, resulting in a point that is shorter, stouter, and slightly narrower that the average SN5A variety of this type. In all members of this variety, margins have been reworked and straightened, though traces of the original serration remain on some specimens. Lengths and widths are essentially meaningless in this variety, since they reflect secondary modification. Relatively "complete" neck widths range from 9.1-13.5 mm.

Seven specimens have been classified as SN5D (Figure 24h-j). Five have undamaged bases which vary in configuration (basal-notched, concave-based, and one straight-based piece), and all are narrow (12.4-13.3 mm), have shallow notches and rounded shoulders. Reworking has taken place in at least two of the specimens. Neck widths range from 8.1-10.0 mm, which would technically exclude this variety from SN5, although, morphologically, it fits this category better than the alternative ESI3, which is corner- or basally-notched, rather than side-notched.

While it may be argued against subdividing a group of only 42 specimens, the approach is validated by the spatial distribution of the varieties across 35WH7. Of the fourteen specimens here identified as SN5A, seven, or 50%, were recovered from TT3, more specifically within the block delimited by units TT3A, B, E, F, and P. All but one of the specimens from TT3E, F, and P are from Level 4 (one specimen was recovered from Level 2), those from TT3A and B are from Level 5 (8.10-7.90 m). This places them stratigraphically well below the radiocarbon-dated charcoal and ash lens at the western edge of TT3E (1160 ± 90 B.P.; 8.67-8.57 m). One specimen from Level 6 of TT3A (CC2-141) was, in addition, provenienced to the "yellow matrix" which underlies the main cultural midden.

Of the remaining SN5A points, three are from levels 1 and 2 of TT4A and C, two are from Level 1 of TT2Q, and two are from the northeastern edge of the site (TT1P, Level 7, and TT1D, provenience unknown). The small sample of three SN5B points allows for no major conclusions. One is from Level 5 of TT3A, one is from Level 2 of TT2H, and one is from TT7B, Level 2. SN5C type points, of which there are 17, were most often recovered from TT2. A total of ten specimens originated in TT2A, F, H, Q, and R, all in levels 1 and 2, which comprise the entire, shallow cultural deposits in this part of the site. The presence of broken and reworked projectile points may explain in part the relatively low flake counts for these units (see earlier discussion of lithic debitage). Most of the remaining SN5C specimens come from the northeastern portion of the site, TT1C, 1P, and TB1 (one in TB1 from "midden" and one from "below midden"). Only one was recovered west of TT2, in level 1 of TT3C. Of the seven points classified as SN5D, two were recovered from TT1 (C and P), three from TT2 (C, F, Q), one from TT4I, and one from TT3D.

One fragmentary specimen, classified merely as SN5, was recovered when sorting the debitage from TT7B, Level 2.

At the Wildcat Canyon site, the SN5 type is associated with the Wildcat Phase. To the south, most of present specimens would fall under the Elko series (including both Elko Eared and Elko Corner-Notched types), with the exception of several variety D points, which with basal widths of less than 10 mm, would be assigned to the Rosegate series. The controversy over the chronological assignment of the Elko series has been discussed above (see Expanding Stem series), with ages for the Northern Great Basin ranging from about 7000 B.P. to 1000 B.P. (Wilde

1985:146; Oetting 1989:434). The radiocarbon dates from 35WH7 suggest a temporal placement consistent with that observed at the Wildcat Canyon site.

SN6 (Figure 23g-l): This type has been created for the purpose of this study to incorporate the small side-notched points that are not uncommon in the Clarno Basin. It includes six specimens at 35WH7, one of which has been refitted from two fragments. A discussion of individual specimens is presented because of their small sample size and considerable range of variation.

CC2-900 (Figure 23g) -- This specimen is both side-notched and basal-notched. With a neck width of 8.7 mm, it is technically at the lower end of the broad-necked points, though its small size (length=21.4 mm, width=14.1 mm), thin cross-section (2.9 mm) and low weight (0.64 g) are consistent with the narrow-necked varieties. Fashioned on a triangular blank, it is indistinguishable from specimens referred to throughout the Great Basin as Desert Side-Notched points (see below).

CC2-79 (Figure 23h) -- Like CC2-900, this point is made on a triangular blank of obsidian. It is notched on the base and one lateral margin. On the same side the basal tang has been rounded off, resulting in an asymmetrically-shaped base. Its general appearance and size (22.1 mm length, 11.9 mm width, 3.1 mm thickness, and weight of 0.71 g) are comparable to CC2-900.

CC2-521 (Figure 23i) -- This specimen is unilaterally notched like the previous piece, and is fashioned on a triangular blank of obsidian with a concave (rather than basal-notched) base. Like CC2-79, the basal tang on the side of the notch has been rounded off, while the opposite corner remains sharp and unmodified. It is shorter than the other two points and appears to have been reworked to its present length of 14.6 mm. It is 12.5 mm wide, 2.8 mm thick, and weighs 0.45 g.

CC2-3/176 (Figure 23j) -- This (conjoined) point has been longitudinally broken through its basal notch, and its distal end is missing. Dimensions (width=13.5 mm, thickness=2.4 mm, and weight=0.55g), material, and presumed blank morphology resemble the specimens already discussed. No side-notching, is, however, present. It is likely that CC2-3/176 was broken in manufacture, perhaps during notching of the base.

CC2-838 (Figure 23k) -- This specimen is a proximal fragment with a concave base and asymmetrical side-notches. It is made of either dark grey chert or an opaque grey obsidian unlike the glassy material used for the specimens discussed above. It differs in outline somewhat from the other four points in the low placement of the notches which results in a somewhat shorter base. Like CC2-79 and CC2-521, the base is somewhat asymmetrical, and one lateral margin is only very slightly notched. It is generally comparable in width (14.5 mm) and thickness (3.2 mm) to the other specimens. Due to the shallowness of one of the notches, its neck width is somewhat larger, i.e. 11 mm.

CC2-566 (Figure 23l) -- Made of chert, this specimen is broken along its length. Unlike the first four points, the margins of which are straight to slightly convex, it has concave margins. The single remaining side-notch is placed low on the point and extends forward, forming a slight barb. The specimen measures 4.0 mm thickness; all other measurements are incomplete.

The six specimens discussed above can be divided into two groups on the basis of morphology and raw material. The first four specimens, although in varying degrees of completion, are compatible with Desert Side-Notched points found across the Great Basin (Baumhoff and Byrne 1959) and beyond (cf. Kehoe 1966). These are defined as "small triangular points with notches high on the sides" (Lanning 1963:253, cit. in Thomas 1981:18). Desert Side-Notched points are generally dated to between A.D. 1200 or 1300 and Euroamerican contact (Thomas 1981:18-19; Holmer 1986:107), and have often been associated with the spread of Numic-speaking peoples across the Desert West (e.g. Bettinger and Baumhoff 1982).

The last two specimens are set off from the former four on the basis of material, morphology (low placement of the side-notches), and horizontal distribution. The first four were recovered in the northeast corner of the site (TT1A, P, and TB1), where they tend to be associated with upper levels (9.30-8.90 m), when not recovered from disturbed contexts. The last two points were found in TT3H and 4H, respectively (levels 2 and 4). While more specific conclusions are not possible because of the small sample size and the incomplete nature of the points, it is suggested that internal variation within these small side-notched points may be of some significance, particularly when this point style is used as a temporal or cultural diagnostic indicator.

The absence of SN6 type points from the Wildcat Canyon site, as well as sites at The Dalles is intriguing. Points of this type are found along the Columbia River and have been recovered farther downstream in the vicinity of Bonneville Dam and in the Portland Basin (Minor, Toepel and Beckham 1989; Pettigrew 1981), as well as upstream (Lohse 1985:347). In the Portland Basin, small side-notched points (Type 12) are said to occur primarily after A.D. 1250, with highest percentages found at Euroamerican contact (Pettigrew 1981:110). The association of this point style with a plank house dated to A.D. 1700 and later at Bonneville Dam (Minor, Toepel and Beckham 1989) may indicate a more intensive protohistoric and historic occupation than that indicated for the Wildcat Canyon site, where Euroamerican trade goods are rare. This conclusion is supported by radiocarbon dates of 250 ± 55 B.P., 220 ± 55 B.P., and 230 ± 55 B.P. at Bonneville, and of 350 ± 90 B.P. at 35WH7, in contrast to the most recent date from Wildcat Canyon (500 ± 150 B.P.). Given the overlap of the dates, however, this is not a strong statistical argument, and it is possible that factors other than time are involved.

ES/SN: Five point bases are characterized by the expanding stem characteristic of ES and SN series types. Neck measurements on these fragments range from 8.4 to 13.2 mm, placing them within the broad-necked series. Three are from TT2 (D, R, and T); the others from TT3G and TT1P.

<u>Small Triangular (ST)</u> (Figure 23p-r): ST identifies another type which is not present at the Wildcat Canyon Site. The seven ST points

from 35WH7 all are small and triangular and may represent either finished pieces or preforms for narrow-necked size points. Basal configuration ranges from convex to straight or concave. Two specimens are made of obsidian and may represent preforms for small side-notched points (SN6), particularly given the common use of obsidian as raw material for this point style. Lengths range from 17.4-26.7 mm, widths from 12.6-18.7 mm.

Four ST points were recovered from the northeastern portion of the site, including TT1F, TT1P, TT1A, and TT2H. These include the more complete of the obsidian specimens. The remaining three were recovered from TT3b, TT3E, and TT4G.

Small triangular points have been found at The Dalles (Cressman 1960, Type IIA), at Bonneville (Minor, Toepel and Beckham 1989, Types 41 and 42), and in the Portland Basin (Pettigrew 1981, Types 13 and 14). Their presence at Bonneville places them after the Bonneville Landslide at ca. A.D. 1100 (Minor, Toepel and Beckham 1989), while the incurvate-based variety of small triangular points in the Portland Basin (Type 13) is contemporaneous with small side-notched points, i.e. increasing from 1250 to the time of contact (Pettigrew 1981:110). At The Dalles, they are identified as late types (Cressman 1960:62).

In the Great Basin, points of this type are classified as Cottonwood Triangular (Lanning 1963). This type is included in the "Desert Series" together with Desert Side-Notched points and dates from A.D. 1300 to Euroamerican contact (Thomas 1978:27; Holmer 1986:108). This age range is compatible with that reported from the Columbia River. The absence of small triangular points and small side-notched points from the Wildcat Canyon site can probably be attributed to the same causes (see above).

Discussion

The small sample sizes of individual point types, only five of which are represented by more than ten specimens, preclude meaningful statistical analyses of this artifact class at 35WH7. Some spatial patterning can, however, be inferred by comparing expected and observed percentages of certain point types with reference to the main areas of the site identified by the debitage analysis. For the present examination, the site is partitioned into an eastern portion (including TT1, TB1, and proveniences given as PH, PH1, and PH2), a central portion, consisting of TT2, and a western portion, including TT3, 4, 5, and 7. The peripherally located TT6 is treated on its own and comprises the fourth area.

All of the five types represented by more than ten specimens (ES1, N=21; PS, N=23; SN5A, N=14; SN5C, N=17; CS6, N=14) show an uneven distribution across the site, i.e. a difference between observed and expected percentages of greater than 10% (Table 10). ES1 points occur in substantially higher frequencies in the western portion of the site, while fewer than expected occur in the eastern portion and TT2. The eastern portion of the site is, on the other hand, characterized by a higher proportion of PS points, of which fewer than expected were found

Table 10. Horizontal Distribution of Projectile Point Types by Area[1]

Wildcat Cyn. Phase[2]	Point Type	East		TT2		West		TT6		All Areas	
		N	%	N	%	N	%	N	%	N	%
W,Q	ES1	4	(19.05)	0	(0.00)	16	(76.19)	1	(4.76)	21	(100.00)
W,Q	PS	12	(52.17)	1	(4.35)	10	(43.58)	0	(0.00)	23	(100.00)
Q[3]	SN6	4	(66.67)	0	(0.00)	2	(33.33)	0	(0.00)	6	(100.00)
W,Q	SN3	1	(50.00)	0	(0.00)	1	(50.00)	0	(0.00)	2	(100.00)
C,W	SN4	1	(16.67)	4	(66.67)	1	(16.67)	0	(0.00)	6	(100.02)
W	SN5A	2	(14.29)	2	(14.29)	10	(71.43)	0	(0.00)	14	(100.01)
W	SN5B	0	(0.00)	1	(33.33)	2	(66.67)	0	(0.00)	3	(100.00)
W	SN5C	6	(35.29)	10	(58.82)	1	(5.88)	0	(0.00)	17	(99.99)
W	SN5D	2	(28.57)	3	(42.86)	2	(28.57)	0	(0.00)	7	(100.00)
Q[3]	ST	3	(42.86)	1	(14.29)	3	(42.86)	0	(0.00)	7	(100.01)
P,C[4]	CB2	0	(0.00)	0	(0.00)	2	(100.00)	0	(0.00)	2	(100.00)
W	CS1	2	(22.22)	3	(33.33)	4	(44.44)	0	(0.00)	9	(99.99)
W	CS2	0	(0.00)	1	(20.00)	4	(80.00)	0	(0.00)	5	(100.00)
Q[3]	CS6	7	(50.00)	3	(21.43)	4	(28.57)	0	(0.00)	14	(100.00)
W,Q	DR	0	(0.00)	1	(100.00)	0	(0.00)	0	(0.00)	1	(100.00)
W,Q	ES3	0	(0.00)	4	(80.00)	1	(20.00)	0	(0.00)	5	(100.00)
W,Q	ES4	2	(50.00)	2	(50.00)	0	(0.00)	0	(0.00)	4	(100.00)
W,Q	ESI1	1	(33.33)	0	(0.00)	2	(66.66)	0	(0.00)	2	(100.00)
W,Q	ESI2	0	(0.00)	1	(100.00)	0	(0.00)	0	(0.00)	1	(100.00)
W,Q	ESI3	1	(20.00)	1	(20.00)	1	(20.00)	2	(40.00)	5	(100.00)
W,Q	ESI4	0	(0.00)	1	(25.00)	3	(75.00)	0	(0.00)	4	(100.00)
Total		48	(30.19)	39	(24.53)	69	(43.40)	3	(1.89)	159	(100.01)

1. underlined values represent deviations of >10% from expected, only for samples >10
   conjoined specimens are counted as one item in this table
2. based on Dumond and Minor (1983), primary phase of use is underlined
   Q=Quinton Phase, 1000 BP-Contact; W=Wildcat Phase, 2500-1000 BP; C=Canyon Phase, 6500-5000 BP; P=Philippi Phase, 9000-7500 BP
3. type not reported at Wildcat Canyon Site. Elsewhere identified as late type (see type definition in this chapter)
4. atypical specimens, questionable typological assignment

in TT2. The percentage of PS points recovered from the western portion of the site is consistent with expectations.

SN5A points exhibit higher than expected proportions in the western portion of the site and are present in fewer numbers than expected in the east. SN5C points, in contrast, were found in higher than expected proportions in TT2, while fewer than expected were recovered from the western portion of the site. CS6 points, finally, occur in greater proportions in the eastern part of 35WH7, while fewer than expected were found in the west.

The differences in relative proportions of PS and ES1 may reflect the presence of a later occupation in the vicinity of TT1. This possibility has already been raised by a slightly more recent radiocarbon date (350 ± 90 B.P.) (see Radiocarbon Dates), and appears to be supported by a small concentration of SN6-type points resembling the Desert Side-Notched type (see discussion above). This late occupation may be characterized by increasing ties to outlying areas, including both the lower Columbia River (as indicated by PS) and the Great Basin (as indicated by the already-mentioned Desert Side-Notched style). In the western portion of the site, a higher ratio of ES1 to PS style points, a greater share of SN5A points, and a subsurface date of 1160 ± 90 B.P., may indicate a somewhat more intensive intermediate age occupation than in the eastern area.

Late point types are relatively rare in TT2. The greater TT2 share of dart points over arrow points suggests an earlier occupation, possibly associated with the atlatl dart shaft cache radiocarbon-dated to roughly 2300 years B.P. No sub-surface radiocarbon dates are, however, available for TT2. The large proportion of SN5C points recovered from this part of the site has been associated with the prominence of projectile point reworking and resharpening, as opposed to manufacturing.

The types of projectile points recovered at 35WH7 are generally consistent with the radiocarbon ages obtained from the site if the Wildcat Canyon typology is utilized. Substantial numbers of dart points may, however, support the inference of a somewhat earlier occupation in

TT2. Classification of the two CB2 points has been problematic and it is unlikely that the two specimens predate the Late Archaic age otherwise indicated for 35WH7. Point types not represented at the Wildcat Canyon site (SN6, CS6, and ST) suggest either more recent occupations than those represented at Wildcat Canyon, or other different extra-regional ties, or both.

Unclassifiable Projectile Point Fragments

Two hundred thirteen items from 35WH7 have been identified as unclassifiable projectile point fragments. Assignment to this class was based on evidence of such features as barbs, notches, and serration, as well as more subjective criteria such as regularity of flaking suggesting a finished product. A comparison of the mean thicknesses of the two subsets--3.90 mm, with an S.D. of 1.14 mm for classifiable projectile points (N=176) and 3.98 mm, with an S.D. of 0.97 mm for unclassifiable projectile point fragments (N=204)--supports their assignment to a single class of artifacts (unclassifiable projectile points include conjoined specimens; this accounts for artifact totals which differ somewhat from the numerical breakdown given above.)

Unclassifiable projectile point fragments are present across the site. Seventy-eight (36.6%) were recovered from the vicinity of TT1, 71 (33.3%) from TT2, 32 (15%) from TT3, 12 (5.6%) from TT4, seven from TT5 (3.3%), one from TT6 (0.5%), and three from TT7 (1.4%). Provenience was uncertain on nine specimens (4.2%).

Miscellaneous Small Biface Fragments

One hundred twelve items have been classified as miscellaneous small biface fragments. This class includes small bifacially worked specimens which cannot be unequivocally identified as projectile points according to the criteria listed above for projectile point fragments. Most are fragmentary, some appear to be intentionally shaped. A slightly higher mean thickness as compared to the projectile points discussed above (4.66 mm, S.D. 0.96, N=112, vs. 3.98 mm, S.D. 0.97, N=204) as well as a slightly higher mean weight (1.09 g, S.D. 0.85, vs. 0.91 g, S.D. 0.72), suggests that some of the specimens in this class may, in fact, be rejected fragments of unfinished projectile points, broken in manufacture and discarded. A very similar breakdown of both categories by raw material, including relatively high proportions of obsidian (16% for small biface fragments and 14.3% for projectile point fragments) relative to the presence of this material in other tool categories, such as flake debris (1%), supports this conclusion. The spatial distribution of both groups shows no striking differences.

Large Bifaces

One hundred fifty-nine specimens have been classified as large bifaces. These tools are presumed to be unfinished implements rejected at varying degrees of completion due to breakage and/or internal material flaws. Eighty-nine percent of specimens in this class are, in fact, fragmentary, and five complete specimens of the remaining 11% were refitted from two or three fragments. Thus, in all, only twelve unbroken specimens were recovered. Large bifaces range in thickness from 3.4 to 19.7 mm, with a mean of 8.9 mm. This is in contrast to small bifaces, which average 4.66 mm in thickness. Measurements and general descriptive information for large bifaces are given in Appendix A. Raw material is almost exclusively CCS, with only one small fragmentary specimen manufactured of obsidian. This is comparable to the distribution of raw materials among the debitage, and suggests that the manufacture of biface tools was a common activity at 35WH7. The predominance of broken specimens, on the other hand, would indicate that complete tools were removed from the site.

One hundred eight specimens (67.9%) of sufficient size have been classified according to Callahan's reduction stages (1979). While lithic reduction, as is often pointed out (e.g. Collins 1975:16), proceeds in a continuous or "linear" fashion, it can be divided into a series of stages (e.g. Collins 1975; Callahan 1979; Frison and Bradley 1980). These are "not sharply delimited one from another, but they are sufficiently distinct in terms of their procedures and output to merit separation" (Collins 1975:16). The assignment of a biface to one stage or another is based on a polythetic combination (Sokal 1974) of attributes including outline, cross-section, width/thickness ratio, edge angles, and nature of flake scars as defined by Callahan (1979:Table 10).

Clearly, bifaces could have been used at any of these stages with little or no further modification. Thus the notion of stages may be misleading in presuming an intent that never existed. It cannot be assumed that every large biface was a projectile point preform, though this may frequently have been the case. The typology does, however, facilitate inter-site comparisons, and avoids the connotations of such terms as "knife," or "blade." In the absence of systematic use-wear analysis, such functional inferences have generally been avoided in the present study.

The following five reduction stages have been defined on the basis of Callahan's classification (Callahan 1979). Following Connolly et al. (1991), each artifact face has been classified independently to accommodate differing stages of manufacture.

Stage 1: Obtaining the blank

This stage involves procurement of raw material. As described by Callahan, "This might entail spalling of large cores to get large flakes, which become biface cores themselves; or it might simply entail selection of a pre-quarried or previously selected cobble, nodule, or chunk to be reduced into a biface itself in the next stage" (Callahan 1979:36). As Stage 1 defines the "unmodified raw material or blank" (Callahan 1979:41), rather than a bifacially worked tool per se, it will not be of concern here. Pertinent information may be found under "Cores" and "Flake Debitage."

Stage 2: Initial edging

This involves production of what might be termed a "roughout." Outline is irregular, with a cross-section ranging from thick lenticular to hexagonal to irregular, with edge angles between 55 and 75°. Flake scars are widely to variably spaced, variable in morphology, and extend over less than 50% of the specimen's width except at its end. This results in persistence of a portion of the original flake surface (Connolly et al. 1991:52). Width to thickness ratio is 2.00-3.00 for core reduction and may exceed 6.00 for flake reduction (Figure 25a-c).

Thirty-one specimens from 35WH7 fall into this class. Shapes range from ovate to oval to subrectangular. Small areas of remaining cortex are common, as are differential coloring and luster, indicating use of heat treatment to improve flaking quality. One heat-treated biface, refitted from three fragments, appears to have broken in two stages. The acute, distal end, may have separated from the larger portion during heat-treating, while the remaining larger fragment appears to have broken apart after attempts to flake the periphery. The distal fragment (CC2-1606) was recovered from TT5B, in the western portion of the site, whereas the remaining parts, CC2-292 and CC2-1175, were found in units TT1C and TT1P, i.e. the eastern portion of the site. The implication of this distribution will be discussed below. In most specimens, the entire periphery has not been flaked, with thick edges remaining when the artifact was discarded. Evidence of platform

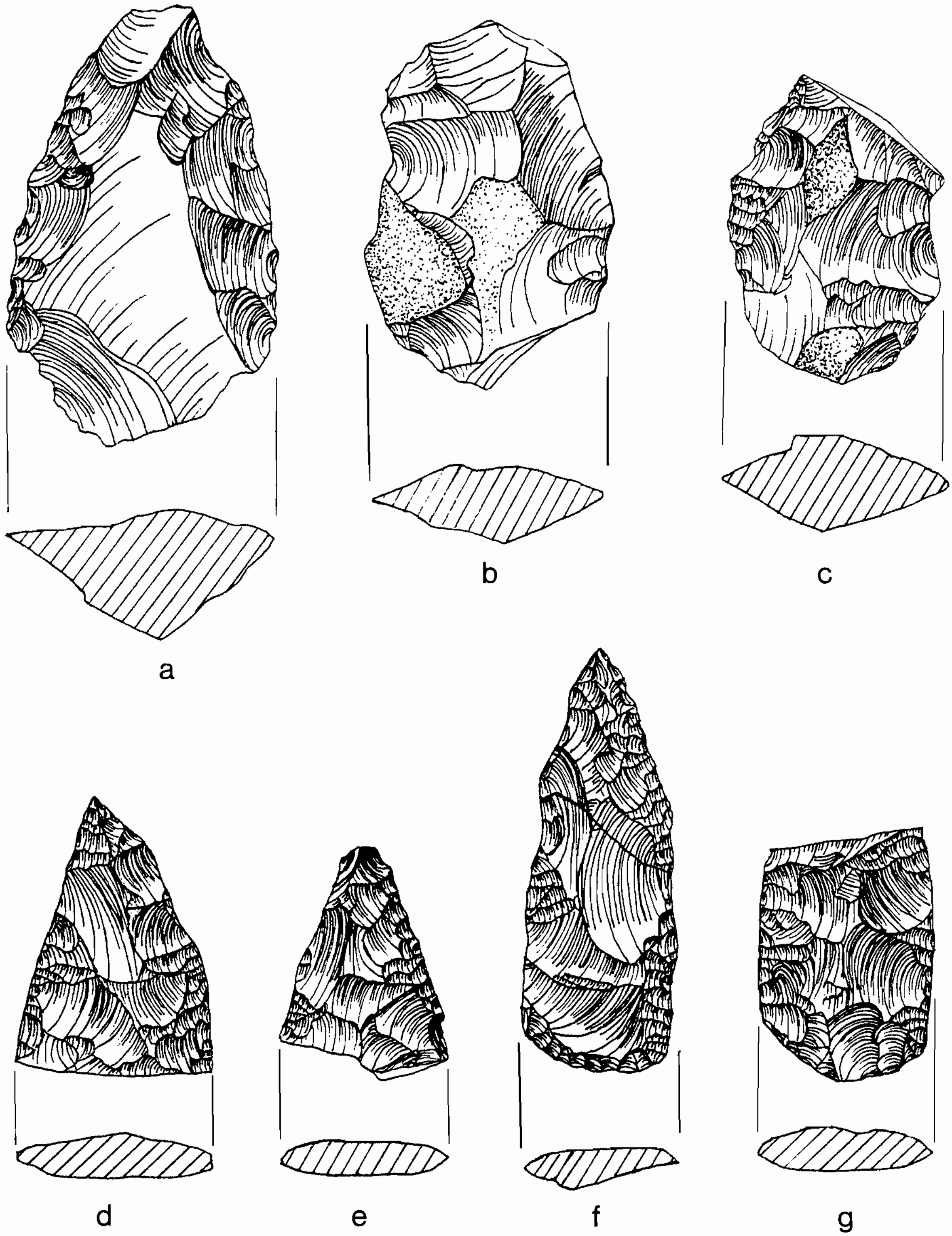


Figure 25. Large bifaces, stages 2/2 and 3/3, 35WH7.

a. CC2-857
b. CC2-368
c. CC2-201
d. CC2-124
e. CC2-434
f. CC2-195/278
g. CC2-968

preparation is sometimes, but not always, present. Most Stage 2 bifaces do not appear to have been used.

Stage 3: Primary thinning

In this stage of reduction, the surface of the artifact is emphasized, resulting in a biface with a semi-regular outline, and lenticular or bi-convex cross-section, and optimum edge angles between 40° and 60°. Flake scars are less variable in morphology, closely to semi-regularly spaced, and extend to the midline of the biface and beyond (50-70% of the width). Width to thickness ratio is 3.00-4.00 (Figure 25d-g).

Twenty-four artifacts are classified as Stage 3 bifaces. As with bifaces assigned to Stage 2, this group includes two specimens refitted from matching fragments. Bifaces assigned to this class generally consist of subrectangular proximal fragments with straight edges and convex bases, or they are well-defined distal fragments with acute tips. Three broader, pointed fragments appear to represent the tips of ovate pieces. Tool margins show evidence of careful preparation and straightening. Although some may have been used as knives, specialized microwear analyses would be necessary to distinguish edge wear from edge preparation with any degree of certainty.

Many Stage 3 bifaces undoubtedly have been heat-treated, and isolated specimens show color changes and heatspalling. However, the unaltered surfaces have been largely removed during thinning and therefore do not present the contrast between altered and unaltered material that is so characteristic of Stage 2 specimens. The presence of cortex is similarly rare among these items. It is perhaps noteworthy that the only complete Stage 3 bifaces are 2 specimens that have been refitted from broken pieces and one item which consists of a distal fragment with a reworked medial break. This may suggest that complete specimens were either curated or further reduced.

In addition to Stage 2 and Stage 3 bifaces, thirty-two have been classified as intermediate between these two stages, i.e. exhibiting two faces in differing degrees of completion. All can be accommodated within the descriptions given above. Again, this group includes a pair of refitted fragments, as well as a distal fragment with what appears to be a utilized medial break.

Stage 4: Secondary thinning

Greater emphasis is placed on the outline of the specimen at this stage, whereby "the eventual shape may be generalized simultaneously with thinning" (Callahan 1979:116). The result is a flattened lenticular cross-section, with edge angles of 25-45°. Flake scars are closely and regularly spaced, and may extend from 50-100% of the width of the specimen. Width to thickness ratio is ca. 4.00-5.00 (Figure 26a-c).

Only five specimens have been assigned to this class. These include one distal fragment, three proximal fragments, and one complete,

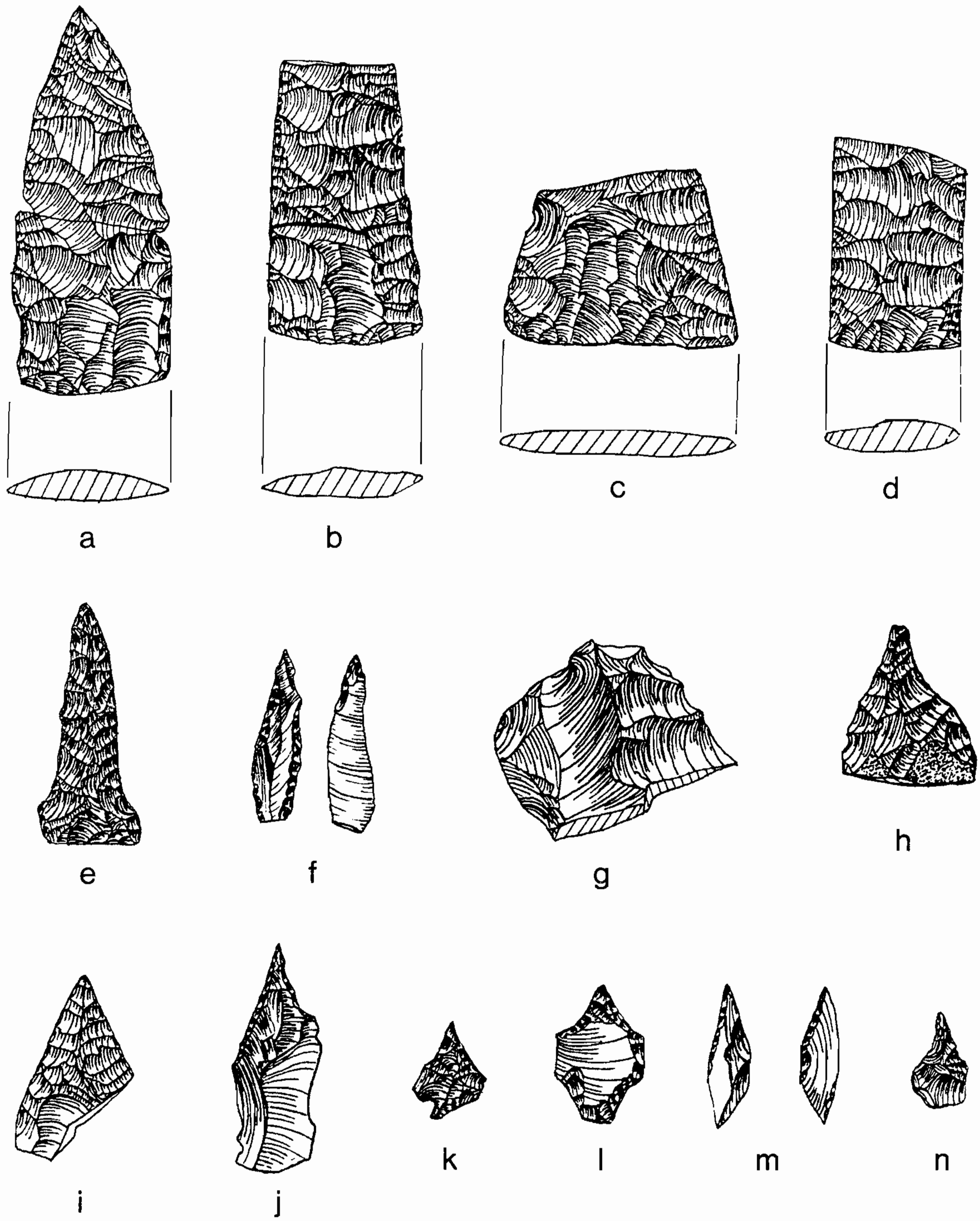


Figure 26. Large bifaces, stages 4/4 and 5/5, and miscellaneous drills and perforators, 35WH7.

a.	CC2-304/969	e.	CC2-94	i.	CC2-316	l.	CC2-429
b.	CC2-837/958	f.	CC2-1260	j.	CC2-816	m.	CC2-788
c.	CC2-841	g.	CC2-1031	k.	CC2-417	n.	CC2-731
d.	CC2-77	h.	CC2-170				

refitted specimen. One of the proximal fragments appears to be part of a triangular biface, the other two are squared with blade edges that are almost parallel. One of the squared bases (CC2-969) matches one of the proximal fragments (CC2-304).

Ten specimens, additionally, fall within both Stage 3 and Stage 4. These include three matching pairs, each of which consists of a proximal fragment and a midsection. Two of the pairs have members of constrasting colors which may have been differentially heated after they broke apart. The six proximal fragments are squared, with blade margins ranging from straight to slightly convex.

Stage 5: Shaping

This stage involves final preparation of the artifact, either for subsequent utilization or hafting specialization. A single specimen (CC2-77) has been assigned to this stage. It is a finely finished proximal fragment with square corners, a slightly convex base, and parallel margins. This specimen may represent a projectile point preform, although it would require considerable modification in order to achieve one of the point styles represented at this site (Figure 26d).

Intermediate stages

Only five specimens exhibit opposite faces which do not represent equal or sequent stages. Of these, two (CC2-504 and CC2-972) are classified as Stage 2/4 and three (CC2-43, CC2-1342, and CC2-1497) as Stage 1/3. The latter consist of flakes which have been thinned on the dorsal face but exhibit no modification on the ventral face. In general, a strategy of reduction alternating between the two faces appears to have been favored, rather than a "unifacial biface production strategy" as identified by Skinner and Ainsworth (1990).

In addition to the specimens discussed above, 51 fragments were recovered which were too small and incomplete to assign to any particular stage. These include the single obsidian Large Biface fragment found at the site.

Discussion

To summarize, of the 108 large biface fragments complete enough classify, early-stage specimens make up the largest proportion. These include thirty-one (28.7%) Stage 2 specimens and thirty-two (29.6%) Stage 2/3 specimens, followed by 24 classified as Stage 3 (22.2%), ten as Stage 3/4 (9.3%), five as Stage 4 (4.6%), and one as Stage 5 (0.9%). Five (4.6%) specimens exhibit stages which are not equal or sequent.

While large bifaces are found across the site, they appear in higher frequencies in its western portion, where a total of 109 specimens (68.6%) were recovered from combined units TT3, 4, 5, and 7 (Figure 27). The highest counts (N=59, or 37.1%) were found in TT3, with numbers decreasing to the east and to the south. Only 14 large bifaces

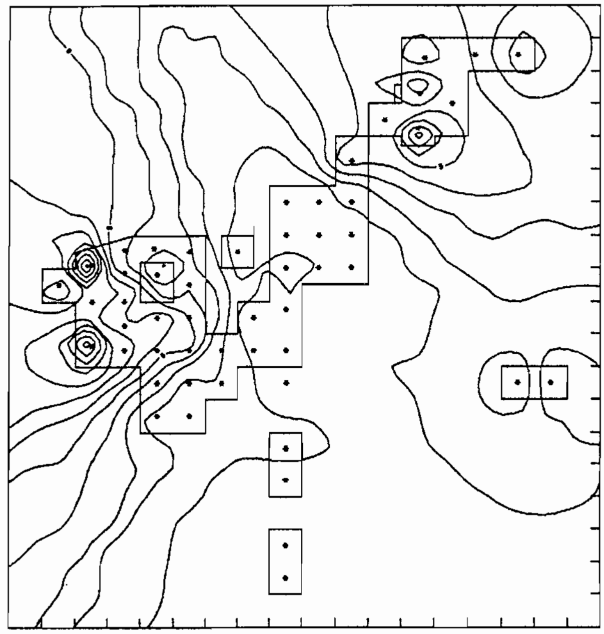


Figure 27. Horizontal distribution of large bifaces, plotted by SURFER software.

were recovered from TT2 (8.8%), while TT1 (including TB1) produced 30 (18.9%). Provenience on the remaining three specimens is unknown.

Cores

Cores are nuclei of raw material from which flakes have intentionally been detached, either for immediate use or for further reduction. Generally, the core serves as the source of raw material. Sometimes, however, it may become a tool in its own right, with little additional modification, either as a chopper, scraper, or wedge, or a biface blank with further reduction. Cores at 35WH7 range from opportunistically reduced chunks of raw material, in which "platforms are located in non-patterned fashion and may change location with every flake removed"

(Callahan 1979:53), to more formally shaped pieces which seem to reflect a greater degree of planning on the part of the prehistoric flintknapper.

Cores have been separated into patterned, and unpatterned, or amorphous, varieties in order to distinguish more expedient from more formal production activities. Patterned cores have been sub-divided into block, discoidal, and bifacial cores, combining terminology from Callahan (1979:41ff), Frison and Bradley (1980:18-23), and Crabtree (1982). Block cores exhibit one or two striking platforms and include conical and cylindrical types. Discoidal cores are defined as "bi-convex ... having flakes or blades removed from the perimeter and usually on both faces" (Crabtree 1982:32). Bifacial cores as defined here tend to be oval and exhibit bilateral symmetry. They grade into and probably overlap with early stage bifaces, a problem that has been discussed elsewhere (Frison and Bradley 1980:20-21) and will not be of concern in this analysis.

One hundred six cores were recovered from 35WH7, with an aggregate weight of 9395.77 g, or approximately 20 lbs. Most are of CCS, with 95 specimens (89.6%) represented by this material. The remaining 11 (10.4%) are of basalt. No obsidian cores were found at the site. Morphologically, 71, or 67% are assigned to the amorphous category, the most expedient of the types. Among the remaining 35, seven (6.6%) are discoidal, nine (8.5%) are bifacial, and 19 (17.9%) are block cores. Cortex was observed on a large portion of the specimens, as was evidence of thermal alteration, possibly the result of intentional heat-treating to improve flaking properties (Luedtke 1992:99 ff.). The average weight of cores at 35WH7 is 85.42 g.

Cores are primarily associated with the eastern and western portions of the site; only 13 specimens (12.3%) were recovered from TT2, in contrast to the proportionately higher representation of such artifacts as classifiable projectile points. The low number of cores in TT2 is, however, consistent with low flake counts encountered in this area (see Flake Debitage), and suggests that primary reduction was not an important activity in this part of the site. An exceptionally large concentration of cores was, on the other hand, recovered from unit TT1A, which, alone, produced 9.4% (N=10) of all cores found at the site. Cores in TT1A were found in levels 3, 4, 5, and 5-6, with six associated specifically with levels 5 or 5-6. Four of these are said to have come from the vicinity of the firepit radiocarbon-dated to roughly 500 B.P. (Feature 4/6). A cluster of cores was found in and around TT7B, including six in TT7B (five of them in levels 2 and 3), two in TT5C (levels 2 and 3), and 5 in TT4B (levels 2 and 3). These include four of the ten green CCS cores recovered from the site and appear to be associated with the concentration of green CCS flakes found in this area (see Lithic Debitage). Smaller concentrations in TT3A (levels 1-3) and TT3C (levels 1 and 2) coincide with peaks in bifaces at both of these units, and a debitage peak in TT3A. Finally, eleven cores were found in TT4G and adjacent TT4I. All but three of these were recovered from Level 2, placing them peripheral to the possible house floor centered on TT4C (See Features).

Drills, Perforators, and Gravers

Fifty-seven specimens from 35WH7 are subsumed under the class of drills, perforators, and gravers (Figures 26, 28; Appendix A). All but two specimens are made of chert. The two exceptions are a perforator fashioned on a reworked obsidian projectile point, and a graver made of basalt.

Drills are characterized by long, narrow, and relatively thick, shaped bits which sometimes exhibit rotational wear on the alternate faces of opposing sides (Figure 26e-g). Of the seven drills present, five are bifacially finished while two consist of edge-worked elongate flakes. Two of the bifacial specimens may have been hafted; one of these (CC2-94; Figure 26e) is roughly "T"-shaped, with a straight base and slight shoulders, while the second, a fragmentary proximal specimen (CC2-1031; Figure 26g), may represent a broad squarish basal portion. The remaining drills are represented by bit segments only.

Perforators are generally broader and flatter, and are often only unifacially worked (Figure 26h-j). Tools of this kind were more likely to have been used for puncturing rather than drilling, although function and manner of usage may overlap. Most of the 15 perforators at 35WH7 consist of flakes in which only the functional end has been modified. Three specimens have been bifacially worked and exhibit broadened and shaped bases for gripping or for hafting. Two additional specimens appear to have been made on broken projectile points. These include the only tool in this class which is made of obsidian.

Six additional pieces are here referred to as micro-drills (Figure 26k-n). They range in length from 1.23-2.07 cm, ranging in weight from 0.19 to 0.99 g. Two are bipointed and three are made on projectile point fragments (two on barbs, one on a partial base). The purpose of these small tools is at present unknown.

An additional specialized tool class at 35WH7 is represented by gravers (Figure 28f-h). Seventeen (59%) of the 29 specimens in this class consist of flat, rounded, unifacially worked projections on flakes or chunks and resemble small endscrapers, although they are probably too narrow to have functioned as such. Ten are pointed spurs on flakes or chunks which have been used without further modification. The remaining two are spurs on reworked broken projectile point fragments.

Some patterning is evident in the spatial distribution of the tools. Sixteen artifacts (27%) were recovered from the eastern portion of the site. These include, in particular, nine gravers and four of the six micro-drills. Four specimens are specifically associated with the radiocarbon-dated hearth feature (Feature 4/6), and four additional specimens were recovered from the same levels. The remaining tools were found vertically distributed from the surface down, with none below Level 7.

Only six items from this class were recovered from TT2. This parallels the low frequencies observed for most other tool classes in this part of the site (see Discussion).

The remaining drills, perforators, and gravers were recovered from the western half of the site. Nineteen (33%) were found in TT3, five in

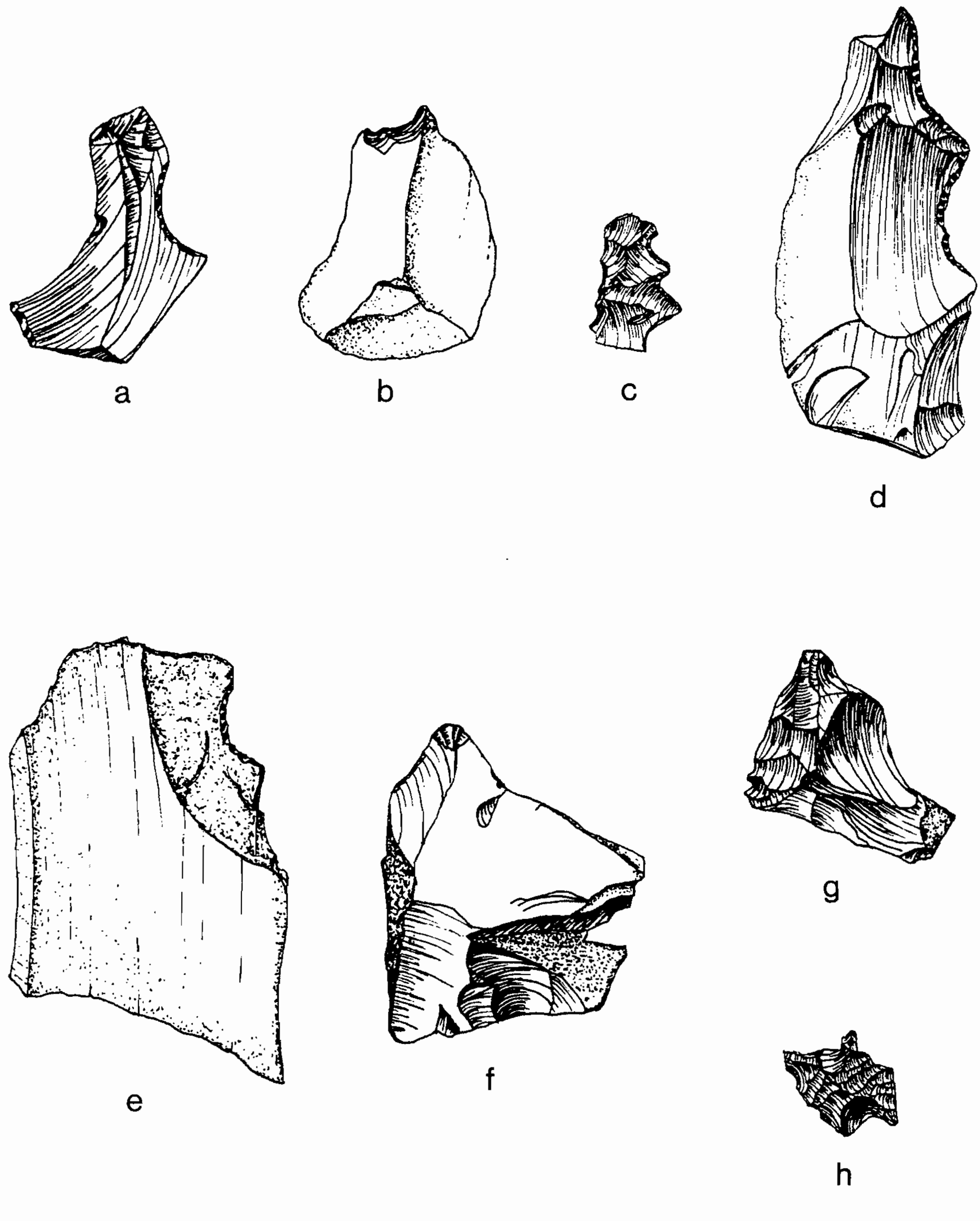


Figure 28. Notches and gravers, 35WH7.

a. CC2-1125	c. CC2-1535	e. CC2-1349	g. CC2-605
b. CC2-1546	d. CC2-1618	f. CC2-720	h. CC2-386

TT3E alone. Thirteen specimens were recovered from Level 1. Tools of this class recovered from TT4 (N=7, or 12%) are found in the upper three levels. The remaining specimens were recovered from TT5 (N=5, or 9%), TT6 (N=3, or 5%), and TT7 (N=2, or 4%). While these counts are small, it is perhaps worth noting the absence of most other tool types in TT6, where one micro-drill, one perforator, and one graver were recovered. Two of these specimens, one of obsidian, are made on reworked point fragments.

Notches

Eighteen artifacts have been classified as notches (Figure 28a-e). Fourteen of these were retrieved from the debitage during the present analysis. Notches are generally flakes with concave "notched" areas which are sometimes retouched but always exhibit a substantial amount of use wear in the form of polish, smoothing, and/or crushing. Notch widths range from as narrow as 4.1 mm to as wide as 24.6 mm with a mean of 11.8 mm. This mean is only slightly larger than the diameter of the foreshafts recovered from a cache above the site (see Atlatl Dart Cache), suggesting a potential use for this type of tool in peeling and shaping branches and sticks. Fifteen specimens are made of CCS, two of basalt, and one of petrified wood. In ten specimens, single notches co-occur either with one or more other functional edges or with additional notches. As many as four notches may be present on one specimen (eg. CC2-1618). Only eight items exhibit a single notch alone.

Horizontally, notches tend to cluster in the western third of the site. Only two were recovered from TT1, one from TT7, and none at all from TT2 or TT6. Six (33%) were, on the other hand, recovered from TT3 and TT4 each. The remaining three (17%) came from TT5. Vertically, there appears to be no particular patterning, with specimens occurring throughout the cultural deposits.

Formed Unifaces

Fifty-five items from 35WH7 have been classified as formed unifaces (Figures 29-30; Appendix A). These include purposefully retouched tools with one or more regular and continuous edges. Items in this class include tools traditionally classified as scrapers, and this designation will be employed as a descriptive label, although the wide range of edge angles observed suggests that some may have served for cutting, rather than scraping (cf. Gould et al. 1971). For descriptive purposes, formed unifaces from this site have been divided into convex and straight scrapers based on the shape of the functional edge(s).

Convex scrapers include a group of 19 distinctive tear-drop shaped artifacts with convex bits and straight to slightly convex, contracting sides which are sometimes unworked and sometimes unifacially or bifacially flaked (Figure 29h-k). Based on their morphology, it is likely that at least some of these specimens were hafted endscrapers. With one exception (CC2-1095), all are manufactured on flakes, and all but one (CC2-509) are made of CCS. Specimens range in thickness from

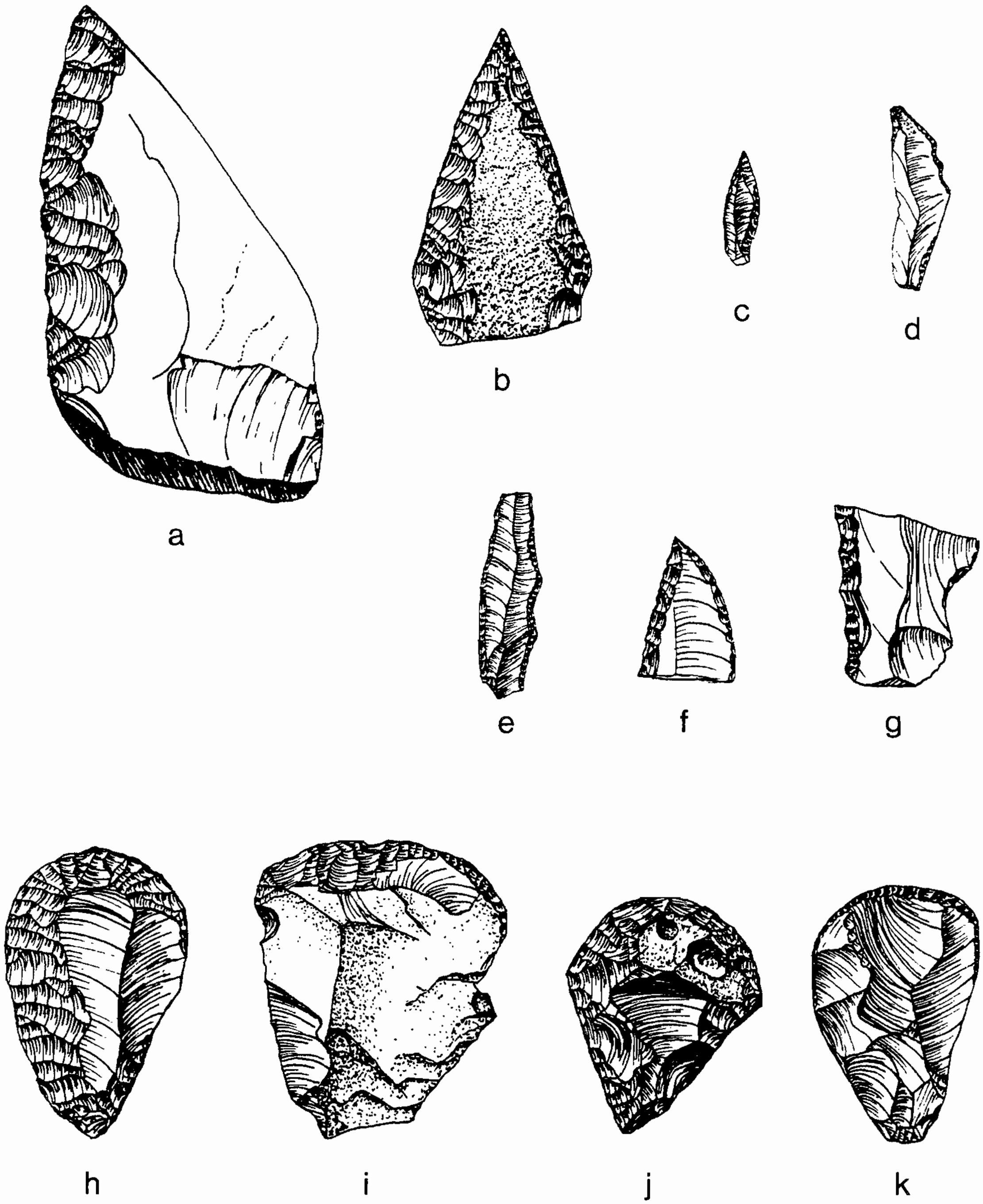


Figure 29. Knives, tear drop-shaped scrapers, and linear flake tools, 35WH7.

a. CC2-909
b. CC2-339
c. CC2-896
d. CC2-1292
e. CC2-680
f. CC2-51
g. CC2-1028
h. CC2-10012
i. CC2-204
j. CC2-269
k. CC2-846

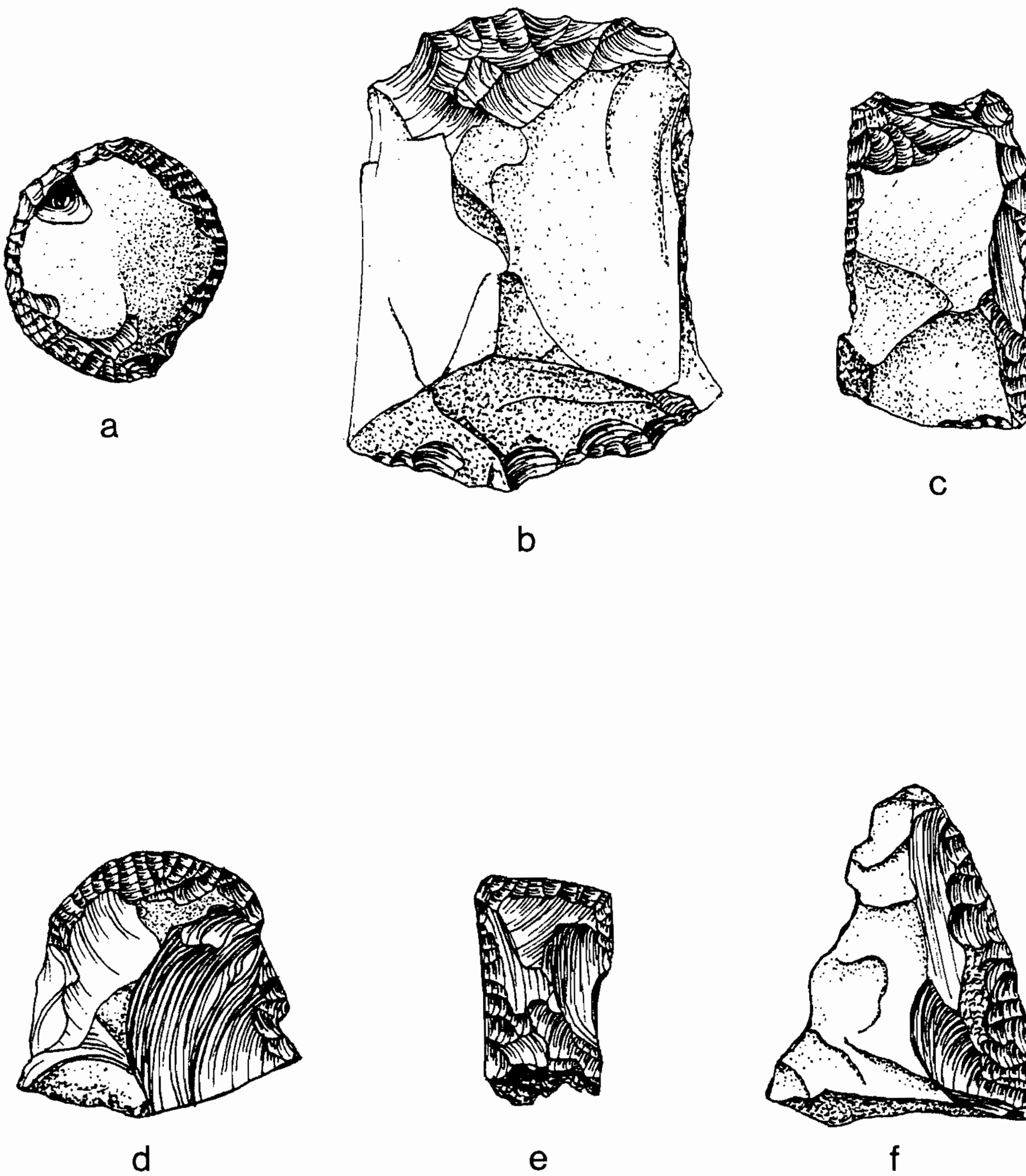


Figure 30. Miscellaneous formed unifaces, 35WH7.

a. CC2-809	c. CC2-12	e. CC2-464
b. CC2-377	d. CC2-256	f. CC2-570

3.7 mm to 16.7 mm, encompassing thick examples with tall bits as well as thin flakes with only fine, marginal retouch. Lengths range from 27.1-50.3 mm, widths range from 18.1-46 mm.

At least eight of the teardrop-shaped unifaces bear evidence of thermal alteration. Little can be said about the function of these tools, but most appear to have been used on resistant materials which have left the functional edges damaged or broken. A wide range of bit thicknesses may indicate differing uses, as may the presence of bifacially edged areas along the bit sections of three of the thin-bitted specimens. Flaking is entirely unifacial on all steep-bitted teardrop-shaped scrapers, as is evidence of wear on all but two in this category (CC2-550, CC2-10012)

A second specialized variety of concave scrapers is represented by a single discoidal scraper (CC2-809; Figure 30a). The specimen is steeply flaked around its entire periphery, with a smooth, "normalized" (Ahler 1979) edge. Like most of the other scrapers from this site, it is made of CCS.

Also included among the convex scrapers is a thick rectangular specimen (CC2-377; Figure 30b) in which opposite ends are flaked to form steep convex edges. Weighing 88.47 g, this artifact is more than twice as heavy than the next lighter scraper, and considerably above the overall mean of 10.51 g. However, it is much smaller than the cobble scrapers discussed below and best included under the present artifact class. This specimen is also made of CCS.

The remaining 22 convex scrapers consist either of larger pieces broken in use or rounded edges which have been prepared on broken flakes or chunks of raw material. All are made of CCS. These specimens include eight which could be classed as endscrapers (two with denticulate edges), four which might be identified as side-scrapers, two with both lateral and distal worked edges, and eight unclassifiable fragmentary specimens. The labels "endscraper" and "sidescraper" are assigned here on the basis of form only. No attempt has been made to classify scrapers by the orientation of their functional edges relative to the striking platform of the flake.

Finally, 12 tools are classified as straight scrapers. These are, as indicated in the name, characterized by straight functional edges, with up to three worked edges on one artifact. Four have single edges, three exhibit dual, parallel edges, four have two contiguous edges which join at right angles, and two rectangular specimens each display three retouched edges. Retouch is entirely unifacial and restricted to a single face (where more than one edge is present) in the first, second, and last of these categories. In the third variety, scrapers with two parallel edges, retouch is found on different faces for each functional edge.

Like other tool types, scrapers are found across most of the site, with exception of TT6 in the southeast. Like several of the other tool types already discussed, however, their distribution does tend to show some patterning. Twenty scrapers (36%) were recovered from TT1, in the northeast. Nine of these came from TT1C, where they occur from levels 2 through 5. This distribution extends above and below Feature 4/6. Eight are convex scrapers, seven of these specifically convex endscrapers (including two teardrop-shaped specimens), and one is a straight scraper with a single edge. An additional 19 scrapers of various kinds were recovered from adjacent units TT1A, A/B, D, F, and P.

Only six scrapers (11%) were found in TT2. TT3 produced a larger proportion, with 17 specimens (31%). These include eight of the 19 teardrop-shaped specimens, three more of which were recovered in nearby units TT4D and 5C. It is perhaps noteworthy that scrapers are entirely absent from TT3A--the unit with the highest debitage counts, relatively high frequencies of cores, early to mid-stage bifaces, and projectile points. While lithic reduction and possibly retooling appear to have been important activities in this vicinity, it was not a locus for activities involving scraping and/or cutting. The remaining scrapers were associated with units TT4A, C, D, E, F, and H (N=7, or 13%), TT5A, B, and C (N=3, or 5%), and TT7B (N=1, or 2%). One specimen was unprovenienced.

Knives

Ten small flaked stone specimens have been classified as knives, in addition to the tabular basalt knife discussed below under "Heavy Tool Industry." In these items, flaking retouch is concentrated along one or two margins, forming an acute cutting edge, while little emphasis is placed on shaping the rest of the tool itself (Figure 29). An exception to this pattern is CC2-339 (Figure 29b), which exhibits shoulders and an incomplete base, and fragmentary specimen CC2-899, which may be part of a similarly shaped piece. In four specimens, two margins are flaked and converge to a point, and four of the more complete specimens exhibit backing in the form of residual cortex or a flat break. All of the larger pieces show use wear along the functional edge(s). Five seam quartz specimens are represented in this class, the remaining tools are of CCS. Three smaller fragments of edge-modified seam quartz have been included, though their precise shape can no longer be determined.

Worked Flakes

One hundred forty items at 35WH7 were identified as worked flakes. These consist, as their label implies, of flakes on which one or more edges have been modified. In terms of manufacturing effort, this tool class is intermediate between scrapers and utilized flakes. Unlike scrapers, edge retouch is generally restricted and irregular, and edges do not exhibit purposeful shaping. Almost all worked flakes appear to be broken and on many, only part of the original edge is present. It is possible that some specimens are pieces of scrapers; clearly, the boundary between these two classes is not absolute. Utilized flakes, on the other hand, only exhibit edge damage related to use; intentional retouch is lacking.

For the purpose of this study, modified edges were counted for each flake and it was noted whether retouch was unifacial or bifacial. Most specimens in this assemblage (116 specimens, or 82.9%) are unifacially retouched. Fifteen (10.7%) exhibit bifacial edges, and seven (5.0%) show areas of both unifacial and bifacial retouch. Two specimens (1.4%) were intermittently flaked around most of the periphery. Generally, specimens with a single retouched edge predominate with 77.9% (N=109), followed by 25 (17.9%) which exhibit two modified edges. Two specimens (1.4%) are flaked intermittently around the entire periphery.

Weights on worked flakes range from 0.1 g to 22.1 g, with a mean of 4.1 g. Small specimens predominate, with 75% weighing 4 g or less. Most worked flakes are of CCS, mirroring the overall predominance of chert in the flake debris. Of 140 specimens, 135 (96.4%) are of CCS, while basalt and obsidian make up 1.4% (N=2) and 2.1% (N=3), respectively. The highest frequencies of worked flakes appear in TT3 (N=56, or 40%) and TT1 (N=36, or 26%). Only 8% (N=11) occur in TT2; 11% (N=16) were recovered from TT4. One specimen is unprovenienced.

Linear Flake Tools

Linear flake tools are unilaterally or bilaterally edged, linear, blade-like flakes (Connolly 1991:88). Twenty-three specimens from 35WH7 fall into this class (Figure 29c-g). Only seven specimens are complete; these average 27.3 mm in length. Mean measurements for widths and thicknesses are 12.9 mm and 3.2 mm, respectively, while weights average 1.14 g. Sixteen specimens are retouched, while wear on the remaining seven is slight and attributed to use only. All but one are unifacial. Seven are unilaterally edged, sixteen bilaterally. All are made of CCS.

Linear flake tools were found across most of the site, but they occur most frequently in TT3 (N=10, or 43.5%). Four were associated with TT1 (17.4%), two with TT2 (8.7%), five with TT4 (21.7%), and one each with TT5 and TT2 (8% together). Twelve of the twenty-three specimens were found among the lithic debitage.

Utilized Flakes

The most expedient of tools at 35WH7 are represented by a large quantity of utilized flakes. These are specimens which exhibit use wear on one or more edges without the presence of preparatory retouch. Preliminary screening was conducted by macroscopic examination with subsequent inspection of questionable specimens under a low-power binocular microscope (10-30x magnification). Specimens selected for inclusion were measured and weighed, and observations on raw material, presence of cortex, and number of edges per specimen were recorded.

The identification of use wear is complicated by the presence of damage due to preparation of edges for lithic reduction and damage which can be attributed to natural forces such as trampling and the action of water, wind, and soil (Keeley 1980). This is particularly problematic when inspection is conducted in the absence of experimental research on locally available raw materials and without high power magnification. It may, in addition, be difficult to distinguish some types of micro-flaking from intentional retouch, although it has been suggested that this determination can be made on the basis of scar size and patterning (Tringham et al. 1974:181).

Flakes identified as utilized in the present study exhibit areas of contiguous and patterned attrition in the form of crushing, micro-flaking, and/or abrasion (polish and rounding) (see Semenov 1976, Tringham et al. 1974, Ahler 1979, Keeley 1980 for discussion of wear types). It was felt that by emphasizing the contiguity of wear, most specimens damaged by "natural" forces would be eliminated from consideration (cf. Tringham et al. 1974:191-192). Because of the hardness of chert (the predominant local toolstone), however, even slight damage was accepted as evidence for wear. Some degree of error may have been incorporated in the identifications, but as the analysis was done by a single individual (the author), there should be no selective bias within or between assemblages.

A total of 340 specimens from 35WH7 were classified as utilized flakes. Cherts predominate as raw material (N=319, or 93.8%), even surpassing the high proportion of CCS among unmodified flakes at the site. A small number of specimens are made of basalt (N=9, or 2.6%) and obsidian (N=7, or 2.1%), fossil bone (N=2, 0.6%), petrified wood (N=2, or 0.6%), and seam quartz (N=1, or 0.3%). Individual weights range from 0.17 g to 115.46 g, however lighter specimens predominate, as evidenced by a mean of 6.81 g. Fifty-two percent of all utilized flakes weigh less than 3 grams. Tool lengths average 32.17 mm, while widths average 21.51 mm. Single-edged specimens are most common, making up 75.3% of the total (N=256), while two-edged specimens amount to 21.2% (N=72). Three used edges are found on 12 specimens (3.5%).

As with most other artifact types, utilized flakes are found across the entire site. High concentrations were found in TT3 (N=122, or 35.9%) and TT1/TB1 (N=88, or 25.9%), while only 29 specimens (9%) were recovered from TT2. High counts include, in particular, TT3E with 23 specimens, TT3P with 21, and TT1P with 20 specimens. This distribution parallels other artifact categories at the site and will be returned to later in this study.

Cobble Tools

Light Choppers

Nine items from 35WH7 have been classified as light choppers (Figure 31a-c). These are fist-sized implements with single, percussion-flaked, moderate to steep-angled edges. Weights range from 200 g to 676 g, although 80% fall between 200 g and 400 g. All are of basalt, including six specimens manufactured on stream cobbles and three which are made on angular basalt cores or flakes. All have been only partially worked, with areas of cortex remaining. Tools in this class presumably served in heavy processing activities, such as chopping or cutting. Five of those manufactured on stream cobbles appear, in

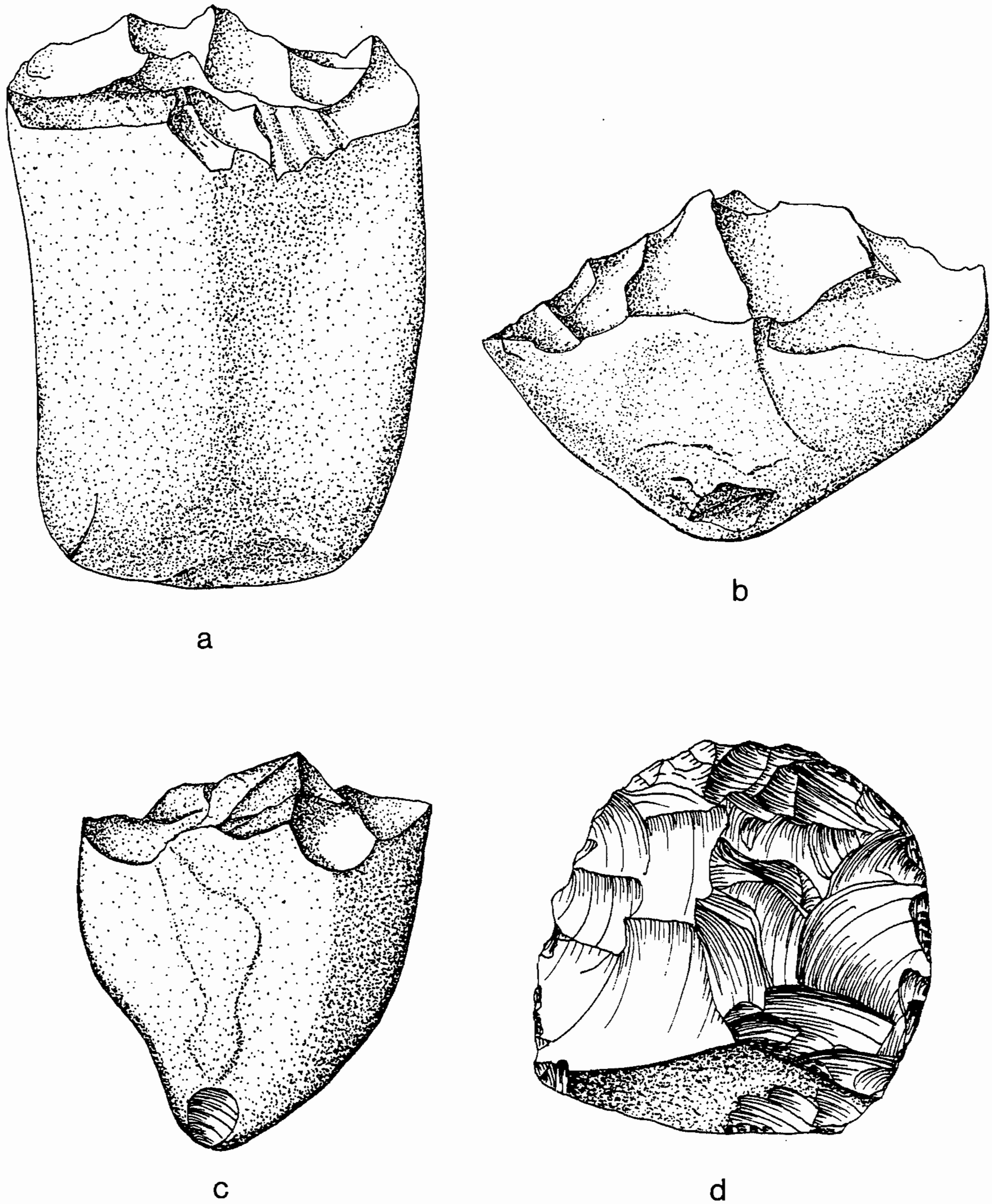


Figure 31. Cobble choppers and cobble flake scraper, 35WH7 (75% of actual size).

a. CC2-977 b. CC2-396 c. CC2-473 d. CC2-324 addition, to have been used as hammerstones, as indicated by the presence of wear ranging from slight pecking to heavy battering and crushing. In four of the stream cobble tools, this additional wear is found on the proximal end of the artifact, i.e. on the cortical surface opposite the flaked margin. The fifth, CC2-982, shows wear from pecking and crushing on virtually every projecting tool edge. Both this artifact and CC2-473 (Figure 31c), another stream cobble tool, exhibit traces of red ochre on the crushed and battered edges, suggesting their use in the preparation of pigments.

The remaining specimens consist of edge-modified chunks of angular basalt. Two rather crude unifacial tools (CC2-53 and CC2-1058), are fire-affected. The third, CC2-111, is a large discoidal core with peripheral bifacial wear.

In light of the small sample of choppers, little can be said about their distribution. They are found in all areas of the site except the extreme southeast (TT6).

Heavy Choppers

Two artifacts have tentatively been defined as heavy choppers, although their function is not clear. Both consist of large, but relatively flat, peripherally flaked angular basalt cobbles. In one case (CC2-472), retouch is predominantly bifacial, in the other (CC2-261), it is unifacial. Specimen CC2-472 measures 16.5 x 16 x 6.5 cm and weighs 3,175 g (ca. 7 lbs). Specimen CC2-261 measures 36 x 27 x 6 cm, and weighs 9,526 g (ca. 21 lbs). They were recovered in units TT1C (Level 5) and TT3P (Level 3), respectively.

Worked Flakes

The twelve specimens of this class resemble the smaller specimens already discussed, but are larger and heavier, weighing between 55 g and 234 g. All except one (CC2-492) are unifacially percussion-flaked along part of an existing edge. The single exception (CC2-492) exhibits a small marginal area of bifacial flaking, but the specimen is predominantly unifacial in nature. Working edges range from straight (N=5) to convex (N=3) to concave (N=1). One specimen is characterized by convergent adjacent edges, two are irregular and indeterminate. Of the latter, one (CC2-332) appears to exhibit part of a fragmentary denticulate edge. Four of the twelve worked flakes are of basalt, the rest are CCS.

Half of the items in this class were recovered from TT1. The rest are from TT2H (N=1), TT3E (N=1), and TT4 (one each from units 4A, E, and H). A single piece is provenienced as "cache" in the project's artifact catalog. The significance of this attribution is not clear.

Flake Scrapers

Two specimens, both made on disc-shaped basalt flakes, have been identified as flake scrapers. These implements are purposely shaped, and unifacially edged around a large part of their perimeter. In both cases retouch is limited to the dorsal face of the flake.

CC2-324 is a thick unifacially retouched flake with a steep dorsal ridge and a wedge-shaped cross-section (Figure 31d). It measures 7.7 cm in length, 7.9 cm in width, and is 3.8 cm thick, weighing 276.18 g. The specimen has been heavily used, resulting in microflaking and crushing along its margins. Diffuse traces of red ochre near the edge of the piece may signify use in the processing of pigments, though the paint residues are less concentrated and pronounced than on the choppers discussed above and may be not be related to the object's original use. CC2-324 was found in Level 3 of TT2E.

CC2-973 and CC2-1040 are matching parts of a single scraper formed on a discoidal flake which is almost identical in diameter to the specimen just discussed, but has been thinned by removal of a large flake across the dorsal surface. Wear is lighter, with less evidence of crushing than on the preceding piece. The individual elements were recovered from Level 1 of TT1A and from a "cave-in" spanning levels 4-8 of the same unit. The composite of CC2-973 and CC2-1040 is 7.9 cm long, 7.5 cm wide, and 2.1 cm thick, with a weight of 157.73 g.

Tabular Basalt Knife

One specimen (CC2-1509) has been classified as a tabular knife (Figure 32c). It consists of a 1.4 cm thick slab of tabular basalt with cortex on both faces and two of four edges. The remaining two edges are

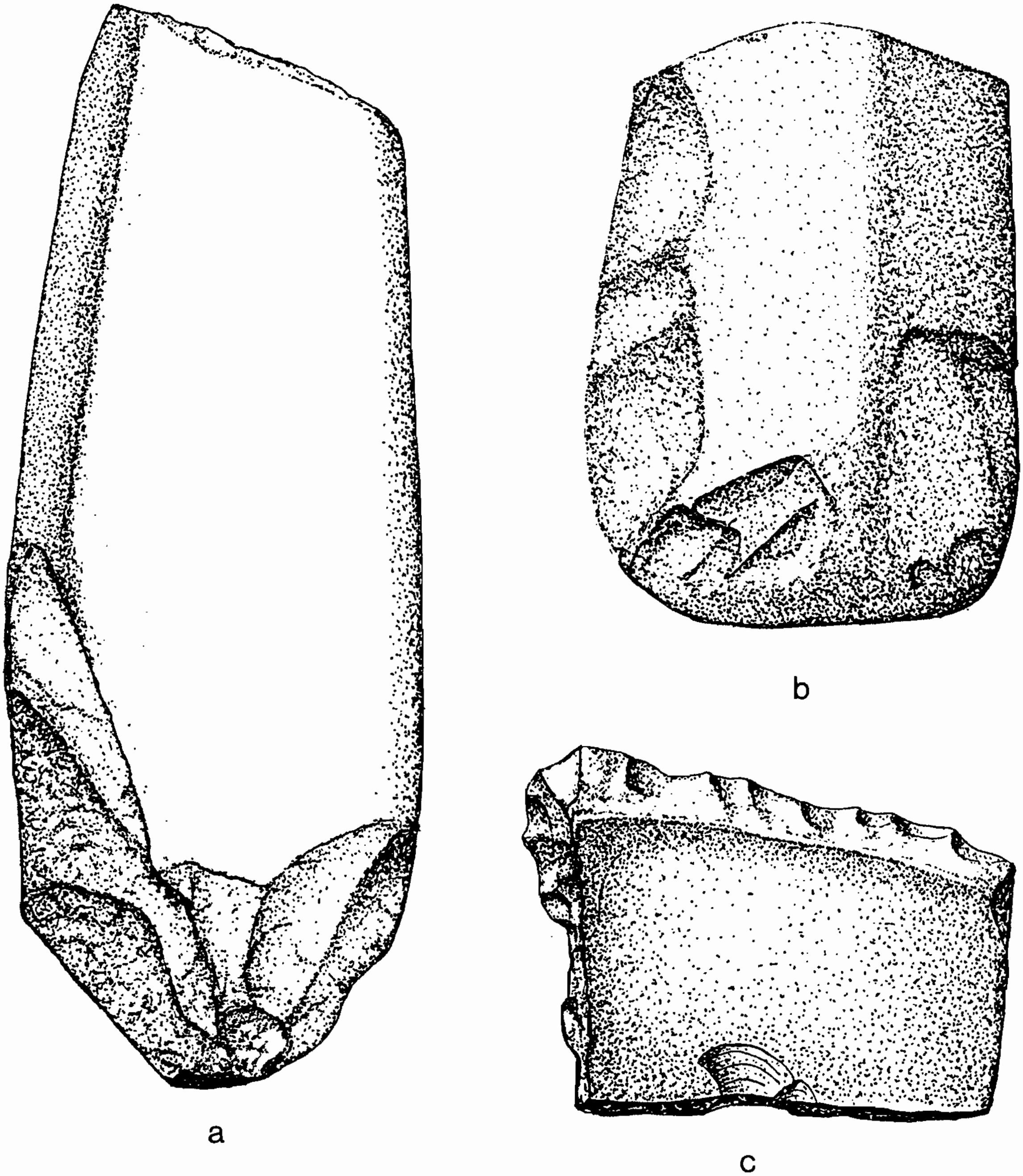


Figure 32. Pestles and tabular knife, 35WH7.

a. CC2-62 b. CC2-192 c. CC2-1059

broken. One is too steep for use, but the other, one forming a 60° angle, exhibits continuous wear--without intentional retouch--along its margin. This specimen is the only one of its kind from this site. It measures 7.2 cm x 5.4 cm and weighs 114.4 g. It was recovered from Level 6A of TT1A.

Edge-Modified Chunks

A residual category of edge-modified chunks was created to accommodate angular pieces of stone with utilized or retouched edges. Twenty-four specimens fall into this group. Ten of these are retouched, 14 exhibit use wear only. Most have a single functional edge, but three have two, and a single specimen exhibits three. Specimens in this class vary in size, weighing between 2.00 and 61.50 g, with an average weight of 23.23 g. Most are of CCS, with the exception of three basalt specimens.

Edge-modified chunks occur across the site, including six recovered from its eastern portion, four from TT2, seven from TT3, six from TT4, and one specimen from TT5.

Ground Stone

Ground stone artifacts make up only a small proportion of the artifact assemblage at 35WH7. Those present include 19 grinding stones (referred to as "metates" in fieldnotes), four anvil stones, two fragmentary pestles, a partially girdled cobble, and a piece of ground and perforated siltstone. Ten items were classified as manos by fieldworkers. Nine of these have been rejected as tools in the present analysis due to the absence of recognizable modification or wear; the remaining specimen tabulated at OMSI could not be found at the time of analysis.

Pestles

Two pestles have been recovered from 35WH7. Both are fragmentary specimens of tools that appear to have served multiple functions involving both grinding and percussion. Both are made on basalt cobbles.

CC2-62 (Figure 32a) is a distal fragment of an elongate basalt cobble with a roughly rectangular cross-section. Cortex has been removed by pecking from two opposing edges. On one of these edges the cortex has been pecked away in an even and narrow band resembling edge-ground cobbles typically associated with Cascade Phase assemblages (cf. Leonhardy and Rice 1970). Considering other temporal information from the site, however, which suggests a relatively recent age, it is not likely that this specimen indicates an early Archaic or early Middle Archaic age. Most of both proximal and distal ends have been removed by spalling indicating use of the pestle as a pounder, although part of a smooth grinding surface also remains in the center of its distal end. The removal of large spalls around the entire base and the battered condition of the proximal end may indicate damage from the use of bipolar force. The specimen measures 5.97 cm x 4.88 cm in width, is 15.19 cm high, and weighs 674.1 g. It was found in Level 1 of TT3C.

CC2-192 (Figure 32b) is a distal pestle fragment with a triangular cross-section. Shaping is pronounced along one edge and the base, and some pecking is present along parts of the remaining two edges. The distal end is relatively rough and spalling has occurred on all three lateral faces where they meet the base, suggesting heavy pounding use in addition to grinding. CC2-192 measures roughly 5.6 cm in diameter, is 8.29 cm high, and weighs 490.1 g. Its provenience is given as Level 2 of TT3D. While a penciled note in the artifact catalog calls this information into question, its provenience close to the pestle discussed above lends support to the validity of this attribution.

Grinding Stones

Nineteen grinding stones have been identified from 35WH7. All consist of square to rectangular basalt blocks weighing between 21 and 73 lbs, with one or two worn surfaces. Frequently, block margins have been trimmed to remove projecting corners. Wear is generally abrasive, although pecking is sometimes present in smaller areas as well. Surface wear ranges from barely detectable by touch only, to pronounced abrasion which is visibly smooth and sometimes darker in color. Where they are clearly identifiable, worn areas are either flat or slightly dished and often roughly circular, ranging in diameter from 7-15 cm. A single specimen (CC2-833) is characterized by a convex grinding surface. In several cases, exposure to direct heat is indicated by cracking of the rock and spalling of grinding surfaces.

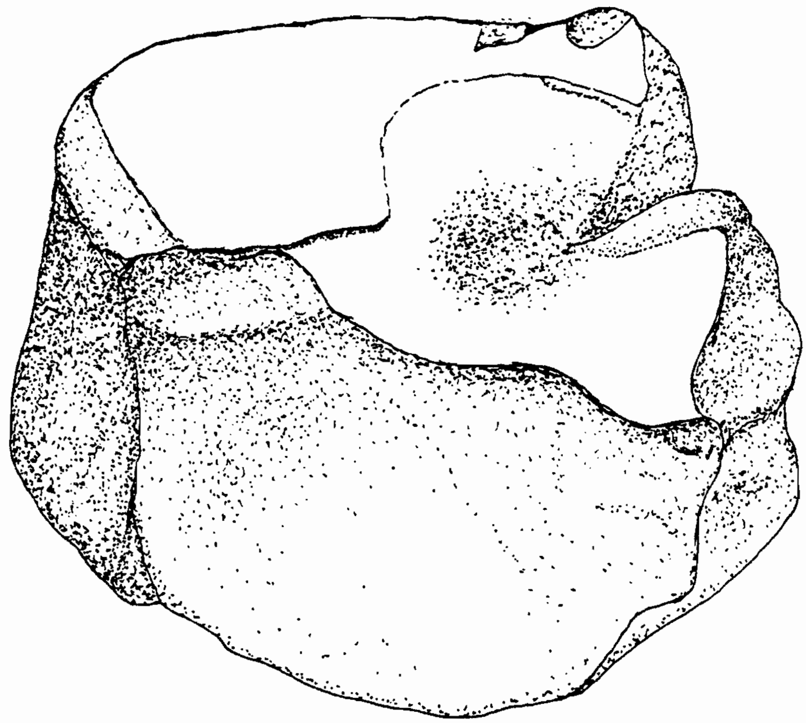
Spatially, grinding stones cluster in the eastern and the western portions of the site. They are found in levels 2 and 4 of TT1C, Level 7 of TT1D, and Level 5 of TB1. One specimen not present at the time of analysis was recovered from Level 3 of TT1F.

The largest concentration of grinding stones at the site was encountered in TT3. Four specimens were recovered from TT3A (levels 2 and 3), one from TT3B (Level 3), one fragmentary specimen from TT3D (Level 2), one from TT3F (Level 3), one from TT3H (Level 3) and two from TT3P (Level 3). In summary, ten, or more than half of the analyzed nineteen grinding stones, were recovered from levels 2 and 3 of an area measuring less than 3 m x 3 m.

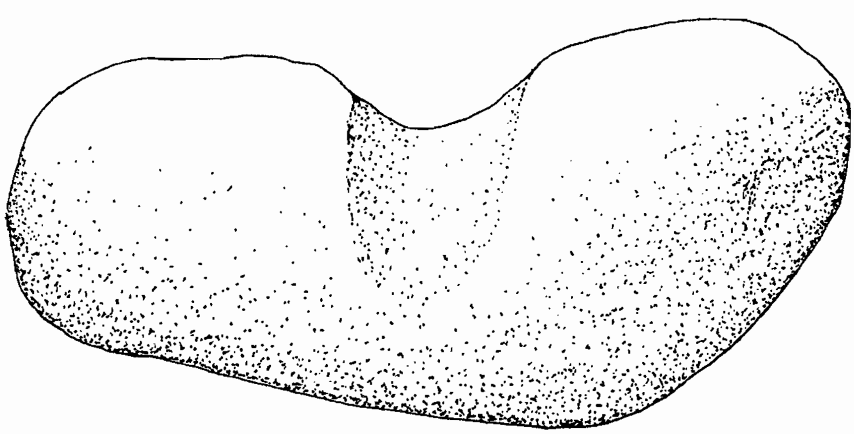
The remaining specimens are provenienced to TT4D (Level 5), TT4H (Level 2), TT4B/C/F (Level 5), and TT5C (Level 3). A trimmed block of comparable size was collected from TT4F (Level 4), however no wear is visible on the specimen and it is not considered here.

Anvils

Four specimens exhibit wear from pecking only and are here identified as anvils. Three are block anvils which are larger, heavier, and probably represent stationary features at the site. One specimen is a cobble anvil, which is smaller and more portable (Figure 33a).



a



b

Figure 33. Cobble anvil and girdled stone, 35WH7.

a. CC2-951 b. CC2-10014

The three block anvils (CC2-40, CC2-571, and CC2-259) resemble grinding stones in shape, but exhibit only a small amount of pecking, rather than the abrasion characteristic of the former. All are on trimmed blocks, with weights of 33, 42, and 80 pounds. They were recovered from TT3A (Level 2), TT3E (Level 3), and TT3P (Level 2) clearly indicating their association with the grinding stones excavated from this part of the site.

The cobble anvil (specimen CC2-951) is a fist-sized angular cobble of basalt with two relatively smooth opposing surfaces. While the circumference may exhibit some trimming, this cannot be determined with certainty and most of the shape is probably natural. This also applies to one of the two smooth faces, which may have been minimally ground. The second of the two smoother faces exhibits a heavily pecked indentation measuring approximately 1.8 cm in diameter. While the stone appears to have functioned as an anvil of some sort, its specific use is unknown. It measures approximately 11 x 6.5 x 6.8 cm and weighs 789.4 g. The piece was excavated from Level 1 of TT7B.

Girdled Stone

CC2-10014 is an elongate rounded basalt cobble with a partially girdled midsection (Figure 33b). It is 10.81 cm long, measures approximately 5.25 cm in diameter, and weighs 327.58 g. Its precise function remains unknown though it may have served as a net weight. It was recovered in Level 3 of TT4C, and may therefore have been associated with the possible house floor described for this area (see Features).

Ground Siltstone

A small piece of perforated and ground, locally available siltstone, was recovered from TT3H (Level 3 or slightly below). The piece is 4.9 cm long, 2.18 cm wide and 0.46 cm thick (Figure 34g). It weighs 5.06 g. Three sides are irregularly broken, while most of the fourth margin has been bifacially ground to a sharp edge. A single, biconical hole, measuring about 2.3 mm in diameter, has been drilled approximately 4.5 mm from this edge. Parallel striations on the interior of the hole suggest the use of a stone, rather than bone drill. The function of this piece is unknown, though the ground edge may have served in cutting.

Worked Bone and Antler

Worked bone and antler are rare at 35WH7. All but two of the eight specimens which comprise this group were found during the faunal analysis conducted by Dr. Joanne M. Mack. All but one were recovered from the western portion of the site (TT3 and TT4) (Figure 34).

The largest group in this category is represented by the articular ends of four feline metapodials (Figure 34b-c). All have been separated from their shafts by scoring and snapping, possibly as the result of

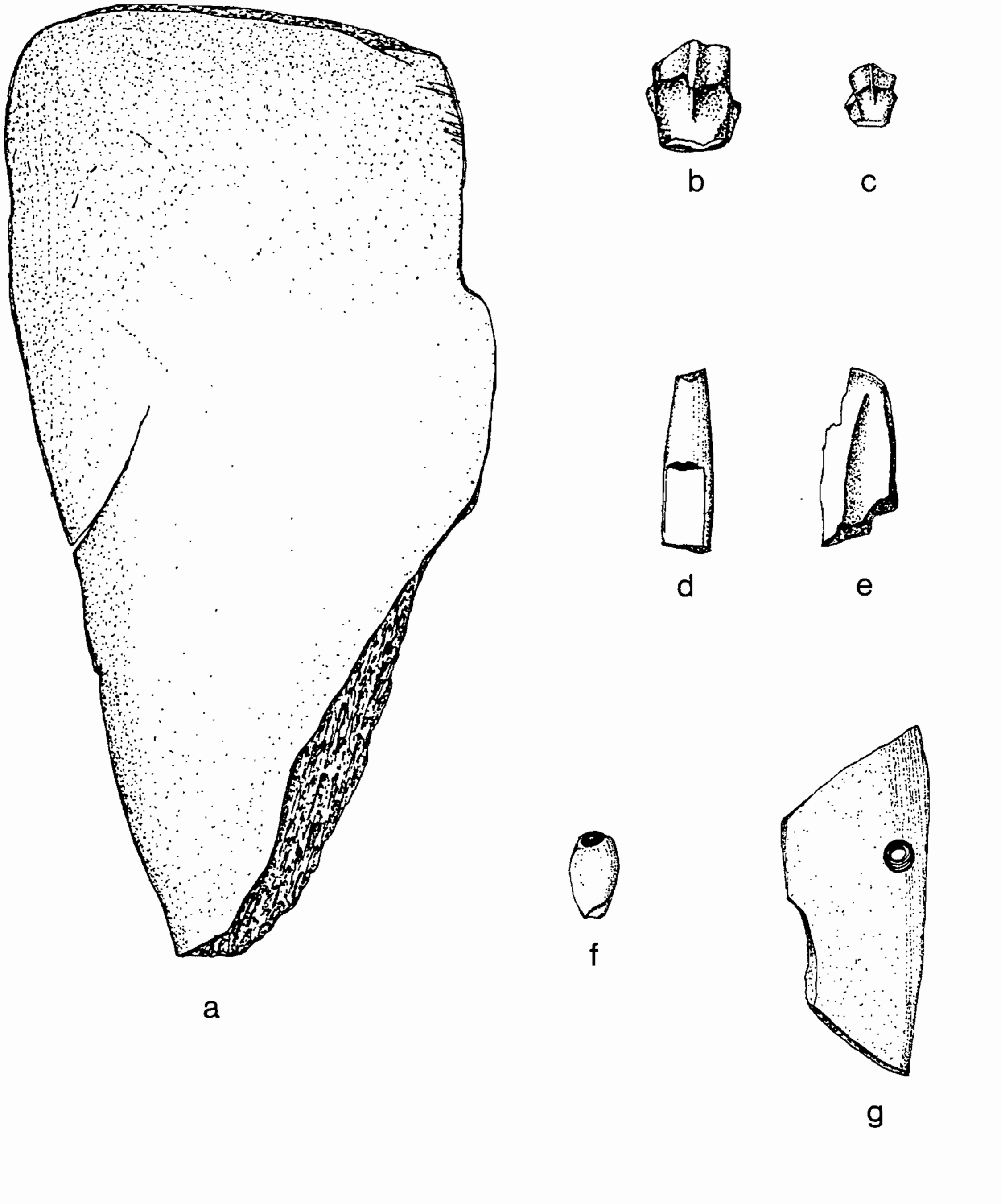


Figure 34. Worked bone, shell, and drilled siltstone, 35WH7.

a. B-78B
b. B-22I
c. B-112C
d. B-162B
e. B-169B
f. no number
g. CC2-855

bead manufacture (Mack, Appendix C; Schmitt 1990), though no bone beads were recovered from this site. All appear to be associated with the house floor described from in TT4. Specimen B-112C (Level 3, TT4J) and the two specimens catalogued as B-78G are from bobcat (Lynx rufus); specimen B-22I is identified as cougar (Felis concolor). It is provenienced to TT4H, Level 3.

A further item of modified bone which was probably associated with the house feature in TT4 is specimen B-78B (Figure 34a). Like B-78G (above), it was found in Level 4 of TT4C. It consists of the flat body segment of a right scapula of a large mammal, probably an artiodactyl. Removal of spine and subsequent grinding of the cut edges has produced a spatulate implement shaped like an isosceles triangle, the base of which curls upward slightly. It measures 13.5 cm in length, with a maximum width of 6.8 cm. The function of this specimen is unknown, but it would appear to be too fragile for any heavy use.

Specimen B-162B is a medial segment of a medium-sized mammal longbone which has been shaped an polished to a tapered point (Figure 34d). A rectangular segment of bone has, in addition, been removed from the exterior of the piece leaving a step about halfway down its length. The specimen is fragmentary and appears to be burnt; both the tip and a lateral portion are missing. It measures 2.62 cm in length and has a maximum diameter of about 8 mm. It was recovered from TT3A, Level 3.

Specimen B-169B is a burnt medial fragment of mammal longbone with part of a curved and polished end (Figure 34e). While it may represent the end of a scraping or fleshing tool (cf. Schmitt 1990:15-16), the piece is extremely fragmentary and a positive identification of its function is not possible. It is 2.66 cm long and 1.24 cm wide. It was recovered from Level 2 of TT3H.

Specimen CC2-789 (originally catalogued with the non-bone assemblage) is a small tip of an antler tine. Because of the burnt and fragmentary condition of the piece, it cannot with certainty be identified as a tool. If it was indeed used, it may have served as part of a pressure flaker or an awl. It is 2.10 cm long and exhibits a maximum diameter of 0.73 cm. It was recovered in Level 4 of TT1A and represents the only worked bone or antler from the eastern portion of the site.

Shell Bead

A single (unnumbered) shell bead was recovered from Level 6 of TT1A (Figure 34f). It is an olivella shell bead with a length of 12.8 mm and a maximum diameter of 7.6 mm. Beads of this kind have been found throughout the Plateau (Erickson 1990) and the Great Basin (Bennyhoff and Hughes 1987). The specimen from 35WH7 is classified as a medium-sized (between 6.51 and 9.5 mm in diameter), "simple spire-lopped" olivella shell bead (Type Alb., Bennyhoff and Hughes 1987:118) based on the method of spire removal. *Olivella biplicata* is most widely used for shell beads in the region and it is likely that the present specimen also represents this species.

Most Great Basin marine shell beads are thought to have been obtained from California (Bennyhoff and Hughes 1987). It is likely, however, that the specimen from the Pine Creek basin was procured on the Oregon or Washington coast from where it would have reached the John Day drainage via the Columbia River (Erickson 1990:131). While olivella shell beads are usually not mentioned in ethnographic accounts of the Plateau and are not listed in Ray's Culture Element Distributions for the Plateau (Ray 1942), they are not uncommon in archaeological contexts, where they have been recovered from both burials and habitation sites (Erickson 1990). At the Wildcat Canyon site, olivella shell beads are characteristic of the Wildcat Phase (Dumond and Minor 1983:159).

A marked expansion of long-distance trade in general and marine shells in particular is observed between A.D. 1350 and 1650 on the Columbia Plateau (Erickson 1990:132). The specimen from 35WH7, recovered from the hearth area of TT1, falls comfortably within this period.

Conjoined Specimens

A consequence of the excavation of the large block of contiguous units at 35WH7 was the recovery of many conjoinable artifact fragments. The refitting of broken artifacts was begun by OMSI lab staff and continued during the present analysis. The distribution of paired fragments across the site serves as a measure of spatial integrity of the deposits (e.g Villa 1982) and offers some additional insights into site function.

Twenty-four artifacts, including projectile points, bifaces, worked and utilized flakes, a core, and a cobble uniface, were refitted from matching fragments (Table 11). When the horizontal distribution of matching specimens is plotted, it can be seen that 17 pairs (71%) are separated by no more than two excavation units (or roughly 2 m) (Figure 35). More specifically, three sets include specimens which were recovered from the same unit, ten sets include specimens from adjoining units, and four sets consist of fragments from units separated by one square. This distance is consistent with findings from refitting studies elsewhere, and has been related to ethnographic observations of spatial patterning resulting from stone working and drop zones (Gamble 1991).

In three cases, paired items were separated by two excavation units, and in four cases, the distance was even greater. This last group will now be examined in greater detail. Specimens CC2-1606, CC2-292, and CC2-1175 are pieces of a heat-treated biface which appears to have broken in two stages. The first fragment was recovered from TT5B (Level 2, 8.90-8.70 m), while the remaining pieces were recovered from TT1C and 1P (levels 4, 8.80-8.60 m, and 10, 7.90-7.70 m, respectively). It appears that CC2-1606, an acute-ended distal fragment, separated from the larger piece during heat-treating in the western part of the site. A subsequent attempt to rework the periphery of the remaining material

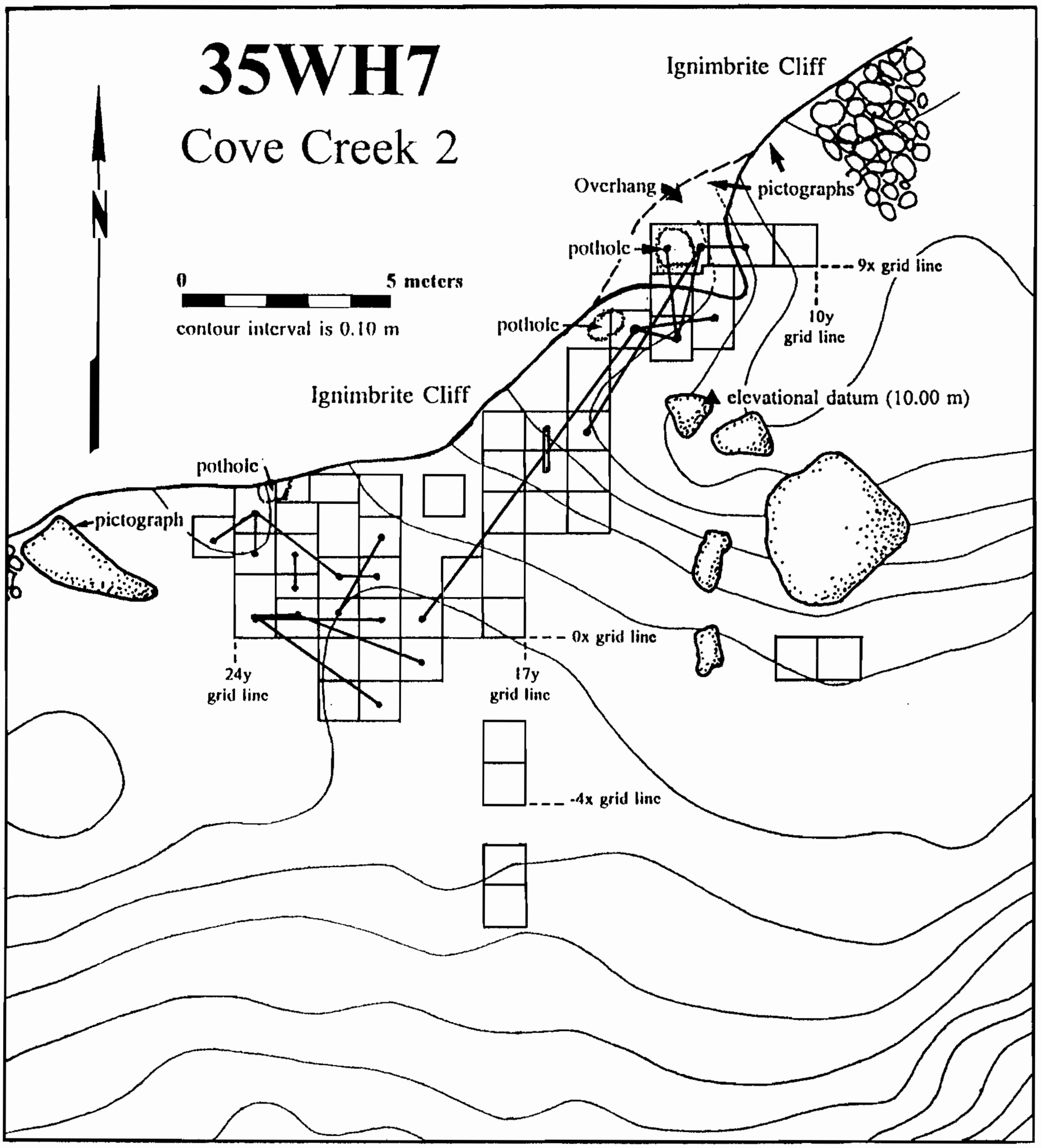


Figure 35. Horizontal distribution of conjoined fragments.

Table 11. Conjoinable Artifacts Recovered at 35WH7

Spec. No.	Class	Unit	Level	*fits with*	Spec. No.	Unit	Level	Type[1]
3	PPT(SN1)	1A	4		176	1P	?	II
25	BIFACE	3C	1A		114	4C	3	IV
85	BIFACE	4A	2		770	3C	2	II
109	PPT(ES1)	3B	3B		814	3A	4-6	II
175	PPT(PSES)	1P	3-5		553	1P	5A	I
177	PPT(CS6)	1A	3		603	1A	4	I
195	BIFACE	4B	1		278	5B	3B	III
212	PPT(CS6)	2F	1B		882	2Q	1A	II
274	PPT(ES1)	1C	3		461	1D	WS	II
291	PPT	1C	4		757	PH	SUR	III
292	BIFACE	1C	4B		1175	1P	10	III
				and	1606	5B	2	V
304	BIFACE	4A	2B		969	4J	2A	IV
325	CORE	2G	1B		668	1P	WS	V
424	BIFACE	1D	6B		656	1F	4B	III
484	PPT(ESI1)	3E	4A		805	3H	2B	II
529	PPT	2F	WS		945	2Q	2	II
624	BIFACE	4I	1		767	3C	2	IV
649	WRKD FL	1D	4		1524	4D	1	V
827	BIFACE	3G	3B		1017	3A	3	II
837	BIFACE	5C	4A		958	7B	1B	II
973	COB UNIF	1A	4-8		1040	1A	1	I
1356	UTL FL	3E	3		1667	7B	3	II

1. I=same unit; II=adjacent units; III=two units apart; IV=three units apart; V=more than three units apart

resulted in fracture and rejection. This later discard appears to have taken place around TT1, or in the eastern portion of the site.

Specimens CC2-325 and CC2-668 are matching pieces of a chert core which were found in units TT2G (Level 1, 9.30-9.10 m) and 1P (wall-scrapings, no exact provenience). Both were reworked after breaking apart. CC2-649 and CC2-1524, finally, are parts of a worked flake which were recovered from TT1D (Level 4, 9.10-8.90 m) and 4D (Level 1, 9.00-

8.80 m). Like the cores just discussed, CC2-1524 has been reworked after separating from its counterpart.

The distribution of conjoined fragments partitions the site into three segments. This division corresponds to and supports that established by other criteria including the distribution of flakes and other classes of artifacts. Ten conjoined pairs were recovered from the western portion of 35WH7, encompassing TT3, 5, 7, and most of TT4. Eight pairs are from the eastern portion of the site, excluding TT1B. Only two pairs were found in TT2. Matched pairs with members cross-cutting these divisions represent prehistoric "cycling" (Ascher 1968); displacement is due to cultural, rather than natural formation processes (Schiffer 1983). The paucity of matching specimens from TT2 suggests that this area may have been characterized less by production than by maintenance activities, a conclusion that has been supported by other functional correlates from the site.

The picture is less clear-cut with regard to the vertical distribution of conjoined fragments, and complicated by thickness of arbitrary levels (20 cm), and differing level definitions between adjacent units. In order to assess vertical displacement, elevations relative to the 10 m datum were compared for conjoined specimens for which both members were recovered from within the same portion of the site (thus excluding specimens separated by greater horizontal distances). In five cases matched parts were recovered from the same or overlapping levels, in five cases parts came from adjacent levels, and in seven cases specimens were vertically removed by more than one level. Several specimens could not be included in this analysis due to incomplete provenience information.

Several factors may contribute to the inconclusive nature of the vertical information. Vandalism, reflected in the presence of multiple potholes, has probably contributed to the scrambling of cultural materials at the site, in concert with "systemic" human activities (Schiffer 1972; Ascher 1968) and bioturbation (e.g. Erlandson 1984; Bocek 1986). The distribution may also, however, reflect a generally homogeneous and undifferentiated nature of the cultural deposits and the relatively short time span bracketed by them.

Miscellaneous Rocks and Minerals

Four items from 35WH7 are classified as rocks and minerals. These are manuports which appear to have been brought to the site but which are not otherwise modified. Also included under this heading are bits of pigment collected at 35WH7.

Crystal

Three chunks of local rock crystal weighing 288.3 g (CC2-1071), 427.1 g (CC2-1070), and 734.5 g (CC2-1099) were recovered from the site. All originated in its eastern portion, including TT1C (Level 2; CC2-1070 and 1071) and TT1D (CC2-1099; levels 4-6). Their purpose is unknown.

Fossil leaf

Specimen CC2-797 is a small piece of stone which exhibits the parallel venation of a fossilized leaf. It is 1.9 cm long, 1.5 cm wide, 0.4 cm thick and weighs 1.3 g. The specimen is unmodified and may be part of the site's natural deposits, though this cannot be ascertained at present. It was recovered in Level 3 of TT3E.

Ochre

Small pieces of pigment, ranging in weight from 0.14 to 10.32 g, and comprising a total of 25.76 g, were found in several parts of 35WH7. Most consist of red ochre. In the eastern portion of the site, ochre was recovered from TT1A (levels 3, 4, 5), TT1B (Level 3), and TT1F (Level 3, 4). The proximity of these units to pictographs situated on the adjacent cliff face (see Rock Art, this chapter) may suggest their use in the production of these representations. A cobble chopper-hammerstone which appears to have been used to crush ochre (CC2-982) was recovered from 25 cm below the surface of TT1P (exact elevation unknown) and may also have been used in this connection.

The largest piece of ochre at the site, weighing over 10 g, was found in Level 1 of TT3C. A second, smaller piece was recovered from nearby TT3E (Level 3). These units are, like TT1, located opposite a panel of pictographs and may be related to their production, as may be a cobble uniface with traces of ochre recovered from TT3D (Level 3).

Pieces of pigment were also found in levels 1 and 2 of TT4B (Level 1), 4E (levels 1, 2), and 4I (Level 1). In addition to the more common red ochre, TT4E produced the only yellow ochre found at the site. A single small piece of red ochre was, finally, recovered from Level 1 of TT2T.

Atlatl Dart Cache

A unexpected find at 35WH7 was the discovery of a cache of atlatl darts in a "horizontal, upward sloping crack [in the cliff face] about eight meters above the site and well-protected from the elements" (Gannon 1970:9). Nine fragments were recovered in 1968, followed by an additional six in 1969. Of these 15 specimens, 13 or 14 are now present in the collection, depending on whether the joined mainshaft and foreshaft (D/E) are considered as one or two pieces.

A short time after their recovery, specimens A, B, C, D, and E were cut between approximately 2.5 and 8 cm above one end for radiocarbon-dating and wood identification. Radiocarbon dates of 2380 ± 100 B.P. and 2230 ± 90 B.P. (Gak 2177 and 2725) were returned on two of the shafts. It is not clear which of the five specimens were actually dated. The lettering system (A through E) established when the specimens were cut for analysis, was retained in the present study, and the remaining specimens were identified as F though N. Botanical identifications were provided for darts A through E in 1972 by Dr. Frank Smith, Department of Botany and Plant Pathology, Oregon State

University, Corvallis (project files, Oregon State Museum of Anthropology). The remaining specimens appear to represent the same wood types. Descriptions of the shafts are presented in some detail below due to the rare nature of these artifacts. General labels and measurements are provided in Table 12.

Foreshafts

Four items are identified as foreshafts (specimens D, F, G, and H). All are tapered to a point at the proximal end, generally below a distinct shoulder, though the taper on specimen H is more gradual. Distal ends on F and H are slotted for insertion of a dart point, with diagonal scoring added to the exterior on F, probably to provide adhesion for sinew wrapping. The distal end on specimen G appears to have been split from impact, leaving only one half of the slot element. Specimen D terminates in a blunt, irregular end, although the piece looks finished otherwise. It is possible that it was in the process of manufacture or under repair. Alternatively, the tip could have served as a bunt, without addition of a projectile, a use described from other sites in the Desert West (cf. Dalley 1970a:93 and sources). Foreshaft lengths range from 39.5 cm to 52 cm, diameters from 1.04 to 1.11 cm. Where visible, the lengths of the shaft taper range from 6.0-9.1 cm. Slot depths on the two finished specimens measure 0.7 and 1.1 cm. Tapered ends retain whittle marks with no attempt made at smoothing the surface. All foreshafts are made of serviceberry (<u>Amelanchier</u> sp.).

Table 12. Wooden Artifacts from Cliff Cache, 35WH7

Dart Spec.	Type	Length (cm)	Dia. (cm)	End Configuration Proximal	Distal	Material
A	Self dart?	49.1*	1.02	Tapered	Indet.,unif. planed	Douglas fir
B	Self dart?	138.0*	1.04	Indet.	Blunt	Douglas fir
C	Mainshaft	29.9*	1.46	Indet.	Socketed, bored	Elderberry
D[1]	Foreshaft	32.1*	1.04	Tapered	Blunt	Serviceberry
E[1]	Mainshaft	41.4*	1.36	Indet.	Socketed, wrapped	Elderberry
F	Foreshaft	45.7	1.07	Tapered	Slotted, scored	Serviceberry
G	Foreshaft	39.5	1.11	Tapered	Slotted?	Serviceberry
H	Foreshaft	52.0	1.10	Tapered	Slotted	Serviceberry
I	Self dart?	106.0*	1.01	Indet.	Semi-slotted?	Douglas fir
J	Self dart?	53.1*	1.07	Indet.	Slotted?	Douglas fir
K	Self dart?	100.2	1.09	Beveled	Slotted	Douglas fir
L	Mainshaft?	56.4	1.42	Indet.	Cut? wrap marks?	Elderberry
M	Raw mat.	31.0	1.70	Unmodified	Unmodified	Elderberry
N	Raw mat.	53.5	1.04	Cut	Indet., residue?	Serviceberry

1. joined
* fragmentary specimen

Mainshafts

These include specimen E and possibly C and L. Specimen E is unequivocally a mainshaft and provides the socket for foreshaft D, to which it is still joined. The distal end is longitudinally split around its circumference several times, probably from impact, which has forced the foreshaft farther back into the socket. Two types of sinew have been wrapped around the socket end, probably to prevent further splitting. Both damage and preventive measures of this kind are common on archaeological specimens and have been documented in experimental studies of atlatl replication and use (Spencer 1974:53). The applied wrap includes a band of 4-5 mm wide sinew as well as an adjacent band of fine, separated, sinew fibers, possibly indicating two events of repair. No adhesives or scoring are evident. The proximal end is broken and irregular. Both D and E exhibit a reddish tint that may represent staining which was applied to the exterior.

Specimen C is a length of wood with irregular ends. It is presumed to be a second mainshaft because of a narrow, tapering groove which is exposed in the pith of one end and which matches in shape the proximal ends of the foreshafts discussed above. The groove is darkened and exhibits what may be a sheen of mastic on one edge. It is not clear what purpose an adhesive would have served at this juncture, however pitch was also found on the tapered ends of five specimens from Hogup Cave (Dalley 1970a:159), suggesting an intentional application. Specimen L is a length of elderberry wood, much like the other two mainshafts. It is split in several areas along its length. In order to reduce disintegration, the piece was "mended" at intervals with five strips of masking tape at some time after its recovery. Because of the fragility of the specimen, these were not removed for the present analysis. The piece exhibits an irregular break at one end; the opposite end is wrapped with tape and plugged with cotton batting. It appears to be cut and hollowed and displays a band of parallel darkened rings which suggest the former presence of sinew wrap between 3 and 6 cm from the end of the shaft, either as reinforcement or for feather seizing. A slight ridge is present at the end of the area presumed to have been bound. The exterior of the wood has been longitudinally scraped between the binding and the terminus of the specimen.

All three items described under this heading are made of elderberry (Sambucus sp., probably S. glauca, blue elderberry). This is a softer and lighter wood than the serviceberry used in making the foreshafts and is consistent with materials used in mainshafts and foreshafts found elsewhere to the south in the Great Basin (e.g. Harrington 1933; Heizer 1938; Hattori 1982). The use of the same material in all three specimens supports the likelihood that specimen L is, in fact, part of a third mainshaft. However dart "fletch-shafts" or "butt-pieces," joined to the mainshaft to engage with the atlatl spur, were commonly also made of lighter materials (Harrington 1933; Heizer 1938; Hattori 1982) and it is not impossible that this is what specimen L represents. Lengths on the specimens range from 30-56.4 cm (however at least one is incomplete). Diameters range from 1.36-1.46 cm.

Other Darts

This group consists of five shafts (A, B, I, J, K), all of which appear to be made of Douglas-fir (Pseudotsuga sp.). These are the longest darts in this collection, including three particularly long pieces measuring 138 cm (specimen B), 106 cm (I), and 100.15 cm (K). Of these, only K appears to be complete. This specimen is slotted at its distal end, while the proximal end is cut obliquely, creating an 11.2 cm long, one-sided taper. The shaft constricts slightly at the base of the distal end, creating a slight shoulder 2.7 cm from the distal terminus. A tiny fragment of sinew wrapping is caught in the base of the slot, and a small area of residue--possibly pitch--remains on the outer face of the slot end.

It is not clear how these specimens were used. The obliquely cut proximal end of specimen K may have been intended for attachment to a separate butt-piece (see Harrington 1933:96 for a similar splice at this juncture of the dart). The remaining darts may may been cast without additional elements as "self darts" (a term coined by Allely, 1992, in analogy to self arrows).

Specimen I is incomplete at one end. A thin rectangular section (50 mm long and 8 mm wide) has been removed from one side of the opposite end, possibly for a type of projectile point attachment referred to as an "L-shaped" notch (Hattori 1982:117). Specimen J is a shorter shaft (53.1 cm), the proximal end of which has broken off. The opposite end is similarly incomplete, but may represent half of a U-shaped or V-shaped notch like those of the foreshafts already discussed, broken from impact. Specimen B, one of the longer shafts, was cut at one end for radiocarbon-dating and/or wood identification. The former shape of this end is unknown. The opposite end is shaved, resulting in a slight constriction which terminates in a blunted tip. Specimen A, finally, is a short segment of 44.3 cm which terminates in a rough and irregular end, possibly an old break, and is shaved off flatly along one face for about 14 cm, beginning at a well-defined, cut step. Diameters on these darts range from 1.01 cm to 1.09 cm.

Raw Materials

These are two specimens with little or no modification. Specimen N is a peeled stick of elderberry, one end of which is roughly cut, while the other is smooth and blunt. This end also appears to be darkened, possibly by exterior application (prehistorically) of a liquid or consolidant. The piece is 53.5 cm long and has a diameter 1.04 cm, and is thus consistent in material and dimensions with the foreshafts discussed above. Specimen M, finally, is a broken and warped length of elderberry, 31 cm long, with a diameter of 1.7 cm, comparable to material used for mainshafts at this site.

Discussion

The preservation of atlatl darts, like other artifacts of wood and basketry, is rare due to the perishable nature of these materials. Published reports for Oregon are limited to those recovered by Luther Cressman from dry caves in the Oregon Great Basin, including Roaring Springs Cave, Catlow Cave, the Five-Mile-Point caves, and Plush Cave (Cressman 1942:70 and Table 18). While Cressman devotes considerable attention to discussing the atlatls themselves, unfortunately, little is said about the shafts. Illustrated specimens from Roaring Springs Cave (Cressman 1940:figures 6 and 7) appear to represent proximal elements which are cupped at one end to engage an atlatl hook and tapered at the opposite end, presumably to fit into a socketed mainshaft. No complete mainshafts or foreshafts are illustrated or discussed. It should be noted that, unlike several dart components discussed by Cressman (1940:39) and many from other sites referred to below, none of the specimens from 35WH7 are decorated, except for the possible application of surface staining.

More information is available on dart shafts from such sites as Leonard Rockshelter, Gypsum Cave, and the Falcon Hill Sites in Nevada, and Danger and Hogup caves in Utah, and has been referred to above in individual discussions. The darts from 35WH7 are broadly comparable to those recovered from the Nevada and Utah sites. While lengths of mainshafts appear to be relatively constant for all of these sites, more variation is evident in the foreshafts. The foreshafts from 35WH7 (ranging in length from 39.5 to 52 cm) are comparable to the foreshaft in the complete dart recovered from Leonard Rockshelter, and to Hattori's variety of "long foreshafts" from Falcon Hill, defined as longer than 20 cm (Hattori 1982:113). Foreshafts from Gypsum Cave, on the other hand, are shorter, measuring no more than 14.4 cm in length, while foreshafts at Hogup Cave exhibit lengths of no more than 31 cm in length (although the small sample of two complete specimens at this site may not accurately reflect the potential range of variation). Whether these differences are coincidental, a function of temporal differences or the correlate of a north-south gradient in the distribution of atlatl (and atlatl weight) types (Dalley 1970a:160), cannot be determined without analysis of a larger sample.

Two specimens from Gypsum Cave described by Harrington (1933:101), which are socketed for the attachment of a projectile point, appear to be analogous to the "self darts" from 35WH7. Due to the form of the taper of these particular specimens (shouldered rather than smooth), the presence of pitch on the taper, the surface finish of the specimens, and the length of the single complete piece (38.7 cm, thus longer than foreshafts recovered at Gypsum Cave), Harrington felt that these were not foreshafts, but rather hafted mainshafts. He was uncertain whether this represented a distinct type of dart or merely a temporary expedient:

> A hunter may have had only one dart remaining, and shattered the foreshaft and socket of that against the rocks of Gypsum Cave. Instead of taking time to make a new dart or to drill a new socket in the old one, he may have simply cut a slot in the shattered end of the shaft he already had, set in a point, and proceeded with his hunting (Harrington 1933:114).

The consistent use of a different material, i.e. Douglas-fir, for self darts at 35WH7, suggests that, at least here, this dart type was the result of a conscious choice, rather than an expedient solution.

The cache at 35WH7 appears to represent a selection of both used and unfinished dart components, as well as unworked or minimally worked raw materials. Proximal elements are strikingly absent, precluding an assessment of the full dart configuration. If separate fletch-shafts were used in this area, they do not appear to have been cached together with other shaft components, but may have been personal property which was kept with the owner.

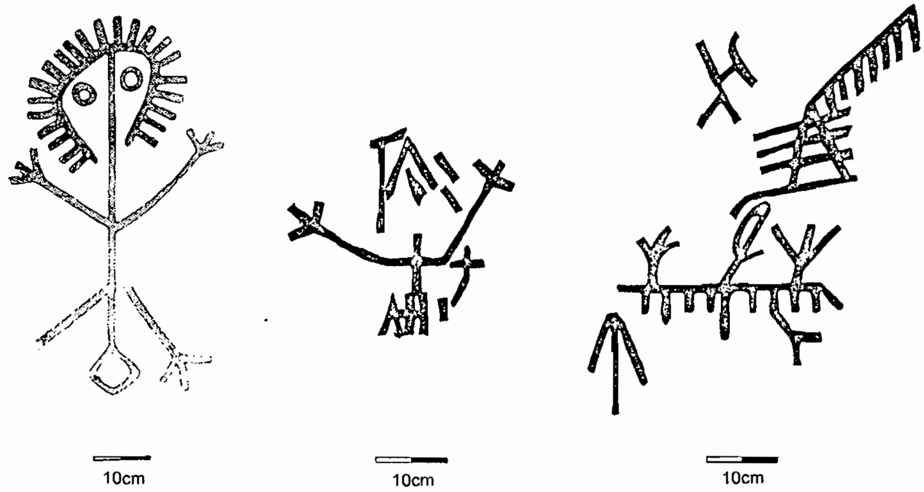
Rock Art

The following description of rock art at 35WH7 is given by Gannon (1968:3):

> There are three pictographs in direct association with the site, all painted with red ochre.... The best-preserved one is directly to the right of the overhang over TT-1. It is an anthropomorphic "phallic figure." Another one with an element of anthropomorphism is situated underneath the overhang. At the west end of the site, on a "fall-block", is a rather complex pictograph and is [sic] partially obliterated by a scent-post. The "arm and hand" motif is present in this one also. There is a possibility that this pictograph may have been painted prior to the block's removal, and that it is upside-down.

According to element record sheets filled out by OMSI recorders, the more clearly defined figure at 35WH7 is 66 cm tall and 36 cm wide. The other designs measure 48 cm by 43 cm, and 28 cm by 28 cm. Major elements are reproduced in Figure 36.

While an exhaustive treatment of rock art in the Clarno Basin would exceed the scope of this study, a few observations can be made regarding its possible cultural affiliations. The most easily recognizable feature of the pictographs at 35WH7 is the rayed head of the anthropomorphic, or possibly zoomorphic, figure. Simple stick figures with a rayed head or rayed arc have been identified throughout the western Columbia Plateau and are considered a hallmark of this style zone (Keyser 1992:61-62). Both rayed arc and stick figure motifs may have considerable time depth, dating to between 3500 and 100 years ago (McClure 1984, cit. in Keyser 1992:97).



a b

Figure 36. Pictographs, 35WH7: a, eastern set; b, western set (from Gannon 1970).

In a recent treatment of rock art of the Columbia Plateau, James Keyser defines the "North Oregon Rectilinear Style," which is represented primarily by pictographs in the upper Deschutes and John Day watersheds and easily subsumes the paintings found at 35WH7. While this style is related to rock art along the Columbia River, it is distinctive in its emphasis on lizards and abstract rectilinear abstracts including rectangles, ribbed figures, grids, zigzags, and ladder figures, often in complex combinations (Keyser 1992:83). Another common rectilinear abstract of this style zone is represented by rakes similar to the rake-like design found at 35WH7. Keyser feels that "this art style is stylistically more like other Plateau art than like Great Basin petroglyphs to the south" (1992:123).

Faunal Remains: Vertebrates

As with the artifactual materials, the sample of faunal remains recovered from 35WH7 may be biased by the coarse screen mesh presumably used in the excavations. Additional difficulties are posed by the poor condition of much of the bone and the consequent application of shellac as a "preservative" to larger specimens (Mack, Appendix C). A total of 1,934 faunal elements were nonetheless retrieved from this site and analyzed for the present investigation. Identifications were completed by Dr. Joanne M. Mack of Pomona College, Claremont, California. The discussion presented below is drawn from Mack's report and expanded with pertinent additional data and comments. Mack's report is reproduced in Appendix C of this study.

Distribution

Of the almost 2,000 specimens in the collection, 775, or 40%, were identifiable to a taxonomic level of class or lower. Percentages assigned below refer to these specimens only. Where relevant, observations were recorded on cultural modifications such as cut marks and burning or charring, as well as sex and age at death. It was hoped that the latter, in particular, would provide information on site seasonality. As it can frequently not be determined whether left or right components are represented, minimum numbers of individuals were not tabulated and counts are given for numbers of identified specimens (NISP).

Taxonomic categories represented at 35WH7 are listed in Table 13. Fourteen distinct species were identified within as many genera, along with additional specimens which could only be assigned to a more general taxonomic level. Classes include birds, fish, mammals, and reptiles, but only mammals are represented by more than a few specimens. Artiodactyls, with 297 specimens (38.4%) clearly dominate the assemblage. It is likely, in addition, that the 32 specimens identified as large mammals were artiodactyls. Of the 197 artiodactyl specimens which are identifiable to a more specific level, 169 are assigned to deer (mule deer, NISP=166, unidentifiable deer, NISP=3), 25 to elk, and three to bighorn sheep. Lagomorphs, with 47 specimens (6.1% of all identifiable bones), make up the second largest category. Of these bones, 39 are identified as Nuttall's cottontail, four are assigned to cottontail only, and three represent jackrabbit. One specimen is merely identified as Lagomorph. The impact of screen-size choice on the recovery of faunal remains, and in particular, on the recovery of small body-size taxa, has been demonstrated by experimental studies (Grayson 1984:168-172). Based on data from a study by Thomas (1969), Grayson (1984:70) concludes that only 29% of size class III faunal materials (including cottontail rabbits) will typically be recovered in a quarter-inch mesh screen. While the degree of actual bias created by the recovery techniques applied at 35WH7 cannot be ascertained, the problem must be considered in interpretations of the assemblage.

Table 13. Identified Faunal Remains at 35WH7

Taxon	Test Trench 1						Test Trench 2												Test Trench 3									Test Trench 4										TT5			TT6		TT7	TB	TP	TP			
	A	B	C	D	F	P	A	B	C	D	E	F	G	H	K	L	N	O	A	B	C	D	E	F	G	H	P	A	B	C	D	E	F	G	H	I	J	A	B	C	A	B	B	1	1	2	PH	OT	Tot
Bird																																																	
Aves uspec.	1	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	7
Asio otis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Dendragapus obscurus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Otus asio	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	2
Fish																																																	
Pisces unspec.	1	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Reptile																																																	
Clemmys marmorata	4	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	1	11
Mammal																																																	
Mammalia unspec.	25	-	20	8	-	31	-	1	-	-	-	7	-	6	-	-	-	-	13	4	12	18	3	1	7	17	27	7	2	1	10	-	-	-	18	-	1	14	1	2	-	-	1	5	-	-	-	15	277
Artiodactyla unspec.	-	-	4	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2	1	-	-	-	-	-	-	13	4	-	-	-	36	-	14	1	-	-	-	-	-	1	-	-	4	-	85
Ovis canadensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	1	3
Cervidae unspec.	3	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	5	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	2	15
Cervus canadensis	1	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	7	2	-	1	-	7	-	2	-	-	-	-	-	1	-	-	-	1	-	25
Odocoileus hemionus	11	1	15	-	39	6	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	1	1	-	-	-	-	1	-	20	14	1	1	-	31	-	11	-	-	-	-	-	1	1	-	-	5	4	166
Odocoileus sp.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Mustelidae unspec.	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Lutra canadensis	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Felis concolor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Lynx rufus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	3
Rodentia unspec.	3	-	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	9
Tamiasciurus douglasii	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Castor canadensis	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Microtus sp.	7	-	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	16
Neotoma cinerea	3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	7
Erethizon dorsatum	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	5
Thomomys talpoides	1	-	5	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
Lagomorpha unspec.	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Lepus sp.	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	3
Sylvilagus nuttallii	7	-	10	-	7	5	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3	39
Sylvilagus sp.	-	-	-	-	-	2	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	4
Mammal, large	2	-	3	-	3	1	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	2	3	-	1	-	-	-	-	9	-	1	-	-	-	-	-	-	-	-	-	2	3	32
Mammal, medium	3	-	3	-	5	5	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	2	1	23
Mammal, small	2	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	2	18
																																																Total	775

Several other taxa are present at 35WH7 in small numbers. Birds include one specimen each of which has been identified as long-eared owl and blue grouse, and two of which are identified as screech owl. The owls are probably local residents, given the proximity of adjacent cliff face. Four unidentified fish bones are also present, as well as eleven reptiles. Carnivore remains include three specimens identified as bobcat and one as cougar, as well as three mustelid bones, two of which are assigned to river otter. The balance of the collection is represented by various types of rodents, including beaver, porcupine, bushytail woodrat, vole, northern pocket gopher, and chickaree (also known as Douglas squirrel). Like owls, many of the rodents may be part of the local fauna and not culturally introduced to the site.

Almost half of all faunal remains (45.9%), and 38.2% of all identifiable elements, were recovered from TT1. This does not include materials provenienced to "pothole" and TB1, which are also attributed to the eastern portion of the site. Thirty-two percent of all faunal materials (31.7% of identifiable materials) were obtained from TT4. Substantially lower numbers were recovered from TT3 (12.6% of all faunal materials and 18.2% of identifiable specimens), TT5 (1.2% and 2.6%), TT2 (1.5% and 2.3%), and TT7 (0.7% and 0.7%). No faunal remains were recovered from TT6. The high taxonomic diversity of the eastern portion of the site, which, with the exception of felids, includes each species identified from 35WH7, contrasts with the homogeneity of the TT4 deposits. Here, 77.1% of all identifiable elements are either from artiodactyls or large mammals, with only one element identified as rabbit, in contrast to 43 from TT1 and its vicinity (92% of all lagomorphs at the site). While faunal remains are scattered vertically throughout the deposits of TT1 and its environs, most bones from TT4 are found in levels 3 and 4, or between roughly 8.60 m and 8.30 m.

The array of species represented in TT1 is probably best explained by the attractiveness of the sheltering overhang area for both humans and animals, with a faunal assemblage resulting from both repeated human occupation and non-human activities. TT4, on the other hand, with its circular occupation floor and associated concentrations of bone, tools, and flakes, probably represents a more limited, human use, and fewer occupational events. The recovery of four cut feline metapodials which appear to represent the by-products of bone bead manufacture (see Worked Bone and Antler, this chapter) from levels 3 and 4 of TT4C, H, and J, reflects an additional activity which can be associated with this probable house feature.

Implications

The faunal taxa identified from 35WH7 are generally consistent with species found in the vicinity of the site today. In an attempt to assemble information on the present local fauna and flora, an informal survey was submitted to Hancock Field Station Director Joseph Jones, whose intimate knowledge of the natural history of this specific area enhances the more general published sources. According to Jones (written communication, 1993), most of the identified archaeological species are presently found within a radius of five miles or less from 35WH7, and many of them within less than a mile. Exceptions are bighorn sheep, which are present from 5 to 10 miles from 35WH7, and western pond turtles, which are only encountered at a distance of more than ten miles from the site.

The John Day drainage falls within the former range of bighorn sheep (Ovis canadensis californiana, which are said to have inhabited "every canyon, cliff, and lava butte as well as many of the rough lava beds of Oregon east of the Cascade Mountains" (Bailey 1936:65). It appears that this species disappeared from the Study Area sometime between the mid and late 1800's as a result of the introduction of domestic stock and associated diseases and parasites (Bailey 1936:66; Van Dyke et al. 1983). According to Jones, bighorn sheep could have formerly inhabited the cliff-face habitats in the Pine Creek basin, i.e. within one to five miles from 35WH7. The question of turtles must remain open. Western pond turtles, Clemmys marmorata, are generally found west of the Cascade-Sierran crest with the exception of a recent introduction in the Canyon Creek area of Grant County. The Study Area does, however, lie just beyond the current southern limit of the painted turtle, Chrysemys picta (Stebbins 1985:100). As turtle shell is known to have been used for rattles (Mack, Appendix C), it may also have been obtained from outside the Study Area, if it was, in fact, brought to the site by people.

Limited information on seasonality was obtained from the 35WH7 collection, although conclusions must remain tentative because of the small sample size. While most of the bones represent adult individuals, 26 specimens are from juveniles. Juveniles were identified by "incomplete ossification of the epiphysis of long bones and by tooth eruption, particularly among ungulates" (Mack, Appendix C). In addition to juvenile packrat (NISP=2), porcupine, pocket gopher, rabbit, and an unidentified mustelid and rodent (each with NISP=1), which may be attributed to the predatory activities of the resident owl population, the collection includes specimens which represent juvenile elk (NISP=10), deer (NISP=6), and bighorn sheep (NISP=1). Mandibles and teeth, each representing a single juvenile individual, are attributed to a 1.5 year-old elk, a 1.5 year-old mule deer, and a 2.5 year-old (30-32 months) bighorn sheep. Mack (Appendix C) concludes:

> From the faunal material the season of use of this site may be hypothesized to be during late Winter through late Spring. The juvenile Artiodactyla mandibles and teeth, which can be accurately aged indicate they were taken in late Winter or early Spring. Mule deer fawn are born from April through June, while both elk and big-horn sheep are born from May to June. Since the juvenile mule deer and elk age to approximately a year and a half old and the sheep to two and a half years old, they must have been killed in late Winter or early Spring. This time of year is also supported by the much higher number of female deer. Male deer do not travel with females after the mating season in late Fall. Since the males shed their antlers in March or April, the males represented in the assemblage likely have been killed in late Spring or early Summer.

The turtle remains provide no conclusive information. While modern habits would suggest mainly spring and summer availability (Stebbins 1985:100-101; however, see Nussbaum et al. 1983:203), the possibility of acquisition of the turtle remains through trade excludes them from serious consideration as a seasonal indicator.

The above-mentioned elements representing 1.5-year old deer and elk were recovered from TT4H (two from Level 3 and one unprovenienced) and can be associated with the house feature described previously (see Features) and radiocarbon-dated to 470 ± 90 B.P. It can tentatively be concluded that this feature was occupied during late winter or early spring. The juvenile bighorn sheep mandible unfortunately lacks provenience. Other bighorn sheep remains were recovered from the house feature just discussed as well as from Level 3 of TB1.

Conclusions

The distribution of faunal remains suggests two major spatial foci of associated activities, namely under the overhang in the eastern portion of the site, and in the house postulated for TT4. A smaller secondary concentration from the vicinity of TT3 is characterized by an exceptionally high proportion of bone (92%) which is either unidentifiable or identifiable only to the class of mammals. The difficulty in taxonomic identification of bones from TT3 may be attributed to the fragmentary or otherwise altered condition of the bone. It is conceivable that the concentration of grinding stones located in this part of the site served in game processing activities, such as the breaking of bones for marrow (Gilbert 1980:10-11), rather than, or in addition to, the processing of plants. Clues to differential processing are also evident from notations on bone condition. All 22 specimens identified as "charred," i.e. heavily burned, were recovered from the eastern portion of the site, and can probably be attributed to the proximity of the recorded hearth features. Eight bones described as "fire-affected," denoting a more moderate impact, were associated with TT3, while no evidence of burning or charring was noted for the remains from the house in TT4.

While a substantial range of faunal taxa were identified from 35WH7, mule deer, elk, and cottontails appear to have been dietary staples. Food supply appears to have been augmented by such mammals as jackrabbit, porcupine, beaver, woodrat, river otter, and chickaree. Some of these species may also have supplied materials for clothing, ornaments, and tools (Mack, Appendix C). Four elements assigned to fish, along with one element of blue grouse, suggest non-mammalian food sources. Non-food-related activities involving the local fauna may be indicated by fragments of turtle carapace, cut feline metapodials, and the presence of fur-bearing species (Mack, Appendix C). Seasonal indicators suggest that at least part of the site may have been occupied during late winter or early spring. Based on the vertebrate fauna, site 35WH7 is interpreted as "a seasonal camp with residence of some duration, not simply a hunting camp inhabited for a few days" (Mack, Appendix C).

Faunal Remains: Invertebrates

A total of 63.22 g of unworked shell was recovered from 35WH7. This includes small fragments found throughout the eastern and western portions of the site.

While much of the shell is too fragmentary to identify, several larger pieces could be assigned to the genus Margaritifera on the basis of size, shape, and presence/placement of such diagnostic features as pseudocardinal and lateral teeth (Lyman 1980). According to Riggs (1968), fresh-water mussels are common in the John Day River and probably in Pine Creek, and "small forms have been collected in small isolated pools in Robinson Canyon," an intermittent tributary to Pine Creek.

In the eastern portion of the site, mussel shell was collected in TT1C, D, F, and P from levels spanning 9.05-8.40 m (levels 3-6). None was noted for TT1A and associated Features 4/6. In the western portion of the site, most mussel shell was recovered from TT3. It appears to decrease eastward from there, with only traces collected from TT4B, 5B and 7B, and none at all observed in TT2 and 6. The uneven horizontal distribution of mussel shell, and its association with previously identified activity areas, suggest that small quantities of Margaritifera were, in fact, utilized by the human inhabitants of 35WH7.

Macrobotanical Analysis

Nine soil samples and three charcoal or "spot" samples were submitted to Dr. Nancy A. Stenholm of Botana Labs, Seattle, for analysis of potential macrobotanical remains. The explanatory power of this source of information is compromised by the small number of substantial samples curated from this site, the frequent uncertainty of context, and the lack of a systematic approach to collection in the field. The results do, however, strengthen earlier conclusions regarding intra-site spatial patterning and provide additional information on prehistoric activities at 35WH7.

Representative samples were selected for analysis from across the site, with emphasis on material representing cultural deposits and features. Proveniences and associations are presented in Table 14. As Stenholm's report is included in Appendix D, details on analysis and methodology will not be repeated here. The present discussion will, rather, focus on the results and their relevance to the present study.

Test Trench 1

Two soil samples were submitted from TT1, one from the top of cultural deposits of TT1F and a second from TT1A. The second of the two samples was associated with ash lens material from Feature 4, dated to between 580 ± 120 and 350 ± 90 B.P. (see Features).

Table 14. Macrobotanical Samples and Associations, 35WH7

No.	Type	Provenience	Associations
34/8	Soil	TT1F, 8x/13y	Top of cult. deposits, west wall
35/6	Soil	TT2C, 3x/17y	Middle of cult. deposits, 8.91m, L-2
36/2	Soil	TT4, -2x/21y	Middle of cult. deposits
37/3	Soil	TT3BC, 1.5x/24y	Middle of cult. deposits, west wall
38/7	Soil	TT3EF, 2.5x/22y	Middle of cult. deposits
39/4	Soil	TT4E, 0x/18.5y	Middle of cult. deposits, south wall
40/1	Soil	TT4DJ, 0x/19.5y	
41/11	Charc./ ash	TT2H, 7.30x/15.75y	Possible firepit, 9.15m, L-1
42/12	Charcoal	TT4C	8.40-8.40m, L-3
43/9	Soil	TT1A	Ash lens material, 8.88m, L-5
44/10	Charcoal	TT4J	8.50-8.30m, L-3
45/5	Soil	TT3F	8.18m, L-4*

* additional associations given as "Stratum 3 bottom," "Bones, etc.," and "for lab study." The significance of these comments is unclear.

The two samples from TT1 produced the highest concentration of plant remains recovered from the site as well as a high content of "occupational debris" (Stenholm, Appendix D), including carbon, red pigment, more than a hundred small flakes, burned and unburned bone (80% of the total bone weight recovered from all samples), and a small projectile point tip. The two samples from TT1 also contained eggshell and bivalve shell. Botanical remains included conifer wood charcoal (western juniper and an unidentfiable member of the pine family) as well as hardwoods, including hackberry, bitterbrush, and willow or poplar. Small amounts of sagebrush and mountain mahogany were also present. Seeds recovered from this area represent chenopodium, bedstraw, and hackberry. Other constituents of the samples were edible fruit or berry tissue, as well as grass and herb stem tissue.

Test Trench 2

TT2 is represented by a soil sample from Level 2 of unit TT2C and a charcoal and ash sample from Level 1 of TT2H. According to accompanying information, the latter sample was associated with a firepit, but this cannot be confirmed on the basis of other data. TT2 shows a low content of both botanical and cultural materials, compared to TT1. The soil flotation sample produced small amounts of juniper, bitterbrush, and hackberry, along with seven flakes and a minor amount of burned and unburned bone. Juniper, hackberry, and bitterbrush charcoal were also recovered from the spot sample, although without accompanying cultural debris. Carbon content from TT2 is extremely low (0.004%, in contrast to an average of 2.4% in TT1), indicating "an area somewhat peripheral to cultural activity with burned features" (Stenholm, Appendix D).

Test Trench 3

Three soil samples were submitted from TT3, including one from TT3B/C, one from TT3E/F, and one from TT3F. The first two were associated the middle of cultural deposits (no elevation was given), while the third was attributed to the middle of Level 4. This places this sample towards the base of, but still within, the cultural deposits, and 40 cm or more below the 1160 ± 90 B.P. radiocarbon date of adjacent TT3E.

The botanical array from TT3 compares favorably with that of TT1, although taxonomic diversity and carbon content are considerably lower (0.24%). Conifers are represented by juniper, while hardwoods include serviceberry, bitterbrush, and hackberry. A small amount of fruity edible tissue is present, as well as chenopodium, bedstraw, and hackberry seeds. Cultural debris includes 165 flakes, a small biface fragment, red and green pigment, and a small amount of burned and unburned mammal bone (13% of total bone weight from all samples). A total of 124 flakes was associated with the sample from TT3F alone, although the high flake count may be attributed to the greater volume of this sample (1,858 g as opposed to an overall mean of about 750 g).

Test Trench 4

Material submitted from TT4 included soil samples from TT4G/I, TT4E (both from the middle of the cultural deposits), and TT4D/J, as well as charcoal "spot samples" from TT4C (Level 3) and TT4J (Level 3). Both spot samples are probably from the area of the house floor described from this part of the site, although the precise provenience of the soil samples cannot be determined.

The botanical array from this area includes juniper, bitterbrush, and hackberry, closely resembling the plant assemblage from TT2. Cultural debris include lithics (N=61), red pigment, and burnt and unburnt mammal bone (5% of total bone weight). Carbon content is 0.24%, identical to that reported for TT3.

Discussion

The potential uses of plant materials recovered at 35WH7, as suggested by Stenholm, are summarized in Table 15. The high proportion of conifer and hardwoods (93% of assemblage weight) suggests the importance of fuel and/or tool manufacture at the site. Stenholm (Appendix D) notes the overall absence of bark, leaves, seeds, needles, and twigs, commenting with regard to juniper that

> even long-dead branches retain bark for considerable periods of time. It is possible that juniper wood lacking, or cleaned of bark and twigs may have been carried to the site for purposes other than firewood.

The former presence of small habitation structures or shelters has been inferred for TT4 and possibly TT1, and may account for the predominance of stripped wood in these locations. The finding of unfinished atlatl dart components in the cliff cache at 35WH7, as well as the large number of unifaces, and particularly, spokeshaves or notches, supports the inference that wood-working activities were conducted at the site.

Evidence of plant food is limited to small amounts of fruity plant tissue and a few seeds from TT1 and TT3. The significance of the three goosefoot achenes may, in addition, be limited due to the habitat preference of this species (Stenholm, Appendix D):

> All chenopodium seeds are fully charred but not popped. This could suggest preparation; however, it should be noted that some chenopodium species are weedy and prefer disturbed habitats such as campsites. Fresh seeds from intrusive plants blown into a hearth could be charred accidentally.

Table 15. Potential Uses of Plant Species Recovered at 35WH7

Material	Suggested Uses	Test Trench
Conifer wood		
Juniper	Fuel; manufactures, e.g. bows;	1,2,3,4
Pine family	Variety unidentifiable	1
Hardwood		
Sagebrush	Fuel	1
Willow	Flexible constructions; cordage,medicine (bark)	1
Poplar	Fuel; small constructions; hide preparation	1
Serviceberry	Manufactures and toolmaking	3
Mtn. mahogany	Fuel; toolmaking	1
Bitterbrush	Fuel	1,2,3,4
Hackberry	?	1,2,3,4
Fruity tissue	Food	1,3
Seeds		
Chenopodium	Food (but presence may be fortuitous)	1,3
Bedstraw	Cosmetic (but presence may be fortuitous)	1,3
Hackberry	Food (marginal)	1

While hackberry seeds are edible, hackberries are thought to represent a marginal food source because of their sparse flesh (Stenholm, Appendix D). Stenholm suggests that hackberries become more attractive after frost enhances both texture and flavor, and may therefore function as a "starvation food." Like goosefoot, the two fragmentary hackberry seeds recovered from 35WH7 could have become incorporated in the deposits by natural, rather than cultural means.

The questionable source of these seeds and the small sample limits their value in identifying seasonality of site use. According to Stenholm, however, bedstraw, chenopodium, and fruity tissue point to early to mid-summer occupation (Appendix D).

In general, the macrobotanical analysis supports conclusions regarding site function drawn on the basis of other sources of evidence. The low proportion of modern flora in the processed samples suggests that bioturbation is insignifiant in all but TT1 (Stenholm, Appendix D). In spite of the already-mentioned limitations of the soil samples, the taxal yield per unit of soil analyzed is characterized as "excellent." Intensity and diversity of use are highest in TT1, and qualitatively similar to TT3. The marginal position previously inferred for TT2 is corroborated by low returns from the macrobotanical samples. The restricted and probably short-term use of the TT4 structure is indicated by a limited array of plants, all of which may have served as fuel wood. The absence of other-plant material in this part of the site is consistent with the late winter/early spring use indicated by 1.5 year-old deer and elk.

Finally, according to Hancock Field Station Director Joseph Jones, all taxa recovered from the macrobotanical analysis are presently available within five miles, and most within less than a mile of the site (Jones 1993, personal communication). The sole "exotic" plant found at 35WH7 is Douglas-fir, represented by the long dart shafts recovered from the cliff cache. Douglas-fir is found between 5 and 10 miles from 35WH7 today (Jones, personal communication 1993). While a change in species distribution could be envisioned for the past two millennia, the most parsimonious explanation is that this material was simply brought to the site from its natural habitat.

Summary and Interpretation

Table 16 summarizes all artifacts recovered from 35WH7. In the foregoing discussions, a tripartite division of the site has been proposed on the basis of flake densities, the distribution of tool types, faunal remains, conjoinable artifact fragments, and features (Figure 37). Several inferences and hypotheses regarding the age and use of 35WH7 are possible based on the preceding discussions and will be presented according to the areal divisions advanced here.

The Middle Area: Test Trench 2

In order to compare the excavation units with regard to their relative percentages of artifact classes, a cumulative frequency graph was created for TT1 through 7. The unique position of TT2 (including TP1 and TP2) is evident (Figure 38). The high number of reworked projectile points, point fragments, and small bifaces recovered from this part of the site reflects the importance of equipment maintenance activities in TT2. This inference may be supported by comparatively low flake densities (see Lithic Debitage, his chapter).

Projectile points from this area are characterized by large neck widths suggesting their use with atlatl and dart, rather than bow and arrow, and supporting a greater age for this part of the site. Cryptocrystalline silicates are the predominant raw material, with only little obsidian present. The paucity of artifacts other than projectile

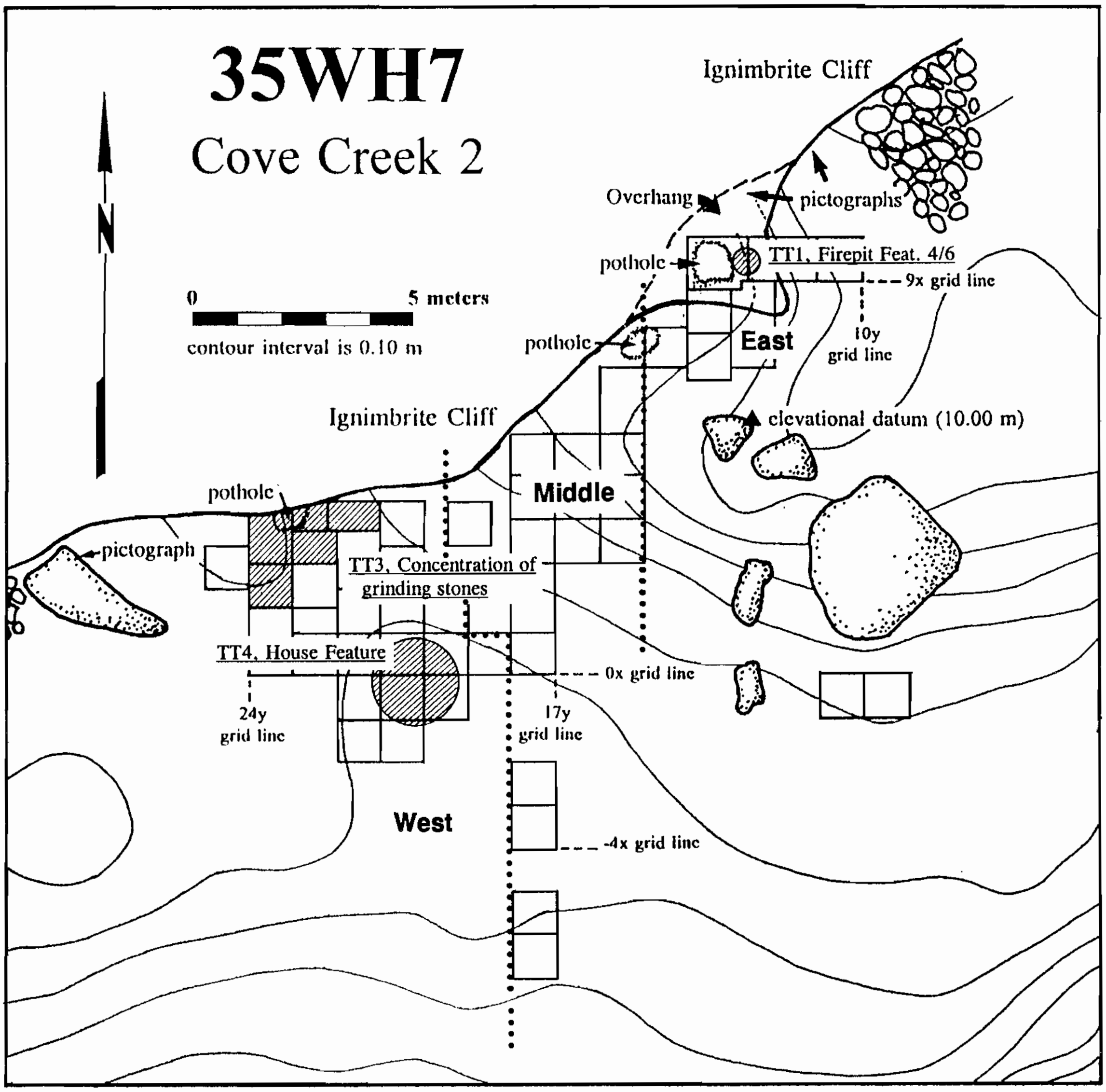


Figure 37. Major features and areas, 35WH7.

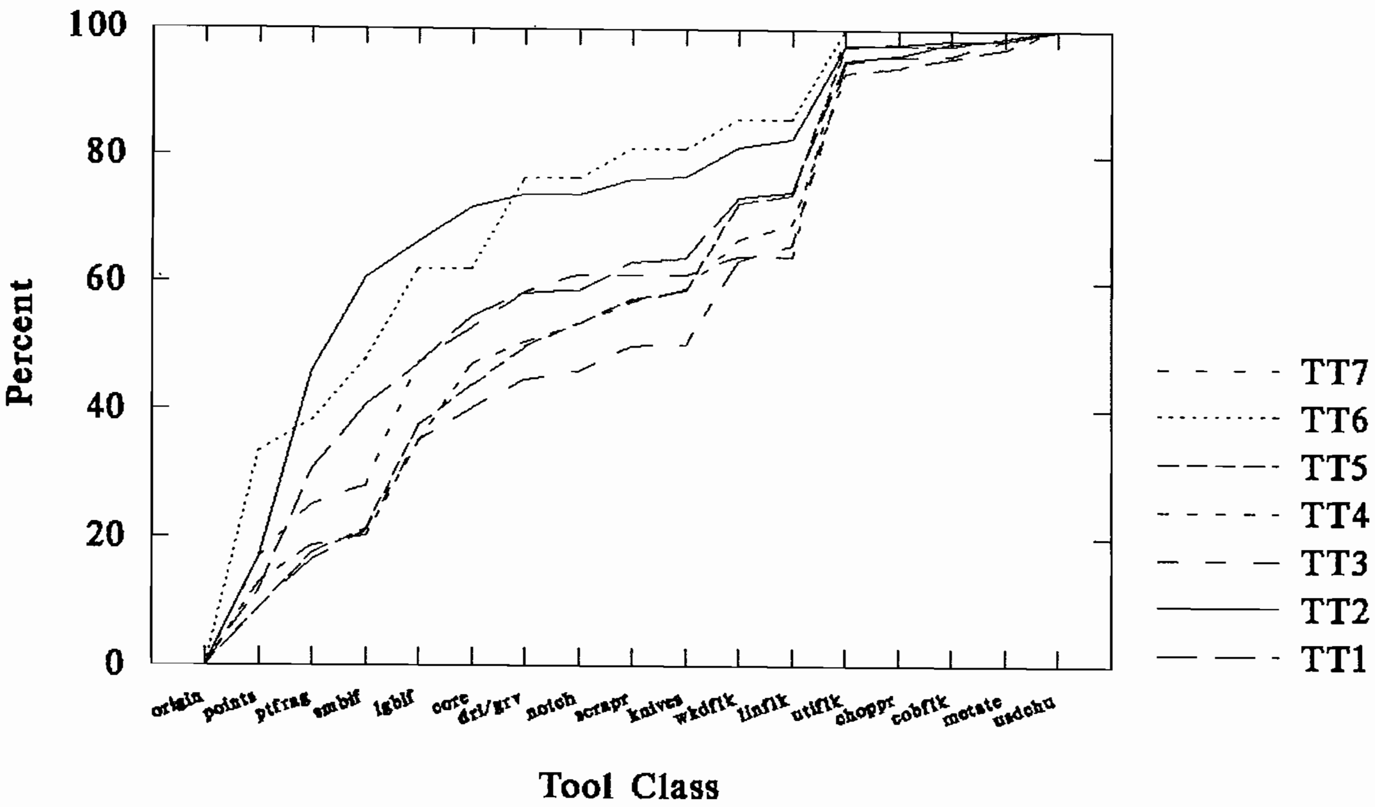


Figure 38. Cumulative frequency graphs, 35WH7. TT1 includes artifacts from TB1, PH1/2; TT2 includes TP1/2.

points, the shallow depth of the cultural deposits, the absence of such features as hearths or activity areas, as well as the near-absence of faunal materials imply a limited and short-term use of this part of the site. The question of site function will be returned to in Chapter 8.

The earliest radiocarbon dates associated with 35WH7, 2380 ± 100 B.P. and 2230 ± 90 B.P., were returned on atlatl dart shafts retrieved from a cache in the cliffs above the site. Admittedly, these have no counterpart from the deposits. The type of short-term use represented by TT2, however, and the types of projectile points observed, are compatible with both the age and activity indicated by the cache. It is likely that TT2 represents the earliest occupation of the site.

The Eastern Area: Test Trench 1

The cultural assemblage of TT1 is both rich and diverse. Features including up to three superposed hearths and a possible house floor imply a longer-term use of this area than that represented by TT2. Three radiocarbon dates (580 ± 120 B.P., 468 ± 80 B.P., and 350 ± 90 B.P.), while statistically similar, may indicate separate occupational episodes. This is supported by their vertically consistent relative positions, as well as the presence of at least two peaks in lithic debitage and artifacts, although the correlation of these peaks between adjacent units is rendered almost impossible due to inconsistent level breaks and vandalized deposits.

Artifacts relate to a wide range of activities, including lithic reduction and game processing. Numerous scrapers, worked and used flakes, and knives, may represent butchering as well as subsequent preparation of food and other animal products. Direct evidence is represented in the large amount of animal bone collected from this area. While mule deer remains and those of unidentifiable mammals predominate, the eastern portion of the site produced a variety of other taxa, including cottontail, jackrabbit, elk, bighorn sheep, porcupine, beaver, river otter, packrat, and other rodents. Small numbers of bird bone (owl and blue grouse), and a few specimens of fish and turtle were also recovered. It has been noted that some of the recovered faunal remains may be present as the result of natural, rather than cultural agents. Grinding stones are present, though less numerous than in TT3. Anvils are absent, as are pestles and other ground stone.

The large number of narrow-necked arrow points in this part of the site (as compared to TT2) is compatible with relatively late radiocarbon dates, as is the slightly higher proportion of PS as opposed to ES1 points. The presence of PS points as well as arrow points resembling the Desert Side-Notched type, common throughout the Great Basin, suggests an extension of extra-regional ties. This inference is supported by higher proportions of exotic toolstone (i.e. obsidian) and the presence of an olivella shell bead in this area. It is not possible to isolate stratigraphically the latest occupation reflected in the TT1 deposits. It is possible, however, that it represents a pattern of

Table 16. Inventory of Artifacts by Unit, 35WH7[1]

Tool Class	1A	1B	1C	1D	1F	1P	TB1	PH1	PH2	2A	2B	2C	2D	2E	2F	2G	2H	2K	2L	2N	2O	2Q	2R	2S	2T	TP1	TP2	3A	3B
Proj. pts. (class.)	11	-	9	6	7	12	5	-	2	4	-	1	3	-	7	1	6	-	-	1	-	13	5	-	2	-	-	6	4
Proj. pts. (frag.)	11	-	14	10	14	20	7	-	2	14	1	4	1	2	13	8	5	-	-	-	2	10	9	1	1	-	-	9	1
Biface, small	6	-	9	8	10	7	2	-	-	2	1	3	1	1	4	6	5	-	1	1	-	4	4	1	1	1	1	3	1
Biface, large	4	1	10	4	4	6	1	-	-	-	-	2	1	1	-	1	5	2	-	-	-	1	1	-	-	-	-	13	7
Cores	10	-	5	7	1	3	2	-	1	-	-	-	2	2	1	3	3	-	-	-	-	-	2	-	-	-	1	5	1
Drills/gravers	4	-	1	2	3	5	-	-	-	-	-	-	-	-	1	1	-	1	-	-	-	1	-	-	-	-	-	3	-
Notches	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Formed uniface	3	-	9	2	1	3	-	-	-	-	1	-	-	-	-	-	3	-	2	-	-	-	-	-	-	-	-	-	4
Knives	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Worked flakes	7	-	7	7	6	7	6	-	1	-	-	2	-	-	1	1	3	1	1	-	-	-	-	-	1	1	-	7	7
Linear flaked tool	1	-	1	1	1	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-
Utilized flake	16	-	15	8	17	20	9	-	1	2	8	5	1	-	1	5	3	-	-	1	-	-	2	-	1	4	4	14	11
Choppers	1	-	1	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	2	-
Cobble flake tools	3	-	-	2	1	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Metates	-	-	2	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	1
Anvils	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Pestles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Used chunks	-	-	2	-	-	1	-	-	-	2	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	1	-
Girdled stone	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Worked bone	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Shell bead	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Drilled shale	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	80	1	88	60	68	85	33	-	7	25	11	17	9	8	29	27	35	4	4	3	2	31	23	2	6	6	7	71	38

Table 16. (Continued)

Tool Class	3C	3D	3E	3F	3G	3H	3P	PH3	4A	4B	4C	4D	4E	4F	4G	4H	4I	4J	5A	5B	5C	6A	6B	7B	7A	PH	Oth	Total
Proj. pts. (class.)	3	3	6	4	5	3	3	-	6	3	4	3	-	1	2	5	2	-	3	3	1	1	2	5	1	1	1	176
Proj. pts. (frag.)	-	2	10	2	-	1	7	-	-	2	2	1	2	2	1	2	-	-	5	-	2	-	1	2	1	6	3	213
Biface, small	2	2	5	1	3	-	2	-	2	-	-	-	-	-	-	1	-	-	2	1	-	2	-	1	-	2	3	112
Biface, large	13	4	7	2	5	2	3	-	9	6	6	2	-	3	1	-	1	2	3	4	6	-	3	7	-	-	6	159
Cores	6	3	-	1	3	1	1	-	1	5	3	3	-	1	5	1	6	-	2	1	2	-	-	6	-	5	1	106
Drills/gravers	3	1	5	-	4	-	2	-	1	1	-	2	1	-	1	-	-	1	2	-	3	2	1	2	-	-	3	57
Notches	-	-	1	1	2	-	-	-	-	1	1	1	1	-	1	1	-	-	1	2	-	-	-	1	-	-	1	18
Formed uniface	3	1	1	1	3	2	1	-	1	-	1	2	1	1	-	1	-	-	1	1	1	-	-	1	-	-	4	55
Knives	1	-	-	-	-	-	-	-	-	1	-	1	-	-	1	-	-	1	1	-	-	-	-	-	-	-	-	10
Worked flakes	5	7	7	3	6	3	8	-	2	3	2	2	1	1	1	2	1	1	4	5	2	1	-	1	-	-	6	140
Linear flaked tool	1	1	2	-	-	1	2	-	-	2	-	-	1	1	-	1	-	-	-	1	-	-	-	-	-	-	1	23
Utilized flake	12	11	18	14	10	5	21	-	4	7	11	12	1	3	2	5	1	3	6	7	6	2	1	13	-	6	11	340
Choppers	-	1	-	-	-	-	1	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	11
Cobble flake tools	-	-	1	-	-	-	-	-	1	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	1	3	16
Metates	-	1	-	1	-	1	2	-	-	-	-	1	-	-	-	1	-	-	-	-	1	-	-	-	-	-	1	19
Anvils	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	4
Pestles	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Used chunks	1	1	1	-	1	-	1	-	1	1	2	-	-	-	-	1	1	-	-	-	1	-	-	-	-	1	3	24
Girdled stone	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Worked bone	-	-	-	-	-	1	-	-	-	-	3	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	8
Shell bead	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Drilled shale	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Other	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Total	51	39	66	30	42	21	55	-	28	33	36	30	8	14	16	23	12	9	30	25	25	8	8	40	2	22	47	1,500

1. excluding lithic debitage

usage resembling that of the Historic period, when the area was shared both by Tenino from the north and Paiute from the south.

The Western Area: Test Trench 4

A radiocarbon date of 470 ± 90 B.P. from a possible house feature in TT4 indicates that occupation of this portion of the site was, at least in part, contemporary with that of TT1. Its age is effectively identical to the middle date of 468 ± 80 B.P. from TT1A. Fieldnotes place the rim of this house feature towards of the bottom of the densest cultural deposits in this area. The dated feature may therefore constitute one of the earlier occupations in this part of the site. The absence of substantially earlier use is supported by the high ratio of narrow-necked to broad-necked points in TT4.

Lithic reduction in TT4 is represented by high flake densities, large unfinished bifaces, and cores. Projectile points make up a large proportion of the assemblage (13%), although they are present in lower frequencies than in TT1, 2, or 3. Few unidentifiable projectile point fragments or small bifaces were recovered, though the implications of this circumstance are not clear at this time. The presence of large amounts of animal bone indicates that, as in TT1, game processing was an important activity, although the focus was almost exclusively on artiodactyls in this part of the site. Notches, one third of which were found in this area, are added to the familiar complement of knives, scrapers, worked and utilized flakes. A few grinding stones were present in the house feature, but as in TT1, other varieties of ground stone were absent.

Juvenile representatives among both elk and mule deer suggest use of the TT4 house feature between late winter and early spring. This would represent a departure from the historic pattern of use, since John Day Tenino historically set out from the Columbia after the spring festival in early April and Northern Paiute abandoned winter villages to the south in early May (see Chapter 3). While seasonal indicators are absent for this time period in TT1, the similarity of dates and assemblages in the two areas may indicate a similar season of use at this time. However, artifacts cited for TT1 as indicators of very late occupation or of extra-regional ties are either absent or less frequent in TT4. This scenario would suggest that a shift to the ethnographic pattern of use occurred within the last 500 years, postdating the house feature in TT4, but prior to the most recent occupation in TT1.

The Western Area: Test Trench 3

TT3 remains the most problematic portion of 35WH7. The area consistently exhibits the highest flake densities observed at the site (with the exception of TT5C which appears to reflect a single reduction event). Animal bone, on the other hand, is much less abundant than in either TT1 or TT4, and rarely identifiable to below the taxonomic level of Order.

The artifact assemblage from this part of the site resembles in large part that already discussed for TT1. TT3 includes, in particular, a large number of large bifaces, which make up 14% of its entire artifact complement and include more than a third of the large bifaces collected from 35WH7. Cores and projectile points are common, while unidentifiable point fragments and small bifaces, as in TT4, make up only a small part of the assemblage. Striking patterns in projectile point type distribution are not apparent, except for somewhat higher proportions of SN5A and ES1. Projectile point neck widths, with approximately equal proportions of arrow points and dart points, are consistent with TT1. Obsidian makes up a somewhat higher proportion of projectile points than would be expected, but is not disproportionately represented among the flakes.

Worked and used flakes are particularly abundant. Other processing tools include a large number of drills, perforators, and gravers, notches, formed unifaces, linear flake tools, but only one cobble flake tool and one object classified as a knife (though knives are, on the whole, a small artifact class).

The most obvious difference in artifacts represented at TT3 relates to the presence of ground stone. This part of the site produced more than half of the grinding stones at 35WH7 (most of these from units adjacent to the cliff), as well as both pestles, all three block anvils, and a girdled stone which may be a net weight.

The evidence presented above suggests the use of TT3 as a work area for manufacture and processing. The general resemblance of the artifact assemblage of TT3 to the assemblages of TT1 and TT4 may indicate that a house depression or living floor was once also present in this part of the site, although there is no unequivocal evidence for discrete house *features* and no hearths or floors were recorded. Excavation of an occupation floor through the charcoal lens radiocarbon-dated to 1160 ± 90 B.P. in TT3E would, however, explain the stratigraphic position of this lens *above* the main peak in cultural materials. It would also lend support to Stenholm's inference of the temporal overlap of TT3 and TT4, a conclusion based on the identical carbon content (0.24%) of the two areas (Stenholm, Appendix D).

Associated Areas: Test Trenches 5, 6 and 7

TT5 and TT7 are spatially and functionally best grouped with the Western Area. The sample of temporally diagnostic projectile points from the four units which make up TT5 and TT7 is small (five specimens from TT5 and three from TT7) and therefore inconclusive. It can be noted, however, that the late types which are so common in the eastern portion of the site (SN6, PS, CS6) are absent here. The small assemblage from TT6 limits adequate comparisons to the rest of the site. Projectile points include a single ES1 and two ESI3, reflecting the use of both arrow and dart points in this peripherally located area and an age which is, on the whole, consistent with the rest of the site.

CHAPTER 6

EXCAVATIONS IN THE PINE CREEK DRAINAGE BASIN: 35WH14

Background

The Pine Creek Village Site, 35WH14, was recorded in 1980 by Terry Mazany and Frank Jongenburger, presumably during their fieldwork for OMSI at Indian Canyon 2 (35WH13) to the west (Mazany 1980). According to the official site record form, the site is situated 8.5 miles east of Clarno along Highway 218 on the north side of the road. Its elevation lies at approximately 2200 feet (671 m). The site extends from 10 to 50 m north of the road on a gentle alluvial slope, facing south towards Pine Creek, about 200 m away (Figure 39). Vegetation is listed as juniper, sagebrush, mustard and cheatgrass.

On the same form, the site is said to consist of "at least nine house pit depressions with a sparse flake scatter of five flakes per square meter over the site." The sketch map accompanying the form does, in fact, show nine housepits. In a more formal, contoured map accompanying the field records from 35WH14, however, only six definite housepits and one possible housepit are identified. The significance of this discrepancy is not clear. The original sketch map also shows an area identified as "potted" to the southeast of the house depressions,

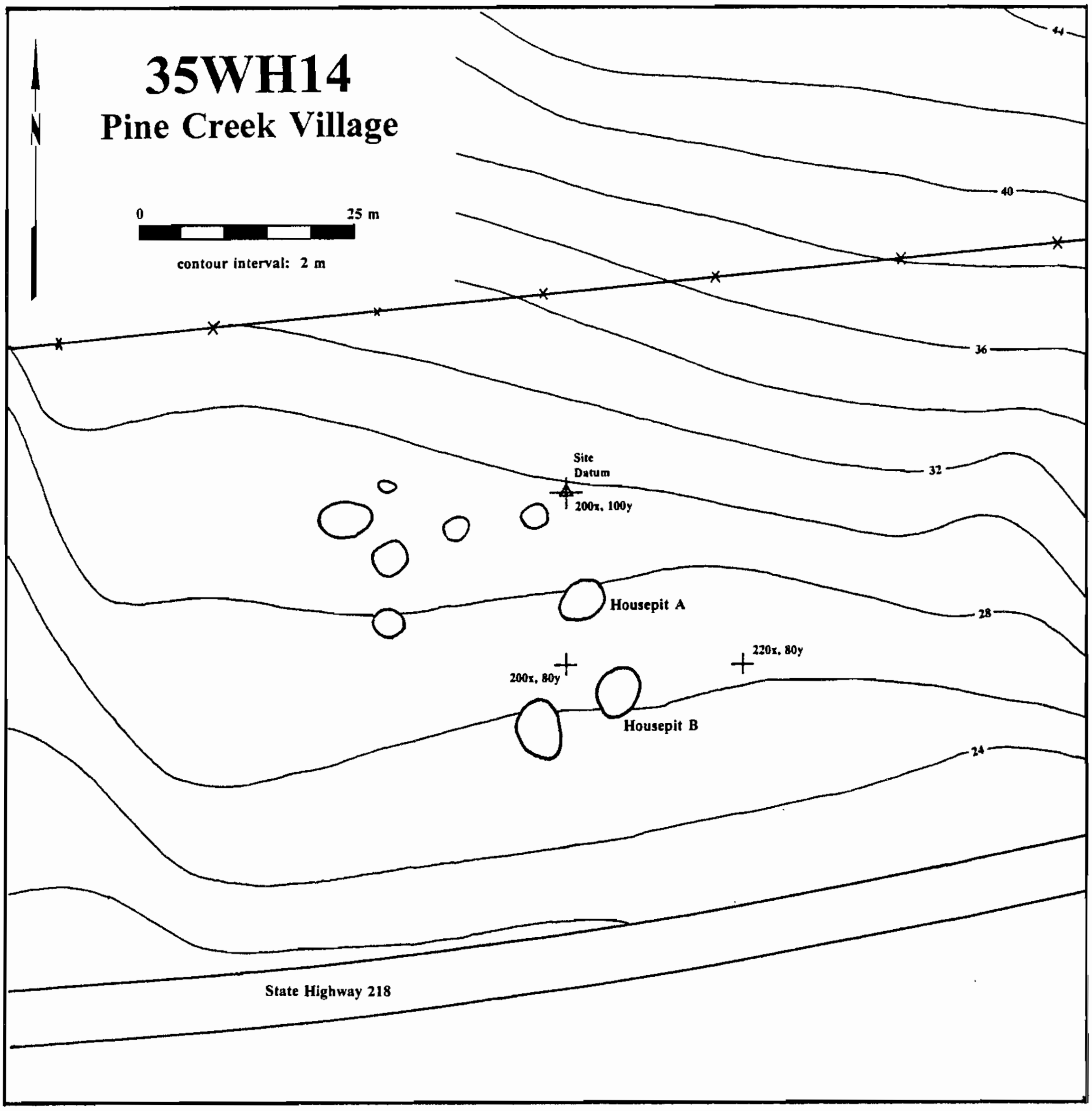


Figure 39. Site plan, 35WH14.

as well as an area of "midden" at the extreme southeastern edge of the the site, adjacent to an unnamed intermittent drainage. Area of occupation is given as 40 m north-south and 70 m east-west. Based on the site record form, the site appeared to be in good condition: "Midden is eroding out, while the housepits appear to be well covered by a depositional history. Minimal pothunting in areas remote from the housepits."

In their observations on the site, Mazany and Jongenburger recommended excavation, and commented that 35WH14 is "one of the very few housepit villages known in the Pine Creek drainage and will add needed information to the local settlement pattern." In 1980, fieldwork at 35WH13 was terminated. In late June of 1981, excavations were initiated at 35WH14 and continued through the beginning of August of that year. The results of these excavations are discussed in this chapter.

General Field Methodology

Fieldwork at site 35WH14 took place over the course of six weeks and was directed by Terry Mazany and Janet Riddle. A grid system with axes trending true north-south (y-axis) and east-west (x-axis) was established across the site, with an arbitrary datum located at 200x/100y and an arbitrary elevation of 100 m. Two housepits were excavated, centered, respectively, at approximately 203x/86y and 206x/78y. No rationale was given for the selection of these particular features. Excavations were conducted within 1 m x 1 m squares and 10 cm arbitary levels, starting with Level 1 in each unit, with depths ranging to a maximum of 1.5 m. Approximately 99.40 m^3 of deposits were removed.

Squares were generally referred to by the coordinates of their southwest corners. In order to simplify the present discussion, and in light of the large number of excavated squares, the area which includes the northern, or upper, housepit and its surrounding units, is referred to here as "Block A," and that which comprises the southern, or lower, housepit, and its surrounding units, is referred to as "Block B." The designations "House A" and "House B" are only used when discussing the discrete habitation features. Excavated units have been assigned consecutive numbers, thus Block A comprises units A1 through A50, and Block B consists of B1 through B38 (Figure 40; Table 17). Although they are mapped on initial site plans and have therefore been numbered, no material is recorded for units A1, A10, and A38 and they do not appear to have been excavated. Based on the size of lithic debitage collected, deposits were apparently sifted through 1/4 inch screen mesh or larger. Field notebooks were kept by Mazany and Riddle, and Excavation Unit Level Forms were filled out by the pit crews. Profiles were drawn regularly, though labeling varies between units and is therefore difficult to correlate and standardize. Features were sometimes described and drawn.

Emphasis in the field was placed on exposing the houses, in particular, their lowest floors. As a result, intermediate floors were

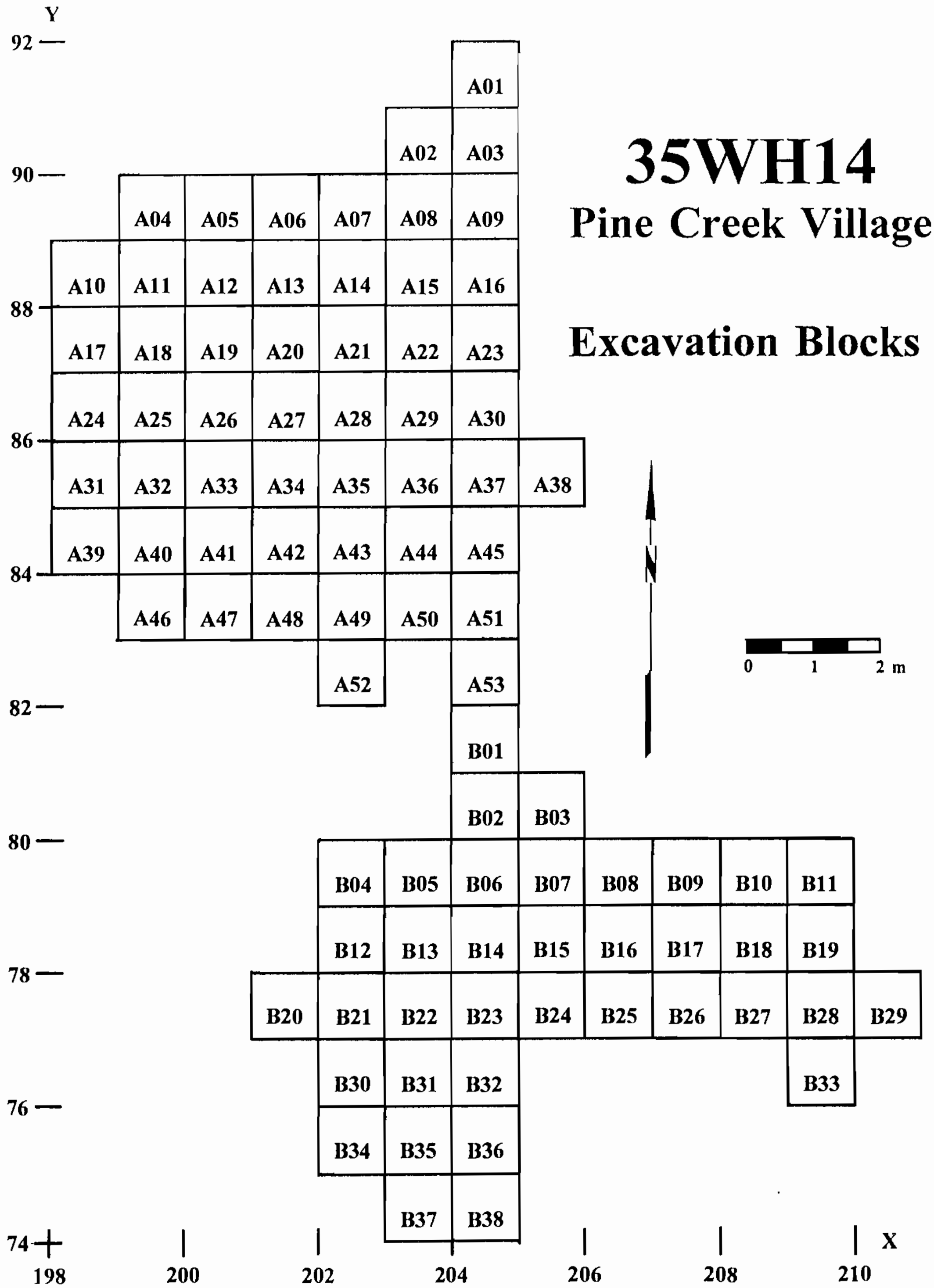


Figure 40. Excavation plan, 35WH14.

Table 17. Summary of Excavation Units, 35WH14[1]

Exc. Unit	X Coord. (SW Cor.)	Y Coord. (SW Cor.)	Top Level	Surface Elevation	Lowest Level	Bottom Elevation	Volume
A01	204	91	1	98.30-98.20	0		0.00
A02	203	90	1	98.30-98.20	6	97.80-97.70	0.60
A03	204	90	1	98.30-98.20	8	97.60-97.50	0.80
A04	199	89	1	98.30-98.20	6	97.80-97.70	0.60
A05	200	89	1	98.30-98.20	8	97.60-97.50	0.80
A06	201	89	1	98.00-97.90	10	97.10-97.00	1.00
A07	202	89	1	98.17-98.10	11	97.20-97.10	1.10
A08	203	89	1	98.20-98.10	11	97.20-97.10	1.10
A09	204	89	1	98.20-98.10	8	97.50-97.40	0.80
A10	198	88	0	97.50-97.40	0		0.00
A11	199	88	1	98.10-98.00	8	97.40-97.30	0.80
A12	200	88	1	98.10-98.00	12	97.00-96.90	1.20
A13	201	88	1	98.10-98.00	14	96.80-96.50	1.40
A14	202	88	1	98.10-98.00	14	96.80-96.70	1.40
A15	203	88	1	98.10-98.00	12	97.00-96.90	1.20
A16	204	88	1	98.10-98.00	9	97.30-97.20	0.90
A17	198	87	1	98.10-98.00	7	97.50-97.40	0.70
A18	199	87	1	98.00-97.90	13	96.80-96.70	1.30
A19	200	87	1	98.00-97.90	13	96.80-96.70	1.30
A20	201	87	1	97.90-97.80	12	96.80-96.70	1.20
A21	202	87	1	97.90-97.80	12	96.80-96.70	1.20
A22	203	87	1	97.90-97.80	12	96.80-96.70	1.20
A23	204	87	1	97.90-97.80	7	97.30-97.20	0.70
A24	198	86	1	98.00-97.90	9	97.20-97.10	0.90
A25	199	86	1	98.00-97.90	13	96.80-96.70	1.30
A26	200	86	1	97.82-97.80	13	96.70-96.60	1.30
A27	201	86	1	97.90-97.80	13	96.70-96.50	1.30
A28	202	86	1	97.90-97.80	13	96.70-96.60	1.30
A29	203	86	1	97.80-97.70	12	96.70-96.60	1.20
A30	204	86	1	97.76-97.70	12	96.70-96.60	1.20
A31	198	85	1	97.90-97.80	7	96.30-96.20	0.70
A32	199	85	1	97.90-97.80	12	96.80-96.70	1.20
A33	200	85	1	97.80-97.70	11	96.80-96.70	1.10
A34	201	85	1	97.82-97.80	13	96.70-96.60	1.30
A35	202	85	1	97.70-97.60	11	96.70-96.60	1.10
A36	203	85	1	97.70-97.60	10	96.80-96.70	1.00
A37	204	85	1	97.80-97.70	11	96.80-96.70	1.10
A38	205	85	1	?	1	?	0.10
A39	198	84	1	97.80-97.70	8	97.10-97.00	0.80
A40	199	84	1	97.80-97.70	11	96.80-96.70	1.10
A41	200	84	1	97.80-97.70	12	96.70-96.60	1.20
A42	201	84	1	97.70-97.60	11	96.70-96.60	1.10
A43	202	84	1	97.70-97.60	11	96.70-96.60	1.10
A44	203	84	1	97.60-97.50	9	96.80-96.70	0.90
A45	204	84	1	97.53-97.50	10	96.70-96.60	1.00
A46	199	83	1	97.70-97.60	10	96.80-96.70	1.00
A47	200	83	1	97.70-97.60	10	96.80-96.70	1.00
A48	201	83	1	97.60-97.50	9	96.80-96.70	0.90
A49	202	83	1	97.60-97.50	10	96.70-96.60	1.00
A50	203	83	1	97.48-97.40	7	96.90-96.80	0.70
A51	204	83	1	97.50-97.40	12	96.40-96.30	1.20
A52	202	82	1	97.50-97.40	7	96.90-96.80	0.70
A53	204	82	1	97.30-97.20	11	96.30-96.20	1.10
B01	204	81	1	97.20-97.10	12	96.10-96.00	1.20
B02	204	80	1	97.10-97.00	12	96.00-95.90	1.20
B03	205	80	1	97.10-97.00	12	96.00-95.90	1.20
B04	202	79	1	97.10-97.00	9	96.30-96.20	0.90
B05	203	79	1	97.00-96.90	13	95.80-95.70	1.30
B06	204	79	1	97.00-96.90	14	95.70-95.60	1.40
B07	205	79	1	97.00-96.90	15	95.60.95.50	1.50
B08	206	79	1	96.92-96.80	14	95.60-95.40	1.40

Table 17. (Continued)

Exc. Unit	X Coord. (SW Cor.)	Y Coord. (SW Cor.)	Top Level	Surface Elevation	Lowest Level	Bottom Elevation	Volume
B09	207	79	1	96.90-96.80	14	95.60-95.50	1.40
B10	208	79	1	96.90-96.80	13	95.70-95.60	1.30
B11	209	79	1	96.90-96.80	10	96.00-95.90	1.00
B12	202	78	1	97.00-96.90	11	96.00-95.90	1.10
B13	203	78	1	96.90-96.80	13	95.70-95.60	1.30
B14	204	78	1	96.90-96.80	15	95.50-95.40	1.50
B15	205	78	1	96.90-96.80	15	95.50-95.40	1.50
B16	206	78	1	96.90-96.80	15	95.50-95.40	1.50
B17	207	78	1	96.90-96.80	14	95.60-95.50	1.40
B18	208	78	1	96.90-96.80	13	95.70-95.60	1.30
B19	209	78	1	96.90-96.80	11	95.90-95.80	1.10
B20	201	77	1	96.90-96.80	11	95.90-95.80	1.10
B21	202	77	1	96.80-96.70	10	95.90-95.80	1.00
B22	203	77	1	96.80-96.70	13	95.60-95.50	1.30
B23	204	77	1	96.80-96.70	14	95.50-95.40	1.40
B24	205	77	1	96.80-96.70	14	95.50-95.40	1.40
B25	206	77	1	96.80-96.70	14	95.50-95.40	1.40
B26	207	77	1	96.80-96.70	13	95.60-95.50	1.30
B27	208	77	1	96.90-96.80	14	95.60-95.50	1.40
B28	209	77	1	96.90-96.80	15	95.50-95.40	1.50
B29	210	77	1	96.90-96.80	13	95.70-95.60	1.30
B30	202	76	1	96.70-96.60	8	96.00-95.90	0.80
B31	203	76	1	96.70-96.60	12	95.60-95.50	1.20
B32	204	76	1	96.80-96.70	14	95.50-95.40	1.40
B33	209	76	1	96.80-96.70	12	95.70-95.60	1.20
B34	202	75	1	96.70-96.60	8	96.00-95.90	0.80
B35	203	75	1	96.70-96.60	11	95.70-95.60	1.10
B36	204	75	1	96.70-96.60	12	95.60-95.50	1.20
B37	203	74	1	96.60-96.50	8	95.90-95.80	0.80
B38	204	74	1	96.60-96.50	11	95.60-95.50	1.10

1. all elevations in meters, volumes in cubic meters

not isolated as discrete units and information on their location is only anecdotally recorded.

The Present Analysis

As with 35WH7, all artifacts recovered from 35WH14 have been examined, reclassified, measured, and analyzed by the present investigator. Some items originally classified as tools by OMSI personnel are no longer considered to be tools and have been excluded from consideration; in turn, more than 1100 formed/utilized tools encompassing most classes represented at the site were recovered from the lithic debris. These were catalogued and analyzed with the rest of the collection.

No field catalog per se exists for the site, although the provenience of most specimens is noted on unit level forms. Instead, provenience information appears to have been transferred to Artifact Recording Sheets (one sheet per artifact). Numerous discrepancies between units, levels, and elevations given on the artifact recording sheets were corrected by reference to all available documentation, but some could not be resolved. The remaining inconsistencies are flagged with an asterisk in the tabulated artifact information (see Appendices), though they are generally minor enough that the artifacts have not been entirely excluded from consideration.

No reports were prepared by OMSI personnel for 35WH14. A single short paper, presumably written by one of the participating students, describes the use of computer analysis in the interpretation of the site (Sheldon 1981). There are thus few avenues available for the resolution of unanswered questions, and more opportunities for misreading the "facts." As with 35WH7, however, it is felt that these difficulties are not sufficient to compromise the validity of the final conclusions.

Stratigraphy

Introduction

While numerous stratigraphic profiles were produced in the field at 35WH14, there was no attempt to standardize these descriptions across the site. Thus sketches from adjacent pits are often irreconcilable with regard to stratigraphic labels and boundaries. Artifacts were collected by arbitrary 10 cm levels, without reference to stratigraphic context, and no systematic sediment descriptions were recorded by the excavators. Additionally, although project leaders noted the presence of multiple occupation floors in both housepits, no attempt was made to define and differentiate cultural strata. Planviews are lacking except for a few discrete features, precluding the reconstruction of all but the lowest floors.

Because of these limitations, it has been difficult and often impossible to reconstruct the depositional history of this site in anything other than gross generalizations. Artifact proveniences are therefore initially presented with reference to the arbitrary 10 cm levels rather than cultural or natural strata. In the final discussion, several superposed cultural components are defined for each excavation block, based on a combination of feature locations and high frequencies in cultural materials.

In the following summary, the discussions of natural and cultural stratigraphy are integrated to clarify relationships as much as possible. More specific inferences regarding the site's depositional history are not possible without further, controlled excavations.

Block A

The sediments of Block A are characterized by three major strata. They consist of 5-15 cm of surface sod (A), underlain by multiple bands described as grey and brown clays, silts, and clay silts (B), all of which are culture-bearing deposits. These overlie a basal stratum of sterile, yellow clay (C), into which the lowest house floor has been excavated. At the southern edge of Block A, the recognition of the yellow clay was complicated by the presence of ash, which was said to have "been deposited so that it extends across the housepit in a NW-SE band.... The ash-sterile yellow mixture is soft and makes the housepit walls more difficult to distinguish" (Riddle, fieldnotes, July 19, 1981).

The uppermost occupation appears to have been either directly above or directly below a discontinuous and thin light grey clay or silt-clay layer which underlies the surface sod (Figures 41-43). It is

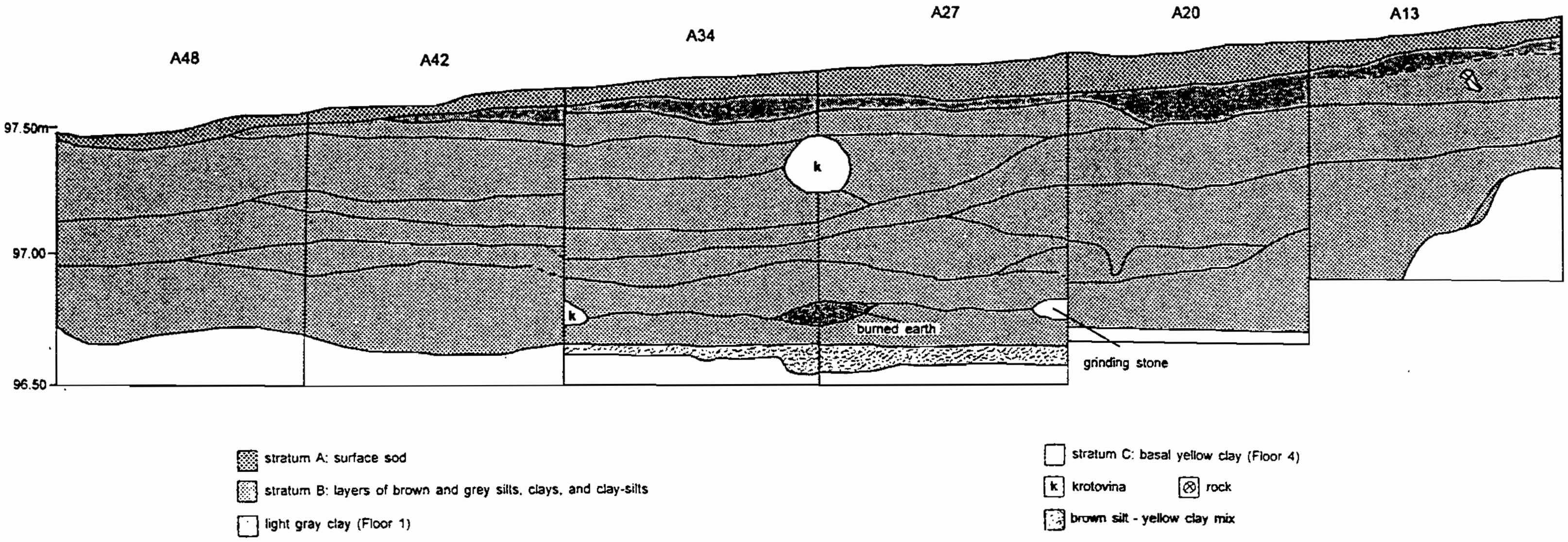


Figure 41. West wall profile, units A13-A48.

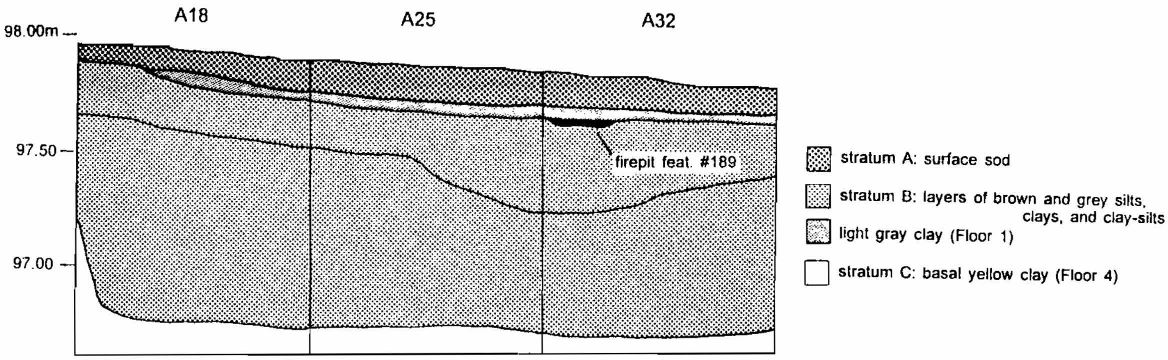


Figure 42. East wall profile, units A18, A25, and A32.

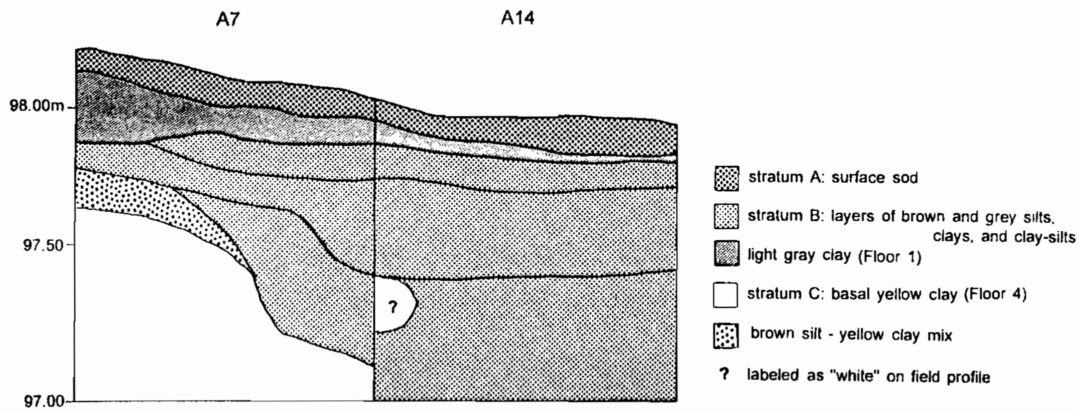


Figure 43. East wall profile, units A7 and A14.

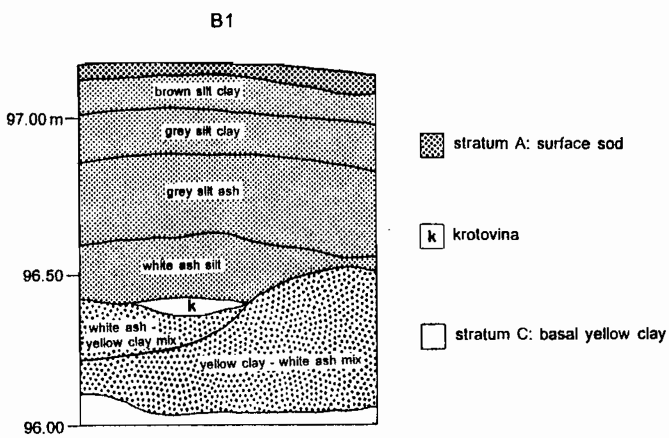


Figure 44. North wall profile, unit B1.

here referred to as a "floor," namely Floor 1, although multiple occupational events may be represented. Floor 1 was observed 20 to 30 cm below the surface in the northern portion of Block A, sloping south to Level 4 in unit A51 (30-40 cm below surface). It is described as a "dark greasy soil." The occupation is identified as "brief," presumably reflecting its shallow depth.

Several bands of grey and brown clays, silt and clay silts underlie Floor 1, as mentioned above. The west wall profile illustrated in Figure 41 presents a cross-section of Block A, extending from A13 in the north to A48 in the south. In Unit A34, in the center of the excavation block, nine strata are distinguished between the uppermost light grey clay and the sterile yellow basal clay, while less stratigraphic differentiation was recorded towards the edges of the house depression.

Field observations place a second occupation (Floor 2) "at the lower terminus of the grey coarse pebble stratum." This floor is dated to 890 ± 20 B.P. by Feature 3, a slab-lined firepit located in units A21, 22, 28 and 29, in levels 6 or 7, depending on the unit. A feature record form notes that the firepit was dug down into a grey clay surface, and subsequently covered by fluvial deposits. The presence of a discrete floor is supported by the obsevation of hard, compacted soil and flat-lying artifacts in units A13 (Feature 127) and A14 (Feature 130).

An underlying occupation floor (Floor 3) was apparently represented by a charcoal scatter (Feature 5), recorded in Level 10 of unit A28 and radiocarbon-dated at 1500 ± 25 B.P. The floor appears to have been relatively close to, though 10-20 cm higher than the feature labeled as "burned brown cultural" in unit A27 (Figure 41). A metate is marked on the profile at approximately the same elevation.

Considerable confusion was created by the attribution of the Feature 5 charcoal scatter in fieldnotes to the "pithouse floor," and it only became apparent during the present analysis that Feature 5, in fact, postdates the basal occupation floor (Floor 4), which is excavated into the matrix identified as "sterile yellow clay." The yellow sterile clay is located between about 40 and 60 cm from the surface at the rim of the housepit. The center of the floor lies about 1-1.2 m from the ground surface.

Block B

Block B exhibits the same broad stratigraphic divisions as Block A, namely about 10 cm of surface sod (A), underlain by several bands of grey and brown silts and clays (no strata are identified as clay-silts in this block) (B) and the basal "sterile yellow clay" (C). The ash referred to above is shown on the north wall profile of unit B1 (Figure 44), where it is intermixed with grey silt overlying the yellow clay. It is not noted for units to the south.

As in Block A, the upper occupation of Block B (here designated as Floor 1) is referred to as a "charcoal layer" (Mazany, fieldnotes, June 24, 1981) and is characterized by "very dark, greasy, soil" (Riddle, fieldnotes, June 23, 1981), 10-20 cm below the surface. Again, the profiles show this occupation to be associated with a thin band of grey clay (Figures 45-47). The upper occupation (identified here as Floor 1) is described as 1 cm deep in unit B26, and is said to be underlain by 10 cm of "rich brown fill" (Mazany fieldnotes, June 23, 1981). It was observed, in addition, that "the top of the layer is clearly defined but the bottom is not" (Riddle, fieldnotes, June 23, 1981).

A south wall profile across the center of Block B (Figure 47) indicates the presence of seven alternating silt and clay layers between the clay lens (Floor 1) discussed above, and the basal yellow clay. Field observations reported occupation floors at 40 cm and 70 cm below the surface. The lower of the two (Floor 2) corresponds to a brown silt. This silt is clearly recognizable on the north wall profile already referred to (Figure 46), and suggests a saucer-shaped depression which begins 5 cm below the surface at its western margin and at its lowest point to perhaps only 30 cm above the yellow basal clay. The identification of a second floor at about 40 cm is rejected for reasons which will be discussed below (see Features).

A dramatic increase in cultural materials is associated with the lowest occupation (Floor 3), which coincides with the surface of the yellow clay, a mottled surface seen by the excavators "as the result of butchering fires, etc." (Riddle, fieldnotes, July 7, 1981). Floor 3 is also characterized by pit features interpreted in the field as storage pits and post molds. Approximately 20 cm of dark brown silt, presumably cultural fill, overlies this floor and either approaches or contacts the

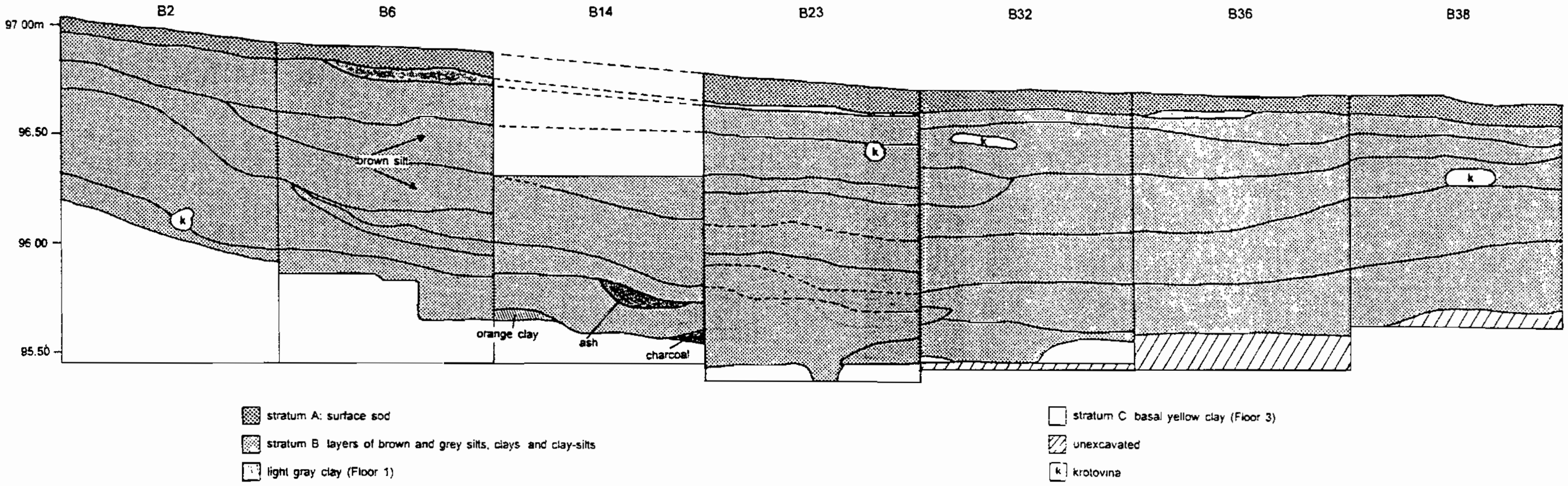


Figure 45. East wall profile, units B2-B38.

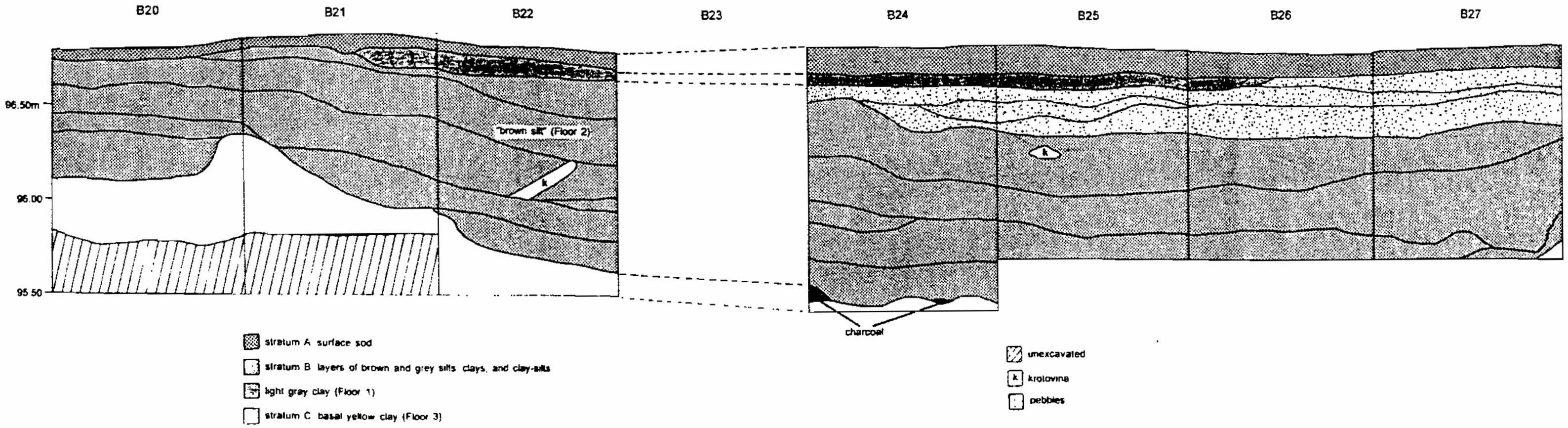


Figure 46. North wall profile, units B20-B27.

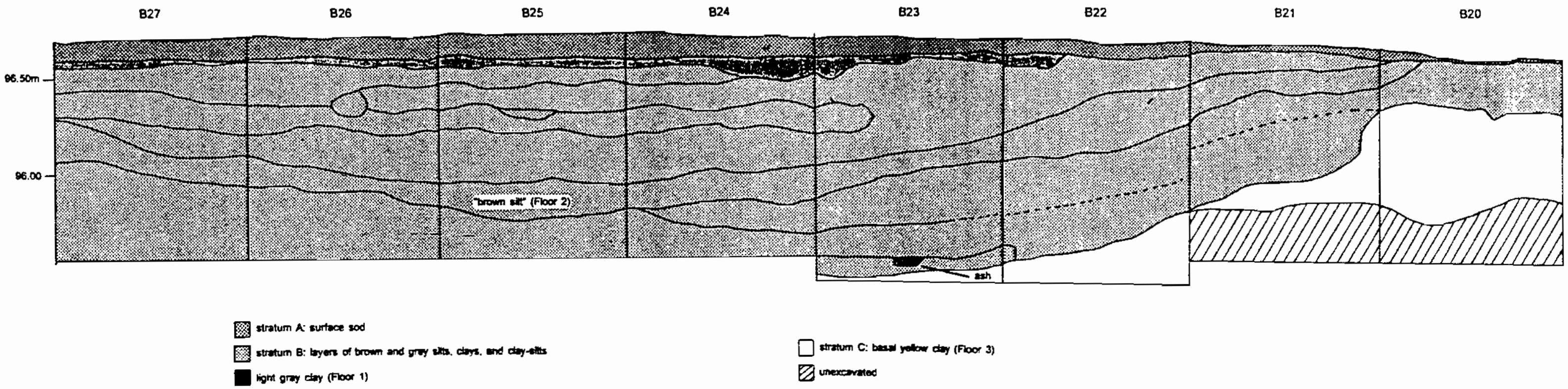


Figure 47. South wall profile, units B20-B27.

"brown silt" of the intermediate floor in the center of the block. Towards the edges of the block, the two floors are separated by up to half a meter of grey silts. The yellow clay was reached at a depth of approximately 1.3 m in the center of the pithouse. Towards its margins, the identification of the yellow clay stratum is obscured by secondary deposition of backfill from the excavation of the housepit.

Features

Features were treated rather inconsistently in the excavation of 35WH14. Eight features were numbered and drawn and recorded in some detail; eleven additional (unnumbered) features were drawn and/or reported as features. In addition, comments on atypical conditions and circumstances, most of which would traditionally be regarded as features, are sometimes recorded in varying degrees of detail on excavation record sheets. These constitute 73 additional features. For the present study, the eleven unnumbered features, and the 73 features mentioned anecdotally by the excavators, have been assembled and numbered from 100 to 183. Information recorded on floor sketches of the basal occupation surfaces (Figures 53 and 59) serves as an additional check against this compilation. All features are summarized in Table 18. Their approximate locations are mapped at the conclusion of this chapter in Figures 87 to 92 (see Discussion).

For the following discussion, features have been sorted into five general categories, including occupation floors, cooking- or heating-

Table 18. Features at the Pine Creek Village Site (35WH14)

Feature Number	Type	Unit	Location	Elevation (m)	Level	Comments/Associations
1	cobble cluster	A15	203.00-203.93x/87.88-88.58y	97.70-97.40	5	28 unmodified rocks, Housepit A, NE edge
2	bone cluster	B23	204.40-204.87x/77.23-77.99y	95.67-95.63	12	
3	slab-lined firepit	A21,22,28,29	202.70-203.70x/86.50-87.35y	97.46-97.15	4/5-7/8	Ground surface of pit is 97.37 (L.6/7)
4	charcoal scatter	B31,32,35,36	203.50-205.06x/75.40-77.00y	95.54-95.51?	12/13?	N, E, & vertical boundaries undetermined
5	charcoal scatter	A28	202.23-202.80x/86.05-86.88y	96.99-96.97	10	Metate #13 associated
6	cobble cluster/ bone scatter	A43	202.50-202.85x/84.60-84.90y	96.90	8-9	BN-764, 769-774
7	"entryway cache"	A48,49	201.98-202.35x/83.08-83.30y	96.61-96.55	10/11	Pestle #1155 and 5 unmodified cobbles
8	posthole & rocks	A33,41	200.07-200.85x/85.65-85.74y	96.65?	12?	Cobbles, 20cm dia. unidentified dark circle
100	packed soil & poss. posthole	A14	202.63-202.15x/88.47-88.58y	97.29-97.25?	9	11-12cm dia.; adjacent to hard-packed soil
101	flake cluster	A45	204.28-204.50x/84.45-84.63y	97.38	3	Concentration of obsidian flakes
102	possible posthole	A9	204.00-204.26x/89.15-89.40y	97.43	7	May be 1 m to south
103	pit, posthole & metate	B24,25	205.10-206.15x/77.22-78.00y	95.53-95.20	13-16	Ground surface 95.45, basal elevations: 95.33, (metate #1355), 95.28 (posthole), 95.20 (pit)
104	5 circular soil stains	B24	varying	96.10-96.00	8	2-5 cm in dia., midpoints: 205.29x/77.69y, 204.55x/77.80y, 204.55x/77.55y, 204.80x/ 77.70y, 204.94x/77.91y
105	burned clay patches	B15	varying	95.54-95.45	14/15	Corresponding lens of burned clay on west wall profile
106	burned clay depression	B27	208.23-208.55x/77.45-77.75y	95.57-95.50	14	Circular pit, steep sides/flat base in yellow basal clay, burned yellow clay interior
107	possible posthole	B26,27	207.90-208.15x/77.48-77.68y	95.60-95.50*	14	
108	3 circular soil stains	B14	varying	96.07	9	5 cm in dia., midpoints: 204.47x/78.19y, 204.47x/78.30y, 204.59x/78.40y
109	pit or posthole	B14	204.54-204.79x/78.10-78.33y	95.42-94.25	15-17	Circular pit in yellow basal clay, interior is "yellow clay, cult. fill mix"
110	5 soil stains & ash area	B6	varying	95.87-95.72	12-13	Dark soil stains w. charcoal, 2 are 4 cm deep, poss. pit in NW corner
111	rock concentration	A16	unknown	98.10-97.90*	1-2	Diagonal band, NE to SW of unit
112	charcoal scatter	A39	unknown	97.70	2	
113	upper occupation floor	A13	northern half of unit	98.00-97.90*	2	Encountered upper floor at base of level in north half of unit
114	upper occupation floor	A53	unknown	97.17-97.10*	2	Metate #473, core #472, cobble tool #458
115	charcoal stain	B31	NW quad	96.60-96.50*	2	
116	upper occupation floor	B26	unknown	96.70-96.60*	2	
117	upper occupation floor	A16	unknown	97.90-97.80*	3	
118	bone scatter	A42		97.40-97.30*	4	Extends into adjacent A48, level 3
119	bone & flake scatter	A35	unknown	97.30	4/5	Said to be assoc. w. a firepit to NE, same elevation; top of Feature 3?

Table 18. (Continued)

Feature Number	Type	Unit	Location	Elevation (m)	Level	Comments/Associations
120	ash	A39	west portion of unit	97.40	4	
121	upper occupation floor	A51	unknown	97.20-97.10*	4	
122	rock cluster	B19	unknown	96.50	4	"Small rock cluster;" "no cultural assoc."
124	"upper" occupation floor	B33	unknown	96.50	4	Postulate association w. Feature 122; actually intermediate floor?
125	"upper" occupation floor	B38	unknown	96.20	4	Actually intermediate floor?
126	charcoal & clay scatter	B30	throughout unit	96.20	5	Charcoal & lumps of yellow clay, note pithouse rim encountered this level in B20
127	hard, compacted surface	A13	north quarter of unit	97.54	6	Southern edge arcs N & E from 201x/88.45y to 202x/88.80y, floor rim?
128	pit or posthole?	A16	unknown	97.60*-97.50*	6	"Dark spot surrounded by yellow clay"
129	charcoal scatter	B28	unknown	96.35	6	
130	hard, compacted surface	A14	NE corner of unit	97.49	7	Assoc. w. "concentrations of medium-sized, rounded pebbles" & flat lying artifacts (?)
131	gravel concentration	A28	throughout unit	97.35	7	Small rocks, 0.5-4.0 cm dia., concentrated toward area of firepit (Feature 3)
132	charcoal & charred bark	A30	204.35x/86.30y	97.20-97.10*	7	"Pocket" of charcoal & charred bark
133	charcoal stains	A37	north side of unit	97.12	7	
134	intermediate occupation	B6,7	unknown	96.40-96.20*	7,8	
135	occupation "level"	B22	unknown	96.14	7	
136	ash concentration	B30	throughout unit	96.10-96.00*	7	
137	post or rodent hole?	B37	SE corner of unit	96.00-95.90*	7	Circular area of sterile soil, 5 cm dia., 2 cm deep
138	rock concentration	A28	all except NW corner	97.20-97.10*	8	
139	rock cluster	B19	NW corner of unit	96.15	8	
140	charcoal	B30	eastern portion of unit	96.00-95.90*	8	
141	gray ashy layer	B35	unknown	95.95	8	
142	pit	A16	north half of unit	97.??-97.35?	8?	"Shallow" pit excavated into yellow clay; bone awl (#BN44) at base
143	charcoal concentrations	A21	202.39-203.00x/87.52-87.70y	97.10-97.04	9	
144	"large, charred branch"	A28	202.37x/86.80y	97.01	9	
145	rock cluster	B13	unknown	96.10-96.00*	9	Many of the rocks "are flat"
146	intermediate occupation	B15	unknown	96.05	9	
147	charcoal & burned bone	B22	203.08x/77.98y	96.03-95.93	8/9	
148	occupation floor	B25	unknown	95.96	9	Based on flake debitage
149	bone concentration	B31	unknown	95.90-95.60*	9-11	
150	compacted surface	B35	SW corner of unit	95.90-95.80*	9	Part of wall?
151	charcoal scatter & baked clay	A32	NE corner of unit	97.00-96.90*	10	
152	posthole	A42	201.66x/84.40y	96.70	10	
153	"ochre processing area"	A47	200.29x/83.99y	96.78	10	On "sterile yellow" clay
154	burned clay, red ochre conc.	B3	throughout unit	96.20-96.10*	10	

Table 18. (Continued)

Feature Number	Type	Unit	Location	Elevation	Level	Comments/Associations
155	charcoal stain	B13	west half of unit	95.94	10	Approx. 25 cm dia. (based on field sketch). Top of pithouse wall encountered at base of level (95.90)
156	burned clay concentration	B18,19	all of B18; SW corner B19	96.00-95.90	10	96.00-95.90 in B19; lumps of burned clay
157	pithouse edge	B22	204x/77-78y	95.90-95.80*	10	Large amount of flakes, charcoal, shell; Concentration at 203.30x/77.80y, 95.80 m
158	possible posthole	B31	203.50x/76.50y	95.74	10	
159	ochre conc.; storage pit	A40,41	ochre in SW corner of A41	96.80-96.70*	11	Plan view shows storage pit 199.80-200.20x/84.20-84.75y, 96.73-96.40
160	seed concentration	B6	throughout unit?	96.00-95.90*	11	Hackberry seeds (*Celtis* sp.) thru. lev.
161	burned clay scatter	B8	throughout unit	95.90-95.80*	11	Lumps of burned clay
162	posthole	B19	209.32-209.48x/78.22-78.38y	95.90-95.80*	11	
163	possible pit	B23	SW portion of unit	95.80-95.70*	11	Postulated to account for vertical position of bone & flakes
164	charcoal scatter	B29	NE corner of unit	96.00-95.90*	11	Charcoal stains & hard clay
165	charcoal stains, burned clay	B35	eastern portion of unit	95.70-95.60*	11	Clay in NE corner; charcoal in eastern quarter of unit
166	charcoal stain, burned clay	B36	along west edge of unit	95.61	11	Separate patches; burned clay in center, dark soil stain in N, appear ca. 25 cm dia.
167	flake scatter	A29	NW corner of unit	96.68	12	2 cm thick
168	possible posthole	A32	199.80x/85.25y (center)	96.71	12	
169	clay concentration	B3	unknown	96.00-95.90*	12	Mound of clay "lumps" on sterile wall
170	charcoal & clay concentration	B8	NE corner of unit	95.80-95.70*	12	Lumps of charcoal & clay intermixed within area of charcoal stain
171	charcoal stain, poss. posthole	B13	203.50x/78.50y (center)	95.76	12	Circular, well-defined (see also Feature 155)
172	flake scatter	B22	203.74x/77.96y	95.65	12	Also mentioned for B13, 95.70
173	rock cluster	B32	SW portion of unit	95.70-95.60*	12	"Small pile of fire-stained & broken rocks"
174	pit	B36	eastern portion of unit	95.60-95.50*	12	In sterile clay
175	charcoal stain	B17	SW corner of unit	95.65	13	
176	circular soil stains	B23	varying (see comments)	95.51	13	204.12-204.24x/77.14-77.25y; 204.32-204.43x/77.15-77.27y;
177	circular dark soil stain	B25	south edge of unit	95.60-95.50*	13	Surface stain w. small charcoal chunks
178	circular baked clay area	B27	NE corner of unit	95.70-95.60*	13	Possibly firepit. Against sterile wall of housepit
179	pit	B8,16	206.15-206.50x/79.20-79.55y	95.59-95.38	14-16	Mound of sterile clay covering brown cultural fill in B16, lev. 14; excavated from pit?
181	bottom of lower occupation	B23	unknown	95.42	14	
182	bottom of lower occupation	B26	unknown	95.50	14	

Table 18. (Continued)

Feature Number	Type	Unit	Location	Elevation	Level	Comments/Associations
183	firepit	B27	208.48-208.69x/77.67-78.00y	95.60?	14	Extends into B18. "Firepit was dug up & disturbed"
184	pit or posthole	A41,47	200.55-200.65x/83.95-84.05y	96.80-96.70*	11	
185	pit	A28,35	202.05-202.35x/85.90-86.12y	96.80-96.70*	12	
186	pit	A43	202.05-202.25x/84.20-84.40y	96.70-96.60*	11	
187	pit	B16	206.40-206.70x/78.05-78.40y	95.50	14/15	
188	pit	B16,17	206.65-207.25x/78.55-79.00y	95.50?-95.35	15	
189	firepit	A32	NE corner of unit	97.60	3	Shown in northern 30 cm of east wall profile, < 5 cm deep
190	burned clay	A25,26,32,33	199.85-200.60x/85.95-86.35y	96.65	13	"Original pithouse floor firepit area"

* elevation denotes level; feature elevation unknown

related features, structural features, storage-related features, and specialized processing areas. Occupation floors have been treated in greater detail under Stratigraphy and will only be summarized at this time. Features will be discussed first for Block A, then for Block B.

Block A

Occupation Floors

Three occupation floors were noted in the field for Block A, however little information was recorded on their location. Based on fieldnotes and profiles a shallow upper floor (Floor 1), represented by a "dark, greasy soil," is postulated in the vicinity of a discontinuous and thin light grey clay or silt-clay layer which underlies the surface sod (see Stratigraphy). It is situated at 20 to 30 cm below the surface in the northern portion of Block A, slopes to Level 4 in unit A51, and then apparently up again in A53, where it is placed at Level 2. From its shallow depth, the occupation is presumed to be "brief." Its field identification as "Probably historic; we've decided to call it a 'teepee ring'--this being the most common name" (Riddle, fieldnotes, June 28, 1981), is not supported by the distribution of artifacts, which are generally concentrated in the northwestern half of the block, rather than in the center of the depression (Figure 48). As there is no contour map of the surface prior to excavation, however, the location of the depression is inferred from the placement of excavation units and

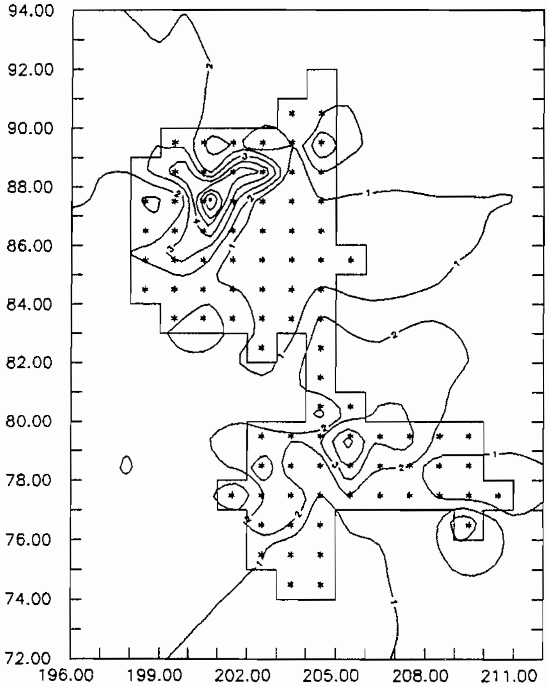


Figure 48. Horizontal distribution of artifacts, Level 2, plotted by SURFER software.

the underlying pithouse margins, and therefore only an approximation of the actual surface topography.

Two additional floors are placed in levels 6/7 and in levels 9/10, primarily on the basis of features 3 and 5 (see Cooking- and Heating-Related Features). While artifact density plots for levels 6 and 7 are not entirely unambiguous and other explanations are possible for the observed patterning, they do appear to form a more concentric distribution, with materials found towards the margins of the floor in Level 6, and towards the interior in Level 7 (Figures 49-50). A major artifact concentration is located to the northwest and adjacent to Feature 3. It

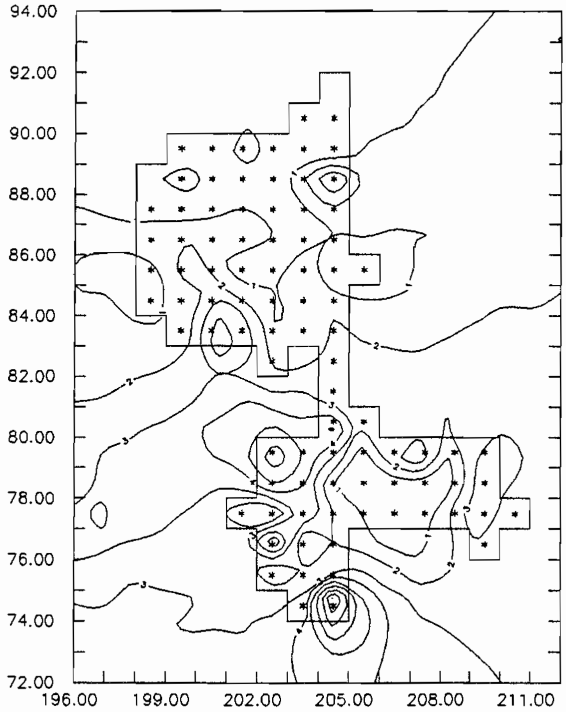


Figure 49. Horizontal distribution of artifacts, Level 6.

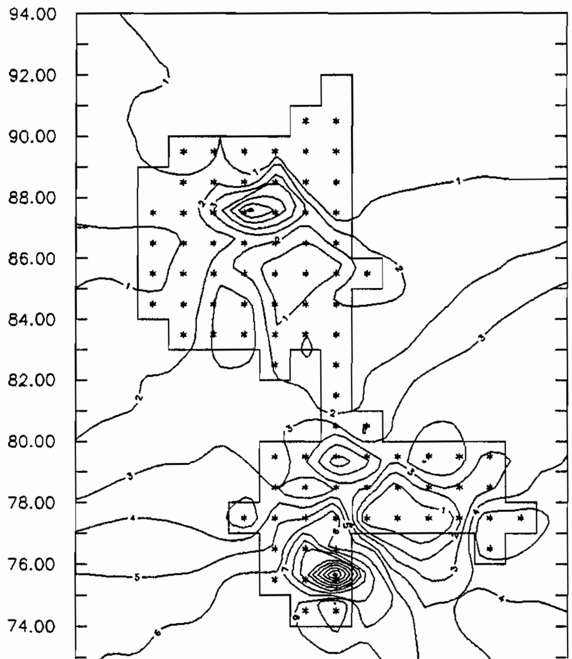


Figure 50. Horizontal distribution of artifacts, Level 7.

is likely that Floor 2 is associated with a prehistoric house, probably of circular shape and dished cross-section.

In contrast to Floor 2, Floor 3 appears to be relatively flat (although sloping somewhat to the south), with a general peak in artifact density in Level 9, decreasing overall both above and below this level. Horizontally, cultural materials appear to be confined to a circular area bounded by steep-sided pithouse walls, even if the cessation of excavation in several of the peripheral units is taken into account (Figure 51). If Feature 5 is coextensive with Floor 3, it does not represent the basal occupation of Block A, given its elevation of 96.99-96.97 m, about 40 cm above the "sterile yellow clay" in this area (unit A28). The underlying silts reflect either a long-term occupation, or regular, repeated sojourns at the site.

Floor 4 appears to lie at an elevation of approximately 96.60-96.50 m, primarily encompassing levels 11 and 12 (Figures 52-53). The identification of this floor, was, as has already been mentioned, complicated by the attribution of Feature 5 to "pithouse floor," a designation that appears, in Block B, at least, to have been reserved for the basal occupation. Details regarding the nature of this floor will be addressed in further discussions.

Cooking- or Heating-Related Features

These include firepits, charcoal scatters, and areas of baked or burned clay. The most prominent is Feature 3, a rock-lined firepit of

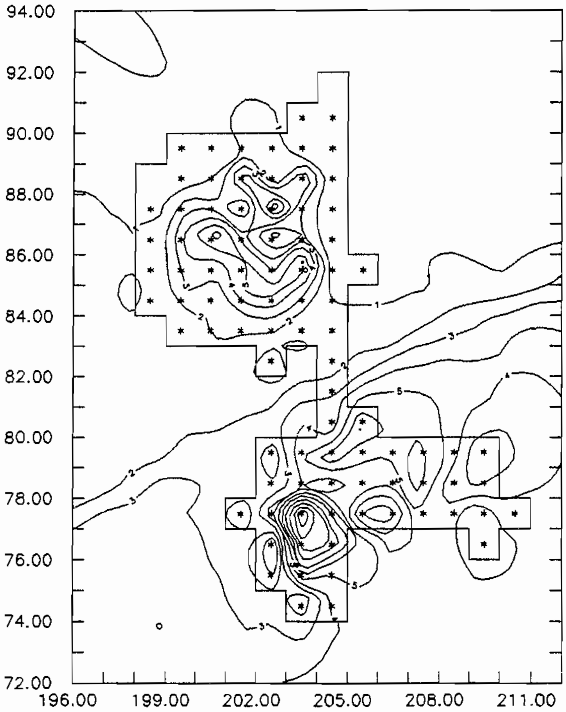


Figure 51. Horizontal distribution of artifacts, Level 9.

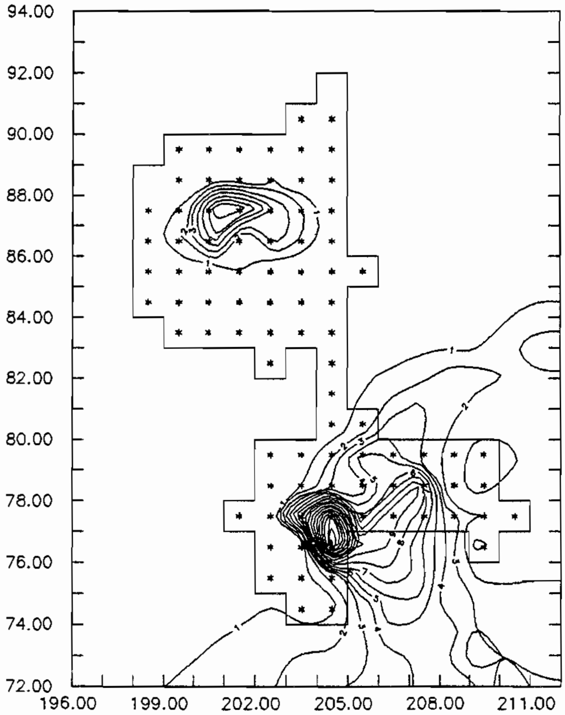


Figure 52. Horizontal distribution of artifacts, Level 12.

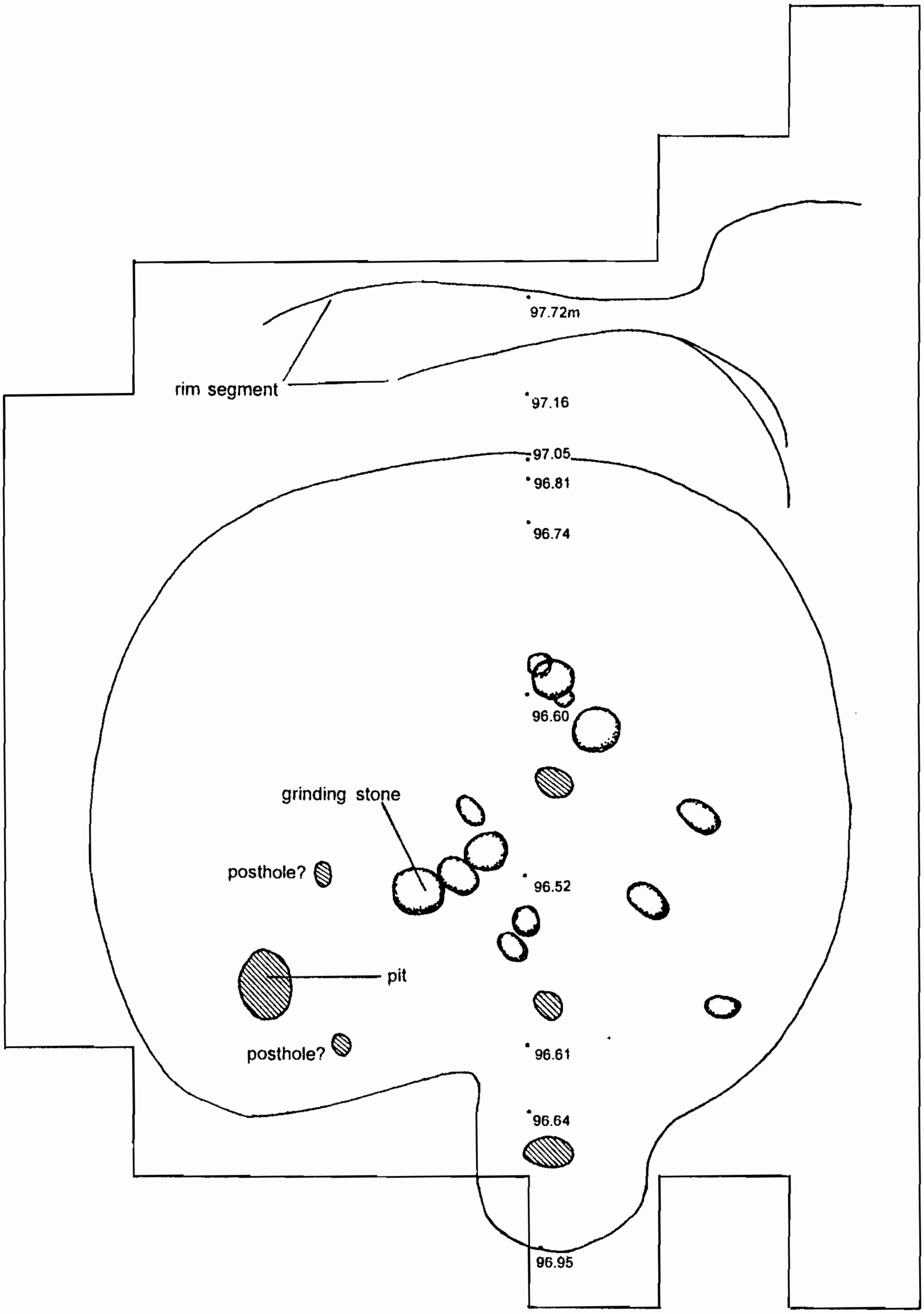


Figure 53. Planview of basal occupation floor, House A.

roughly 1 m diameter, with a burned clay rim and heavily charcoal-stained soil (Figures 54-55). Situated at the juncture of units A21, 22, 28, and 29, Feature 3 ranges in elevation from 97.37 m (marking the top of the rock lining) to 97.15 m (the base of the pit). The floor surface into which the firepit is dug is located at 97.37 m, placing it in Level 6 (A29) or 7 (A21, 22, 28). A sample of charcoal from the pit was radiocarbon-dated to 890 ± 20 B.P. (see Radiocarbon Dates). Flotation analysis of charcoal and soil from the feature identified charred juniper wood with some juniper bark. These are thought to represent fuel wood (Stenholm, Appendix D).

The other major feature in this category is Feature 5, which is described as a "charcoal scatter and metate." From the planview sketch of this feature, it appears to be very patchy, with three small clusters containing elongate pieces of charcoal that may represent burned wood. It is located in Level 10 of unit A28 between 96.99 and 96.97 m, which places it 16 to 18 cm below Feature 3. The metate associated with the scatter could not be located during the present analysis. While features 3 and 5 are both located north and east of the center of the pithouse, no generalizations are possible regarding internal hearth placement. In the former case, precise wall configuration cannot ascertained; in the latter case it is not clear that the feature truly represents a hearth.

A date of 1500 ± 25 B.P. was returned on charcoal from Feature 5 (see Radiocarbon Dates). Based on botanical analyses of wood, charcoal, and soil from Feature 5, Stenholm concluded that "the diversity in

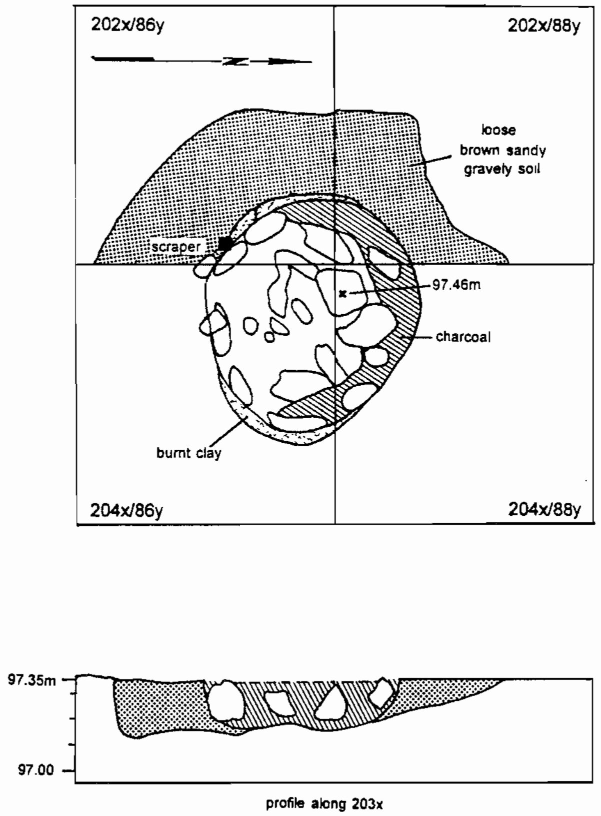


Figure 54. Feature 3, planview and profile.

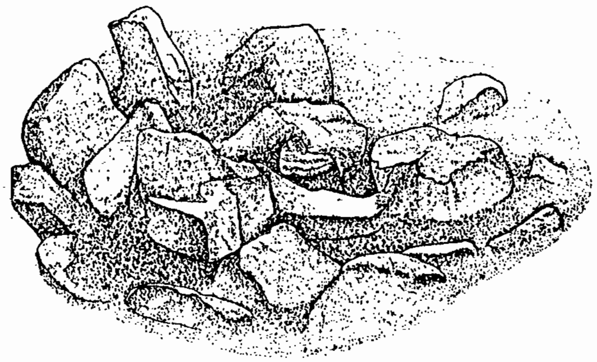


Figure 55. Feature 3, oblique rendering.

botanical and non-botanical arrays suggests general purpose midden. It seems to reflect several activities, such as food (faunal) or possibly tool preparation featuring hardwoods" (see Macrobotanical Analysis, this chapter, and Appendix D).

Other charcoal scatters reflecting the proximity of fire include features 132 and 133, in the general vicinity of Feature 3, and features 143, and 151, both of which are probably roughly contemporaneous with Feature 5 or Floor 3. A "large charred branch" (Feature 144) was reported from Level 9 of A28, i.e. in the level above Feature 5. However, no further detail was recorded, precluding additional interpretations. Charcoal and ash were also observed, respectively, in levels 2 and 4 of A39 (features 112 and 120).

Two final features are included in this class. Feature 189 represents a firepit which is only identified on the east wall profile of A32. It is located in the northeastern corner of the unit at approximately 97.60 m (the base of Level 3). The feature appears to be very shallow, with a depth of less than 5 cm. It measures approximately 30 cm in diameter. Feature 190 marks an area of burned clay in Level 13, at the intersect of units A25, A26, A32, and A33 in the west of House A. It is identified in fieldnotes as "original pithouse floor firepit area" and measures about 75 cm from east to west and 40 cm from north to south. Additional descriptive information is not available for this feature and it is not identified on the transit map for the basal floor of House A.

Structural Features

Numbered features in this category are represented by six postholes or possible postholes. Additional structural features including walls and doorway are discussed in this context. This number is unfortunately too small to allow reliable conclusions regarding the superstructures for Housepit A. An additional problem is created by the uncertainty in the identification of features in this class, which are labeled either as "postholes" (features 8, 152), possible posthole (features 100, 102, 168) or "pit or posthole" (Feature 128). The additional possibility that some are actually rodent holes cannot be ruled out.

Postholes are recorded in Level 9 of A14 (Feature 100), Level 10 of A42 (Feature 152), Level 12 of A32 (Feature 168) and (most probably) Level 12 of A33 (Feature 8). Feature 8, associated with the basal pithouse floor (Floor 4), was surrounded by a concentration of rocks interpreted in the field as a post support. According to a field sketch, this particular posthole measures approximately 20 cm in diameter (Figure 56), while a diameter of 11 cm was inferred for Feature 100 (in A14). Two additional features were situated at somewhat higher levels, in Level 7 of A9 (Feature 102) and in Level 6 of A16 (Feature 128). Both are in the general vicinity of what appears to be a remnant of a second pithouse rim roughly parallel and to the north of the excavated and mapped house. Feature 102 measures 25 cm in diameter. No further information is available for Feature 128.

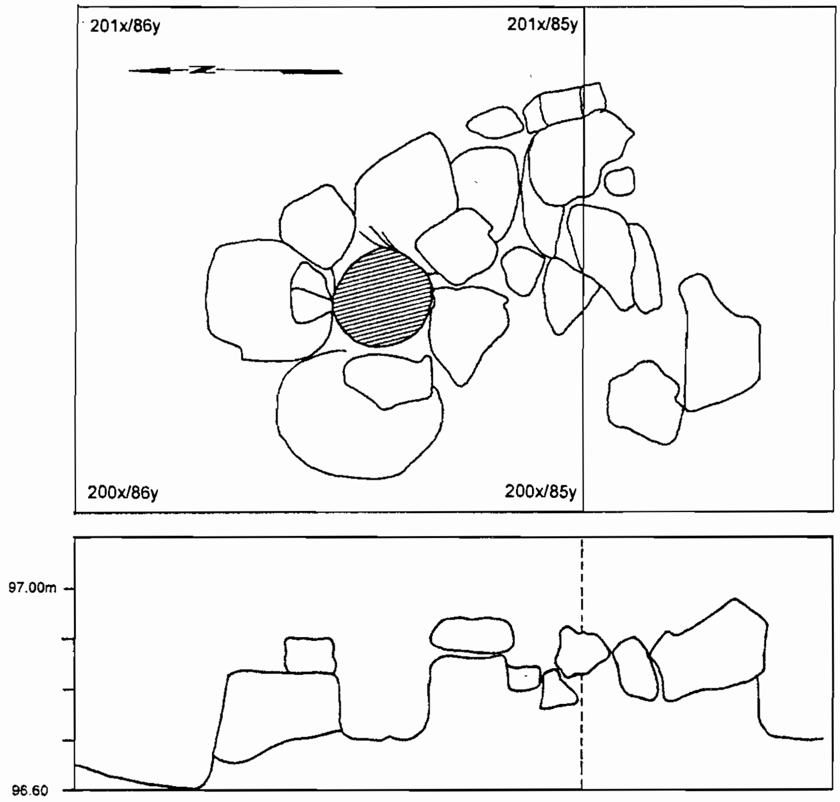


Figure 56. Feature 8, planview and profile.

The records concerning pithouse wall shape (all relating to the lowest occupations) are somewhat more detailed. Several profiles show steep-sided walls with a floor excavated 40-50 cm deep. The basal floor appears, as already mentioned, to be relatively flat. There is no clear evidence of a wall bench. Two roughly concentric, arced "wall remnants" were recorded north of and parallel to the main house and may account for the northern bulge in the artifact density distribution map for Floor 3, as well as the confusing stratigraphy.

The entrance to the original pithouse in Block A is located east of center along its south end. An entryway projects southward about one to 1.5 m from the south wall, its surface rising in elevation from 94.64 m in the north to at least 96.95 m in the south. The shape of the entryway suggests a short tunnel or elongated hatchway. While semi-subterranean houses on the Columbia Plateau are frequently illustrated with central roof entrances (e.g. Nabokov and Easton 1979), side entrances were, in fact, not uncommon. Side entrances were characteristic of Tenino houses, which were circular in plan, with a conical roof of radiating poles supported by four central posts (Ray 1939:135). While less frequent, entrance tunnels were used by Klickitat, Wenatchi, and Sanpoil (Rice 1985:96). The planview illustration compiled for Block A shows a northeast-facing projection which is associated with the outer of the two already-mentioned housepit rim remnants and which resembles in shape the southfacing entryway discussed above. It is possible that this represents the northeast-facing doorway of another house; whether older or younger cannot be determined.

Storage Features

Six features at 35WH14 are described as "pits" (features 128, and 142, 159, 184, 185, and 186), and one is identified as an "entryway cache" (Feature 7). With the exception of features 7 and 142, no information is available regarding their contents. Three of the features (184-186) are only identified in the mapping data for the basal floor (Floor 4). The problem of differentiating between pits and postholes has been noted above (e.g. for Feature 128, which is also mentioned in the discussion of postholes).

A large storage pit is situated in the southwestern corner of the pithouse floor (Feature 159, units A40, A41). It measures 40 cm east-west and 55 cm north-south, with a depth of approximately 30 cm. Three smaller pits are located in units A41/47, A28/35, and A43 (Features 184, 185, 186) and are also associated with the lowest house floor. They range from 10 to 30 cm in diameter. Feature 128, the possible posthole in levels 6 and 7 of A16 discussed above, is described as a pit or posthole. It is in the level above Feature 142, "a shallow pit excavated into yellow clay," containing a bone awl (Cat.# BN-44). The precise relationship between these two features cannot be determined from available evidence. The lowest pit does, however, appear on a north profile of A16, and may be associated with the first of the already-mentioned "rim remnants." It measures 35 cm from east to west and is 10 to 15 cm deep.

Feature 7, finally, the "entryway cache," is located in the doorway to House A. It is located in levels 10 and 11 of units A48 and A49, respectively, and measures 37 cm east-west by 22 cm north-south, with a depth of 6 or 8 cm, depending on the source. Feature records show six unlabeled, cobble-like objects within the depression, which appear to correspond to catalog entries 1159, and 1228 through 1232. Two of these were not classified in the OMSI catalog, four others are described as a pecked stone, a hammerstone, a digging stone, and a pestle. Only the final of these, Cat.# 1155, is considered to be an artifact by the present analyst. It is a multipurpose tool which appears to have been used as a pestle, a maul, and possibly as an anvil. The implement exhibits pronounced ochre staining.

Specialized Activity Areas

Specialized activity areas are only infrequently mentioned in field observations, probably because of the lack of emphasis on clearing contiguous floors. Seven were, however, noted, and will be treated here. Features 6, 118, and 119 are bone scatters (see Faunal Analysis, this chapter). Feature 6, located at the top of Level 9 of unit A43 consists of a roughly circular concentration of cobbles and bones, about 35 cm in diameter. This feature is probably associated with Floor 3. Additional bone scatters are represented by Features 118 and 119, centered in Level 4 of units A42 and 35, respectively. Feature 119, identified as a "bone and flake scatter" is said to be associated with a firepit (Feature 3?) to the northeast at the same elevation (97.30 m).

Two areas of lithic reduction are represented by flake "scatters" or "clusters." These include Feature 101, a concentration of obsidian flakes in Level 3 of A45, and Feature 167, a flake scatter located in Level 12 of A32, the southwest corner of Floor 4. Feature 153 is referred to in excavation notes as an "ochre processing area" in A47, Level 10 (Feature 153). A concentration of ochre is also recorded in unit A41, Level 11, in conjunction with Feature 159, the pit already discussed (although the ochre is outside the pit itself). Both features

(153 and 159) are at comparable elevations and probably represent the same activity. An ochre-stained pestle-maul from the entrance cache (Cat.# 1155; Feature 7) in Level 10 of unit A48 provides added support for the reduction of ochre within this part of the house.

The final activity which will be discussed in this context is indicated by the presence of numerous grinding stones, particularly in association with the lowest occupation. Artifacts catalogued as metates and located below an elevation of 97.00 m were plotted on the planview of Floor A, with relative sizes approximated as well as possible (Figure 53). This adds seven specimens to those indicated in the original mapping data, while two mapped specimens are not accounted for by the catalog information.-

The twelve grinding stones plotted in this manner form a distinct cluster in the southern two thirds of the eastern half of the house, apparently in line with the entryway. They appear, in addition, to be associated with two pit features. One of these (Feature 186) lies at the southern edge of the metate cluster, while the second (Feature 185) lies in its center with the grinding stones arranged roughly in a circle around it. The nature of these pits cannot be determined, as their existence and location are only known from mapping notes. The central pit appears to measure roughly 30 cm east-west by 20 cm north-south, and would appear to be too small for a main hearth. The spatially discrete nature of food grinding in this pithouse is, however, apparent, and will be returned to in the later discussions of the site.

Rock features

Five features associated with Block A are classified as rock features. They are variously referred to in fieldnotes as cobble cluster, rock concentration, or gravel concentration. Rock features were recorded in units A15 (Level 5), A16 (levels 1-2), A28 (levels 7-8), and A43 (Level 8).

The rock feature recorded in the greatest detail is identified as Feature 1. It consists of a concentration of 28 unmodified basalt rocks in level 5 of unit A15 (Figure 57). No charcoal or ash were associated. While the profile drawings of this feature show an elevation ranging from 97.70 m to 97.64 m, mapped elevations of the individual cobbles indicate elevations between 97.78 and 97.56 m (levels 4-6). The cluster measures about 90 cm from east to west and 70 cm from north to south.

Several explanations for this feature are possible. No pit outlines were observed, however the cluster, as drawn in the feature record, appears to rest on a slightly dished surface, while its top is entirely flat. While far from definitive, this may suggest the presence of a rock-filled pit. The location of Feature 1 above the northeast rim of House A may indicate its origin in house-cleaning activities which may have moved cobbles away from the house floor to the rim of the house, an explanation which was proposed by the field director (Mazany, fieldnotes, July 1, 1981). On the other hand, a "dark spot" surrounded by yellow clay was mapped in Level 6 of this unit and

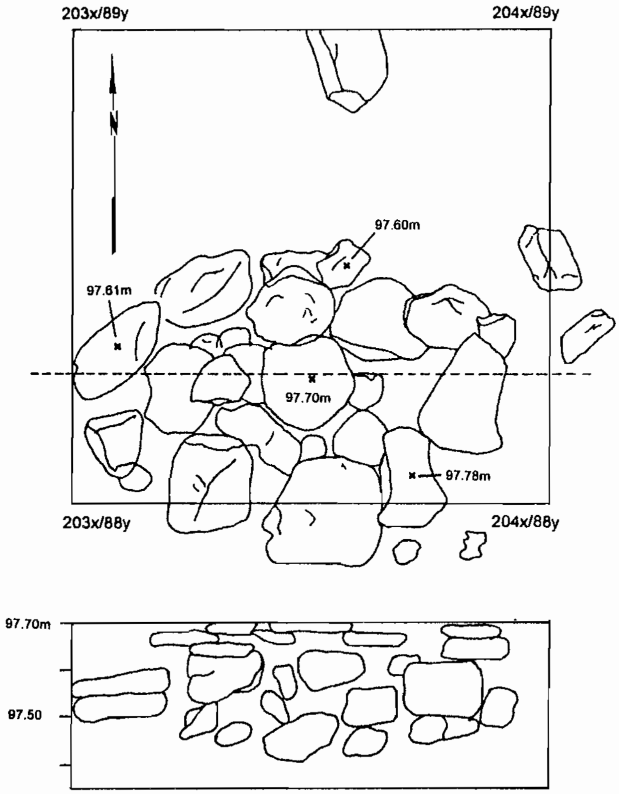


Figure 57. Feature 1, planview and profile.

has been interpreted as a pit or posthole (Feature 128). The cobbles may have served as additional support for a structural member. A similar feature has been discussed above (Feature 8).

Feature 111, located in levels 1 and 2 of A16, consisted of a linear rock feature of unknown function:

> About 50% of the pit's surface is covered by fist-sized cobbles and pebbles in a band extending from northeast to southwest across the pit.... Excavation in 202x,88y showed that this is just a superficial rock layer. This appears to be some kind of "wall" extending several meters both to the northeast and the southwest (Riddle, fieldnotes, June 23, 1981).

Features 131 and 138, were, finally, recorded in levels 7 and 8 of A28. Fieldnotes for Level 7 comment that "the entire pit has small rocks from

0.5 to 2.0 cm in diameter, concentrated toward firepit," while in Level 8, "rocks are concentrated everywhere but the northwest corner of the pit." Both concentrations are probably part of a single feature which appears to be associated with the already discussed, rock-lined firepit (Feature 3).

A feature identified as a cobble cluster/bone scatter was recorded in levels 8 to 9 of A43 (Feature 6) has already been described (see Specialized Activity Areas).

Block B

Occupation Floors

Block B, like Block A, exhibits a shallow upper occupation associated with a thin band of light grey clay or clay-silt, here 10 to 20 cm below the surface (see Block A for details) which is said to be underlain by 10 cm of "rich brown fill" (Mazany, fieldnotes, June 23, 1981). As in Block A, the upper occupation, Floor 1, is described as a "charcoal layer" (Mazany fieldnotes, June 24, 1981), characterized by "very dark, greasy, soil" (Riddle, fieldnotes, June 23, 1981). The upper occupation floor is placed at Level 2 in unit B26 (Feature 116) and at Level 4 in B33 and B38 (Features 114 and 117), two units which are located at the margins of the block. Elsewhere in the fieldnotes, alternatively, a discrete floor is postulated for Level 4. The association of Level 4 deposits with either Floor 1 or a discrete floor of any kind, will, however, be demonstrated as unlikely on the basis of artifact distributions. This will follow a discussion of Floor 2.

Fieldnotes indicate the correspondence of Floor 2 with a brown silt. This brown silt is clearly identifiable on wall profiles. It suggests a saucer-shaped depression which extends to a minimum of 5 cm below the surface at its eastern margin to perhaps only 30 cm above the yellow basal clay at its lowest point. An east-west diameter of more than eight meters is indicated. The thickness of this "intermediate occupation" layer is reflected in anecdotal feature notes, which place it, respectively, at Levels 7 and 8 in units B6 and B7 (Feature 134), at Level 7 in B22 (Feature B15), and Level 9 in units B15 and B25 (Features 146 and 148). It is likely that the reports of a floor in Level 4 refer to the upper reaches of this surface. Whereas a density plot of formed and utilized implements from Level 2 shows a diffuse scatter of tools (Figure 48), Level 4 exhibits a distinct clustering of artifacts around the margins of the block, corresponding to a large void in the center (Figure 58). It is likely that this "occupation" actually corresponds to Floor 2, which would slope upward to this elevation at its margins.

The basal occupation of Block B (Floor 3) is associated with the surface of the yellow clay. Like the earliest occupation of Pithouse A, the floor is characterized by a number of pit features interpreted as storage pits and post molds which will be discussed below (Figure 59). The yellow clay was reached at a depth of approximately 1.3 m in the center of the pithouse. The determination of its natural elevation is complicated by secondary deposition of backfill from the excavation of

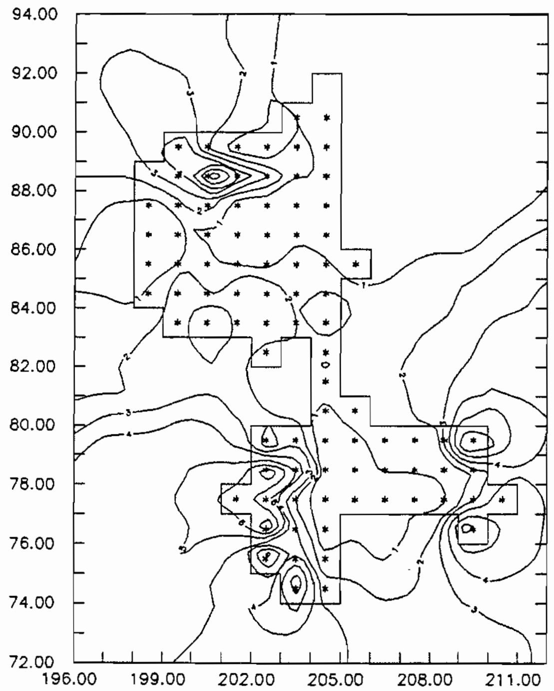


Figure 58. Horizontal distribution of artifacts, Level 4.

the housepit and a limited number of profile drawings of the Block B housepit walls. However the differential between elevations for the center of the floor (ca. 95.50 m) and the inner edge of the rim (95.90-96.00 m) suggests a maximum excavated depth of somewhat under 40 cm, depending on the amount of redeposited backfill. Features 181 and 182, located in Level 14 (at 95.42 m and 95.50 m, respectively), identify the "bottom of the lower occupation" in units B23 and B26.

Cooking- or Heating-Related Features

Twenty-five features in Block B fall into the class of cooking- or heating-related features. They include charcoal stains and scatters,

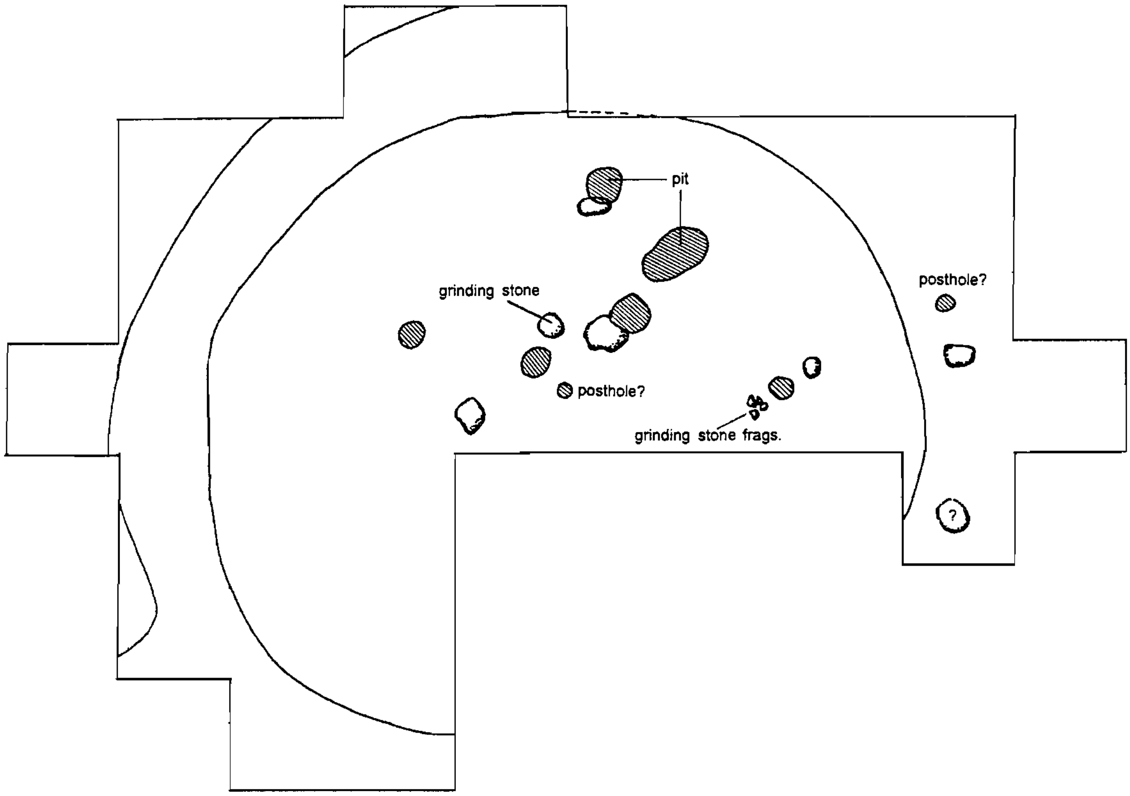


Figure 59. Planview of basal occupation floor, House B.

areas of burned or baked clay, a few ash concentrations, and three pits. Features of this type are primarily encountered within and along the area defined by the perimeter of the basal house. Most tend to cluster in the southwestern quadrant of the excavation block where charcoal, burned clay, or ash, are found in every level except levels 1 and 3 and the lowest floor (levels 13 and 14). Here, interpretation is complicated by the "many rodent runs" observed in levels 1 though 5 of unit B22. With the exception of Feature 129 (charcoal noted in Level 6 of B28), the southwestern focus of cooking- or heating-related features does not change until beginning in Level 10, when charcoal staining and burned clay also appear along the northern and eastern margins of the block.

Only for levels 13 and 14 are cooking- or heating-related features reported from the center of the house floor. These include an ash pit measuring approximately 30 cm in diameter and 25 cm in depth in B24 (Feature 103; 95.45-95.20 m), with associated burned clay stains in adjacent B15 (Feature 105). Also recorded for Level 14 are two pit features in B27 (Features 106 and 183). Feature 106 consists of a shallow circular depression excavated into the basal clay, with burned yellow clay interior, steep sides, and a flat base. It extends from 208.23x to 208.55x, and from 77.45y to 77.75y, with a depth of 7 cm (95.57-95.50 m). Feature 183 is described as a

> circular clay spot, probably a firepit, in the northeast corner. It is right up against a sterile clay wall of the housepit. The firepit was dug up and disturbed but it extends roughly from 208.48x-208.69x and from 78.00y-77.67y [sic] (excavation unit level form, unit B27).

The elevation is given as 95.60 m; whether this marks the top or the bottom of the pit is not clear. These descriptions appear to refer to separate features, but this cannot be corroborated as they are neither mentioned nor plotted anywhere else.

Also associated with the lower levels are features 110 and 4. Feature 110 is described as six soil stains and an ashy area or pit in unit B6 (levels 12-13). The feature is subsequently interpreted as a refuse deposit rather than a firepit (Mazany, fieldnotes, July 2, 1981). Feature 4 is a scatter of charcoal chunks, charcoal stains, burned clay lumps, and ash in units B31, 32, 35, and 36 just above the sterile yellow clay, between approximately 95.54 and 95.51 m).

Radiocarbon dates of 2450 ± 40 B.P. and 2580 ± 40 B.P. were obtained from Feature 4 (the charcoal scatter) and Feature 103 (the ash pit), respectively (see Radiocarbon Dates, this chapter). Botanical samples were also analyzed from both features. A floated soil sample from Feature 4 produced macrobotanical remains of mature Populus sp., charcoal, CCS and obsidian flakes, burned and unburned mammal bone (large and small mammal), and a trace of shell. Charcoal and wood samples from Feature 103 were identified as lodgepole pine and juniper (see Macrobotanical Remains, this chapter, and Stenholm, Appendix D).

In general, the spatial distribution of cooking- or heating-related features suggests that the lowest levels of Block B experienced the most substantial use, with intensity decreasing in the upper deposits.

Structural Features

Numbered structural features consist of five postholes or possible postholes. Other features including walls and doorway will also be discussed in this context. As in Block A, only limited inferences regarding structural details of the house are possible.

All recorded postholes are associated with the lower occupation levels of Block B. Feature 158, a posthole of unknown diameter, is located in Level 10 of B31. A second posthole (Feature 162) is located in Level 11, on the eastern rim of the pithouse (B19). It measures approximately 16 cm in diameter. A single posthole of unknown dimensions is recorded for Level 12, B13 (Feature 171, 95.76 m). The remaining two postholes (Features 103 and 107) were located in units B24/25 (Levels 13-16), and B26/27 (Level 14). Based on mapping data, their diameters measure approximately 15 and 20 cm, respectively. One or more additional postholes may be represented by the circular stains south of the ash feature in B6 (Feature 110; Mazany, fieldnotes, July 2, 1981).

With rim profiles limited to one unit (B21), little information is available concerning pithouse wall shape. As in Block A, 40-50 cm of the original clay matrix appear to have been excavated for the house floor. The floor itself rises gradually towards the walls, which then rise abruptly the last 30 cm to the rim. West of Block B, a rim segment of an additional, steep-walled, depression can be seen in the west and north wall profiles of unit B20 (Figure 46). Its floor, at about 96.00-96.10 m, is slightly higher than the floor of House B.

A plan sketch of House B places the entrance of the house at its northern end. Mapping data for the site, on the other hand, suggest a continuous rim between units B5 and B2, but indicate a possible doorway at the southwestern edge of the house (see Figure 59). The abrupt decline in numbers of artifacts and flakes between B6 and B2 tends to support the presence of a wall, rather than an entryway, to the north. At present, a more definitive statement regarding the precise outline of the house is not possible.

Storage Features

Eight features from Block B are identified as pits, all associated with the lower occupation. Six are mapped on the planview shown in Figure 59. These include features 103, 106, 109, 179, 187, and 188. Feature 103 is a 25 cm deep pit of approximately 25 cm diameter in B24 (levels 14-16, 95.45-95.20 m). Feature 109 is located in levels 15-17 of B14, and measures approximately 25 cm in diameter and 17 cm in depth. Feature 179, in Level 14-16 of B8 (95.59-95.38 m), measures 35 cm in diameter and is 21 cm deep. In B16, the unit adjacent to B8, excavators observed a "mound of sterile clay covering brown soil," presumably from the excavation of the pit, which suggests a longer term occupation or reoccupation of this floor. A large, pit (Feature 187) was, finally, plotted at the boundary of units B16 and B17. It measures 60 cm east-west and 45 cm north-south, with a depth of between 15 and 25 cm (exact depth unknown).

Two additional pits (Features 163 and 174) are located in units B23 (Level 11) and B36 (Level 12), respectively. Feature 163 was postulated by the field crew to account for the vertical position of bone and flakes in the southwestern portion of B23. Feature 174 is said to have been excavated into sterile clay. No further details are available regarding either of these features.

Specialized Activity Areas

Six areas are characterized as specialized activity areas. Three (features 2, 147, 149) consist of concentrations of bone. All were observed in the triangle formed by three adjacent units B22, 23, and 31. Elevations encompass 95.76-95.63 m in B23 (Feature 2, Level 12), 96.03-95.93 m in B22 (Feature 147, levels 9-10), and approximately 95.90-95.60 m in B31 (Feature 149, levels 9-11). The three concentrations are probably the result of either a single activity or longer-term refuse deposition on this part of the floor (see Faunal Remains, this chapter).

Other specialized activity features include Feature 154, an area of burned clay with a concentration of ochre in Level 10 of B3, Feature 160, consisting of a concentration of hackberry seeds found throughout Level 11 of B6, and Feature 172, identified as a flake scatter in Level 12 of B22 and B13.

As a result of the horizontal patterning observed in the distribution of grinding stones on Floor 4 of House A, all metates associated with the lowest floor of House B were plotted. This includes seven catalogued specimens and one grinding stone (#832) for which there is no entry in the original artifact catalog. All specimens recorded in Level 12 or lower are included, spanning elevations from 95.33 to 95.63 m. Specimens from above these levels were excluded due to the uncertainty of floor assignment.

The distributional patterning of House B is not as clear as that of House A, primarily because of the smaller sample and the incomplete excavation of this housepit. However, here, too, grinding stones are found in one portion of the house, the eastern portion, while they are absent from the western third. Rather than being arranged in a circular pattern as in House A, metates are scattered without any apparent patterning. Their distribution appears, however, to correspond with the distribution of pit features, with each useable grinding stone (excluding small, fragmentary specimens #634, 1357, and 539) lying adjacent to a pit. The only exception is undocumented metate #832. The maximum distance between members of a pair is approximately 65 cm (Cat.# 1355 and Feature 109); members of the remaining five pairs are either immediately adjacent to each other or within 10-30 cm. While the association of grinding stones and storage pits may be be related to food processing, the grinding stones may also have served to cap storage pits (cf. Musil 1992:161).

Rock Features

Four features from Block B are identified as "rock clusters." Features 122 and 139 were both encountered in unit B19 (levels 4 and 8, respectively). Feature 145 was found in Level 9 of B13, while Feature 173 was excavated in Level 12 of B32. Comments regarding these phenomena are sparse. Feature 122 was marked "no cultural associations," while Feature 173 was said to consist of a "small pile of fire-stained and broken rocks." No other information was recorded.

Radiocarbon Dates

Data on four charcoal samples submitted by OMSI for radiocarbon dating were retrieved through a records search with the Laboratory of Isotope Geochemistry at the Univeristy of Arizona, Tucson (Table 19). All four samples are from buried charcoal, including two from Block A (A-2602, A-2604) and two from Block B (A-2603, A-2605). In a letter report of the analysis results, sample proveniences are given by site coordinates. All y-coordinates consist of three digits (eg. 864, 764, 874, 774), unlike the standard two digits used for the north-south axis at the site. As the last digit is consistently "4," and no decimal is indicated, it has been assumed that this number is not of critical locational significance.

Sample A-2602: This sample is attributed to Level 10 of unit A28. It appears to correspond with the charcoal scatter and associated metate identified as Feature 5. A date of 1500 ± 25 B.P. was returned.

Sample A-2604: This sample was collected from unit A22 and is attributed to Feature 3, the slab-lined hearth associated with a surface level of approximately 97.37 m (Level 7 in A22). A radiocarbon date of 890 ± 20 B.P. was returned. This date is stratigraphically consistent with the earlier date of 1500 ± 25 B.P. discussed above.

Sample A-2603: This sample was collected from unit B32. It is attributed to "pithouse floor" and is associated with the charcoal scatter identified as Feature 4. While the vertical boundaries of the scatter are not clear, it was drawn at an elevation of 95.54-95.51 m,

Table 19. Radiocarbon Dates and Source Information, 35WH14

Sample Number	Lab Number	Radiocarbon Age	Source of Sample	Sample Location
1	A-2602	1500±25 B.P.	Charcoal scatter, Feat. 5	A28, L.10
2	A-2603	2450±40 B.P.	Charcoal scatter, Feat. 4	B32, L.13
3	A-2604	890±20 B.P.	Hearth, Feat. 3	A22, L.5-8
4	A-2605	2580±40 B.P.	Ash pit, Feat. 103	B24, L.14-16

placing it in Level 13 of B32. Sample A-2603 was dated to 2450 ± 40 B.P.

Sample A-2605: This sample is attributed to an "ash pit in pithouse floor," in unit B24. It is undoubtedly associated with the pit (also mapped as an "ash pit") identified here as Feature 103, extending from 95.45 to 95.20 m̄ (levels 14-16). The submitted charcoal sample was dated to 2580 ± 40 B.P.

Student's t ratios were calculated for each pair of dates using uncalibrated age values (Thomas 1986:249-251). All four dates are significantly different, when compared with the expected t-value of 1.96 (α=0.05). The results are presented in Table 20. While the *calibrated* ages for A-2603 and A-2605 (2468 B.P. and 2742 B.P.) are separated by almost 300 years (Table 21), their minimum ages at one sigma are fairly close together and overlap at 2 sigma. It is felt that the occupational episodes represented by the two early radiocarbon dates are probably fairly similar in age. All four radiocarbon dates are internally and stratigraphically consistent.

Table 20. Radiocarbon Dates and Calibrated Ages, 35WH14

Sample Number	Radiocarbon Age	Calibrated Age[1]	Minimum Cal. Age[2]	Maximum Cal. Age[2]
1	1500 ± 25 B.P.	1354 B.P.	1402 B.P.	1341 B.P.
2[3]	2450 ± 40 B.P.	2468 B.P.	2708 B.P.	2358 B.P.
3	890 ± 20 B.P.	782 B.P.	789 B.P.	742 B.P.
4	2580 ± 40 B.P.	2742 B.P.	2750 B.P.	2719 B.P.

1. calibration based on Stuiver and Pearson 1993
2. calibrated age range at 1 sigma
3. multiple possible intercepts at 1 sigma

Table 21. Computed t-ratios for Paired Radiocarbon Dates

Radiocarbon Age	Radiocarbon Age			
	890	1500	2450	2580
890	---	20.61	34.88	37.79
1500	20.61	---	19.08	21.84
2450	34.88	19.08	---	2.30
2580	37.79	21.84	2.30	---

LATE ARCHAIC VARIABILITY AND CHANGE ON THE SOUTHERN COLUMBIA PLATEAU:

ARCHAEOLOGICAL INVESTIGATIONS IN THE PINE CREEK DRAINAGE

OF THE MIDDLE JOHN DAY RIVER,

WHEELER COUNTY, OREGON

Vol. 2

by

PAMELA ETHEL ENDZWEIG

A DISSERTATION

Presented to the Department of Anthropology
and the Graduate School of the University of Oregon
in partial fulfillment of the requirements
for the degree of
Doctor of Philosophy

June 1994

Artifacts Collected

Flaked Stone Tools

Projectile Points

Projectile points are represented by 405 specimens at 35WH14. A large proportion are proximal fragments (37.53%), suggesting the importance of retooling at the site. Reworked specimens are uncommon. Almost 20 percent of the points are complete, with the balance made up of distal, medial, and lateral fragments in approximately equal proportions. Raw material is predominantly CCS (71.11%), although with a substantial amount of obsidian (28.15%). Basalt makes up less than one percent of this artifact class, and was clearly not the material of choice.

Classifiable projectile points are divided roughly equally between both excavation blocks, with 97 specimens recovered from Block A and 124 specimens from Block B. Densities are higher in Block B, with 2.63 points per m^3 as compared to 1.86 points per m^3 in Block A. Cryptocrystalline silicates represent the dominant raw material (N=157, or 70.72%) overall, though with a relatively large proportion of obsidian (N=64, or 28.83%). A single basalt point is present, representing less than half a percent (0.45%) of the entire collection. Both excavation blocks show almost identical representations of raw material (Table 22).

Table 22. Distribution of Classifiable Projectile Points by Raw Material, 35WH14

Raw Material	Both blocks		Block A		Block B	
CCS	157	(70.72)	68	(70.10)	89	(71.77)
OBS	64	(28.83)*	28	(28.87)	35	(28.23)
BAS	1	(0.45)	1	(1.03)	0	(0.00)
Total	222	(100.00)*	97	(100.00)	124	(100.00)

* includes one specimen of unknown provenience

The relative abundance of obsidian among projectile points represents a departure from the distribution of raw material among lithic debitage. There, obsidian comprises only 5.70% of all flakes (see Lithic Debitage, this chapter). A similar pattern was observed at site 35WH7 (Chapter 5), although the proportion of obsidian at that site was lower overall. It suggests that this raw material was brought to the sites either as late-stage preforms or as finished tools. Basalt, was clearly, not favored for the manufacture of projectile points.

Point neck widths at 35WH14 range from 3.2 mm to 15.90 mm. Like raw material proportions, measurements for both excavation blocks are nearly identical, with a mean of 9.51 mm for Block A (N=87, S.D. 2.52) and a mean of 9.89 mm for Block B (N=108, S.D.=2.61). The distribution of neck widths is graphically represented in Figure 60. As at 35WH7, the distribution shows a minimum between 6 and 7 mm, separating broad-necked dart points from narrow-necked arrow points. While a few narrow-necked specimens (less than 7 mm) are present in both excavation blocks,

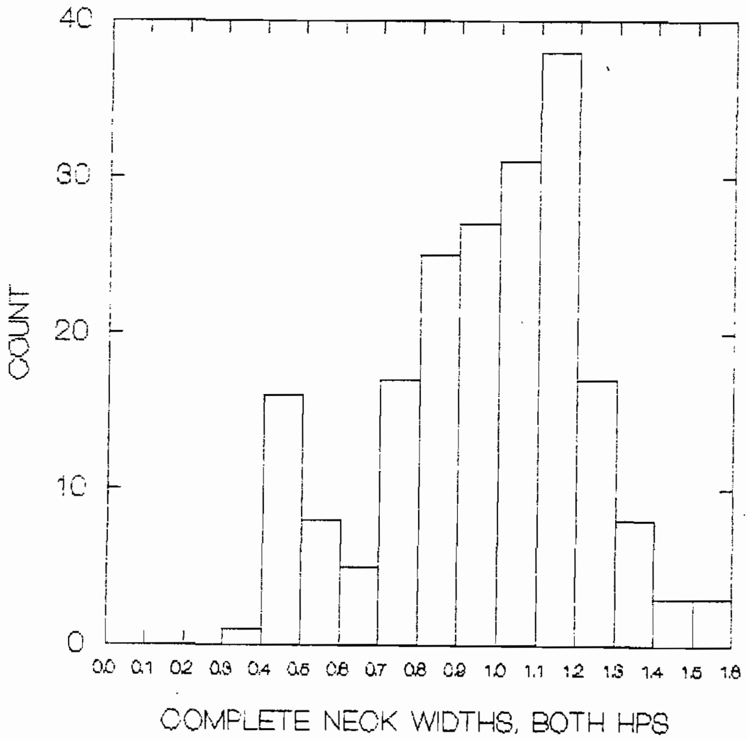


Figure 60. Frequency distribution of projectile point neck widths (complete neck widths only).

they only constitute 13% of the assemblage (N=28). Broad-necked dart points predominate, with a mode of 11 to 12 mm.

Classification

The large number of the complete points and proximal fragments allowed the assignment of 222 specimens, or more than half of all projectile points, to commonly identified Columbia Plateau or Great Basin "chronotypes" (Wilde 1985). Most specimens could be accommodated under Dumond and Minor's Wildcat Canyon classification scheme (Dumond and Minor 1983). Deviations and inconsistencies will be discussed in conjunction with the individual types. General definitions and age assignments have been presented in Chapter 5 and will not be repeated here. Comparative treatment of projectile point types at 35WH14 is reserved for the discussion of components at the end of this chapter; the following section is devoted primarily to descriptive information. Specific measurements and proveniences are tabulated in Appendix B.

ES1 (Figure 61a-e): Eighteen specimens were identified as ES1. These include six from Block A and twelve from Block B. Shapes vary, including corner-notched specimens with short barbs as well as basally notched points with long, flaring barbs. Obsidian is common, with eight specimens made of this material. The rest are CCS. One white chert point from Block A (Cat. #661) exhibits a fragmentary base which is uncharacteristically wide and thick and may represent the sort of diamond-shaped base sometimes observed on points classified as DR by Dumond and Minor (1983:171). A second fragmentary specimen with a missing basal element has been assigned to this type on the basis of general morphology and neck width, following Dumond and Minor (1983:170).

Points of this type occur in levels 3 through 8 in Block A, with a single, but mislabeled, specimen attributed to Level 12. In Block B, ES1 is found 4 through 9. This suggests that this type is not associated with the basal occupation of the site.

ESI1 (Figure 61f): This type is represented by a single chert specimen from Block A. It is complete and exhibits long, flaring barbs

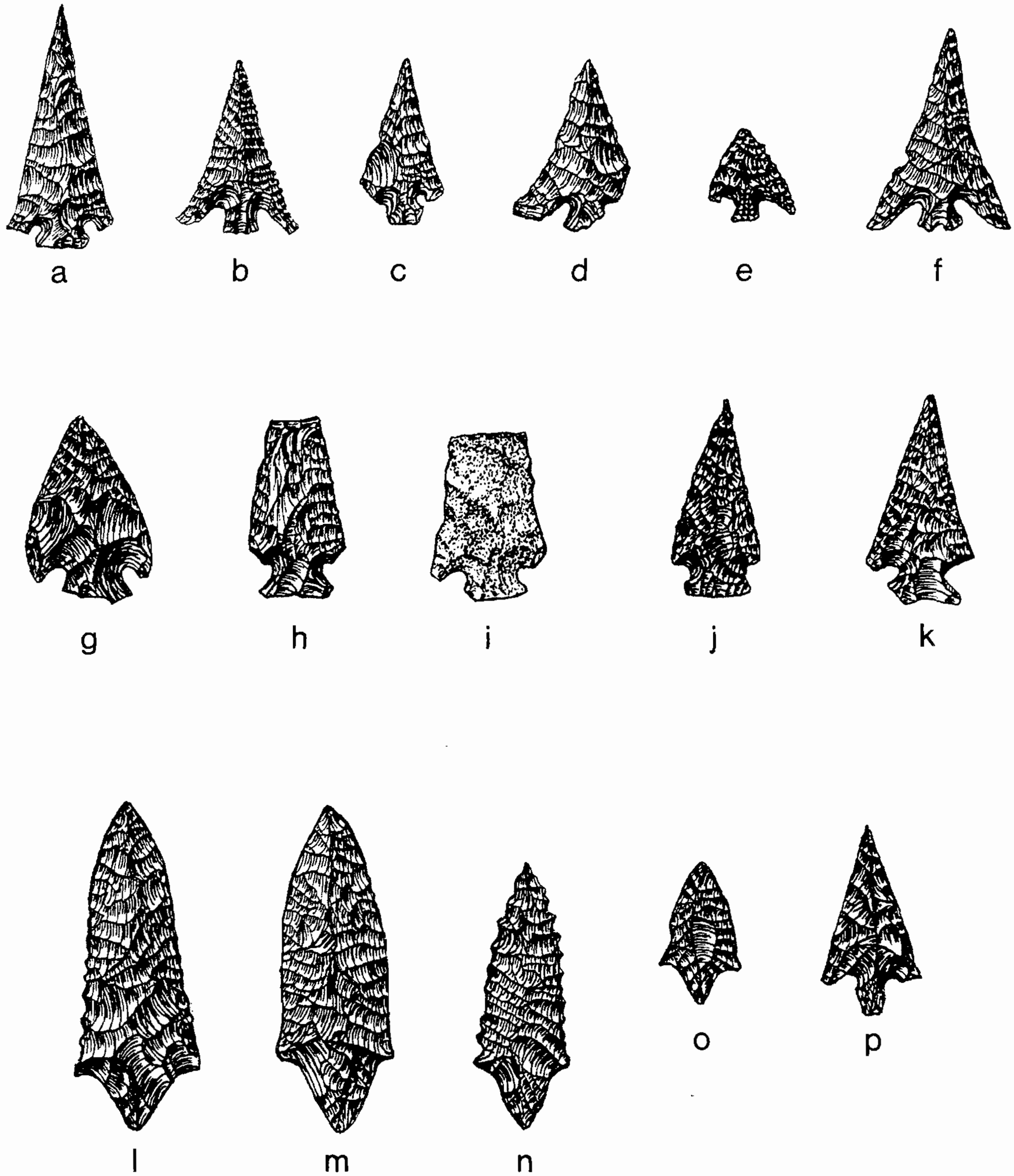


Figure 61. Projectile points, Expanding Stem series, CS1, and PS, 35WH14.

a.	828	e.	366	i.	682	m.	1073
b.	1237	f.	1140	j.	261	n.	826
c.	816	g.	214	k.	783	o.	1103
d.	118	h.	1299	1.	960	p.	1122

created by basal notching. The stem is notched from the base as well. The specimen was recovered from Level 12 of Unit A28, placing it with the earliest occupation of House A.

ES2 (Figure 61g-j): Seven specimens were classified as ES2. While this type encompasses some morphological variation, it is less pronounced than among ES1 (though this simply reflect the bias of a small sample). Five specimens are made of CCS, the remaining two of obsidian. Two, both of CCS, were recovered from the southwest corner of Block A (A32, Level 2; A47, Level 6). The remaining specimens were found in Block B. The two most likely associated with undisturbed deposits were recovered from levels 10 and 12 of B23. The rest were found in units which straddle the rim of the pithouse (Level 9 of B10 and B35; Level 3 of B38).

ESI2 (Figure 61k): Two fragmentary specimens of this type are present, one of obsidian from Level 11 of A20, the second, of CCS, from Level 8 of B5.

ES3/ESI3 (Figure 62): Fourteen specimens from 35WH14 are subsumed under ES3 as defined at the Wildcat Canyon site, twenty-two under ESI3. Both sets are characterized by enough consistent internal morphological variation, to warrant their division into three varieties. Because of the intergrading of basal-shapes, and the small numbers involved in several of the groups, both indented-based and straight- or convex-based varieties will be discussed together, although the separation established at the Wildcat Canyon Site will be maintained. Where

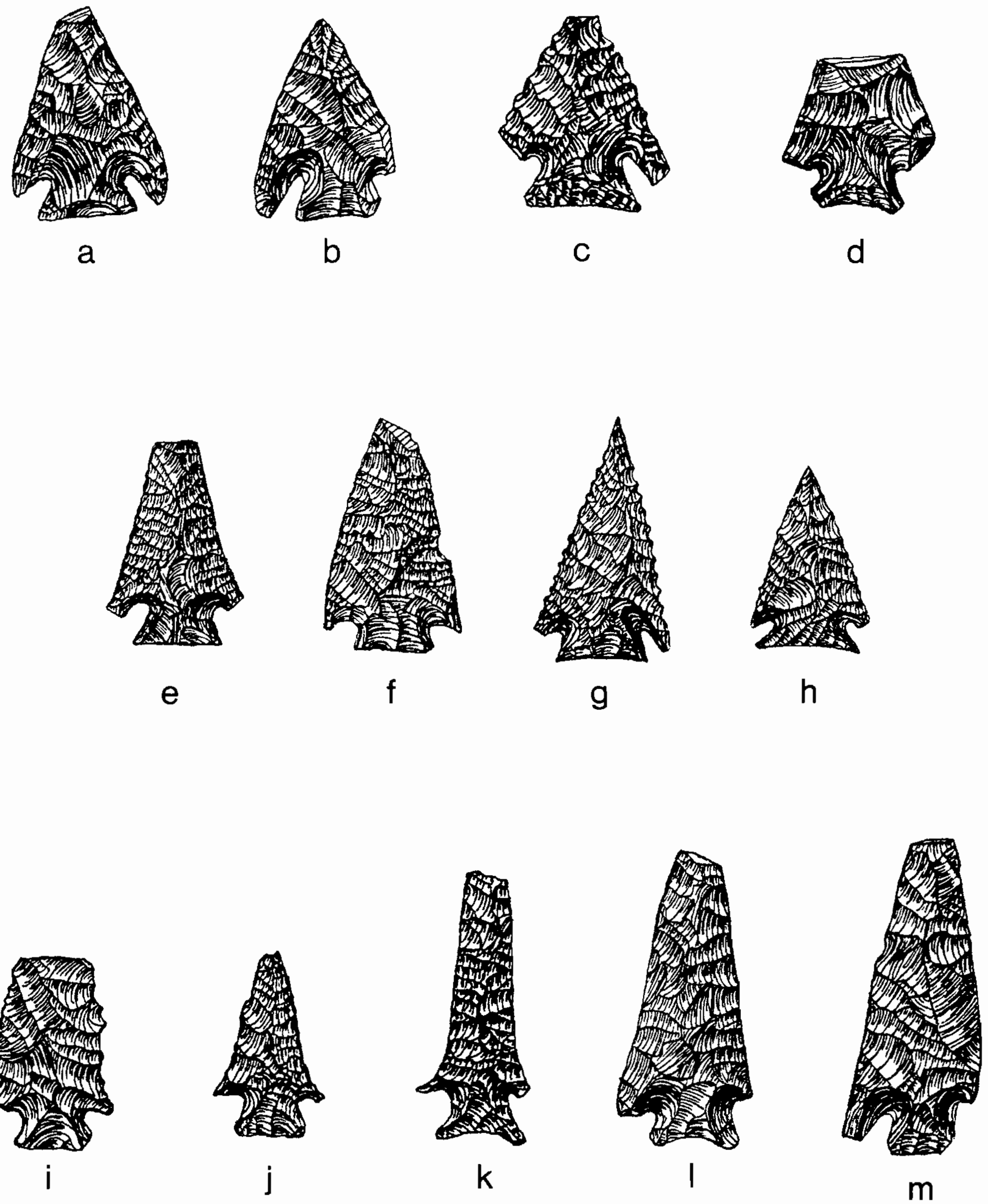


Figure 62. Projectile points, ES3 and ESI3, 35WH14.

a.	850	e.	241	h.	1024	k.	937
b.	1185	f.	1209	i.	334	l.	447
c.	785	g.	1039	j.	975	m.	239
d.	1178						

measurements are not mentioned, they fall within the range stipulated for the Wildcat Canyon Site.

ES3A/ESI3A (Figure 62a-d): This variety is represented by relatively stout points ranging in thickness from 4.6 to 5.5 mm, and from 20.4 to 21.9 mm in width. Lengths on the three relatively complete specimens are 26.9 mm, 28.6 and 33.2 mm. All are basally notched and exhibit long barbs which end at or slightly above the base. Stem lengths range from 5.5-7.6 mm, with a mean of 6.3 mm. Barbs are rounded or squared. Several of the points are fashioned on tear-drop shaped blanks, resulting in convex margins. In the rest, margins are straight. Bases are straight to convex. The nine specimens were found in association with both blocks, generally in the middle levels (levels 5 through 10), although one specimen was recovered from Level 2 of Block A. Eight of the specimens are manufactured of CCS, one of obsidian.

ES3B/ESI3B (Figure 62e-h): This variety is a thin, finely worked point with straight, often serrated margins, and sharp, pointed, rearward projecting barbs. Notches are long and deep and placed either at the base or corner. Flaking is finer than in ES3A/ES3IA, and frequently consists of narrow, parallel scars. The indented-based version of this variety is considerably more common and is represented by ten specimens, in contrast to the three straight-based examples. Lengths on the complete specimens measure 24.8 mm, 25.7 mm, and 32.8 mm, however the shorter two of these three have been reworked and a considerably greater maximum length is indicated by fragmentary specimens exceeding 30 and even 40 mm. Thicknesses range from 3.1 to

5.4 mm, stem lengths from 4.1 to 7.7 mm with an average of 5.9 for straight-based, and 5.6 mm for indented base specimens. Complete widths range from 17.1 to 21.4 mm.

ES3B/ESI3B are associated with both excavation blocks, including two from levels 8 and 9 found in the area between the housepits (Cat. #362, B1/L-8; Cat. #561, A51/L-9). Vertical associations range from levels 6 through 12, with a single somewhat atypical fragment recovered from Level 2 of Block A. The latter specimen is the only one of obsidian; the rest are of CCS.

ES3C/ESI3C (Figure 62i-k): This variety is, once again, very different from the other two, but internally rather consistent. In spite of their broad neck widths, which would suggest use with atlatl and dart, these are rather small, arrowpoint-sized projectiles. They exhibit short barbs which project laterally, and broad, corner-notches which extend rearward into the base, such that the maximum width is always at the shoulders. Specimens with indented bases are more common than those with straight bases (N=8, vs. N=3). Margins are usually concave and occasionally serrated. Several of these points appear to have been laterally reworked. Four are made of obsidian, the rest of CCS. ES3IC, in particular, tend to intergrade with SN5 as defined at Wildcat Canyon (Dumond and Minor 1983:171).

The eleven points grouped within this variety, while spanning levels 2 through 10, were often recovered from higher elevations, including one from Level 2, two from Level 3, and two from Level 4. The most distinctive feature of their distribution is their tendency to cluster above and around the margins of the pithouse depressions. While this would seem to exclude them from the earliest occupation of the site, it does not exclude the possibility than they were displaced from lower levels and more central locations by one of the episodic reexcavations of the depression.

Complete specimens measure 25.1 mm, 29.6 mm, and 40.2 mm in length. Widths range from 12.7-17.4 mm, thicknesses from 3.4-5.3 mm. Stem lengths measure between 5.6 mm and 7.3 mm, averaging 5.8 mm for ES3C and 6.4 mm for ES3IC.

Unclassifiable ES3/ESI3 (Figure 621-m): Four specimens cannot be assigned to either of the 3 varieties distinguished above. All appear to have been reworked from broken points by reworking of one lateral margin. All are, as a result, asymmetrically barbed. Three exhibit straight bases, one an indented base. Given the small number of points involved, their measurements will not be detailed here, but are available in Appendix B. But it should be noted that three of these points were recovered from Level 12 of their respective excavation units (A21, B23, B32). As these were found inside the housepits (one from Housepit A, and two from Housepit B), they would appear to be associated with the early occupation of the site. The fourth specimen is from Level 6 of B23. All are made of CCS.

ES4/ESI4 (Figure 63): Like ES3, ES4 type points have been subdivided to reflect the internal variation of this type. As above, straight- or convex-based specimens will be discussed together.

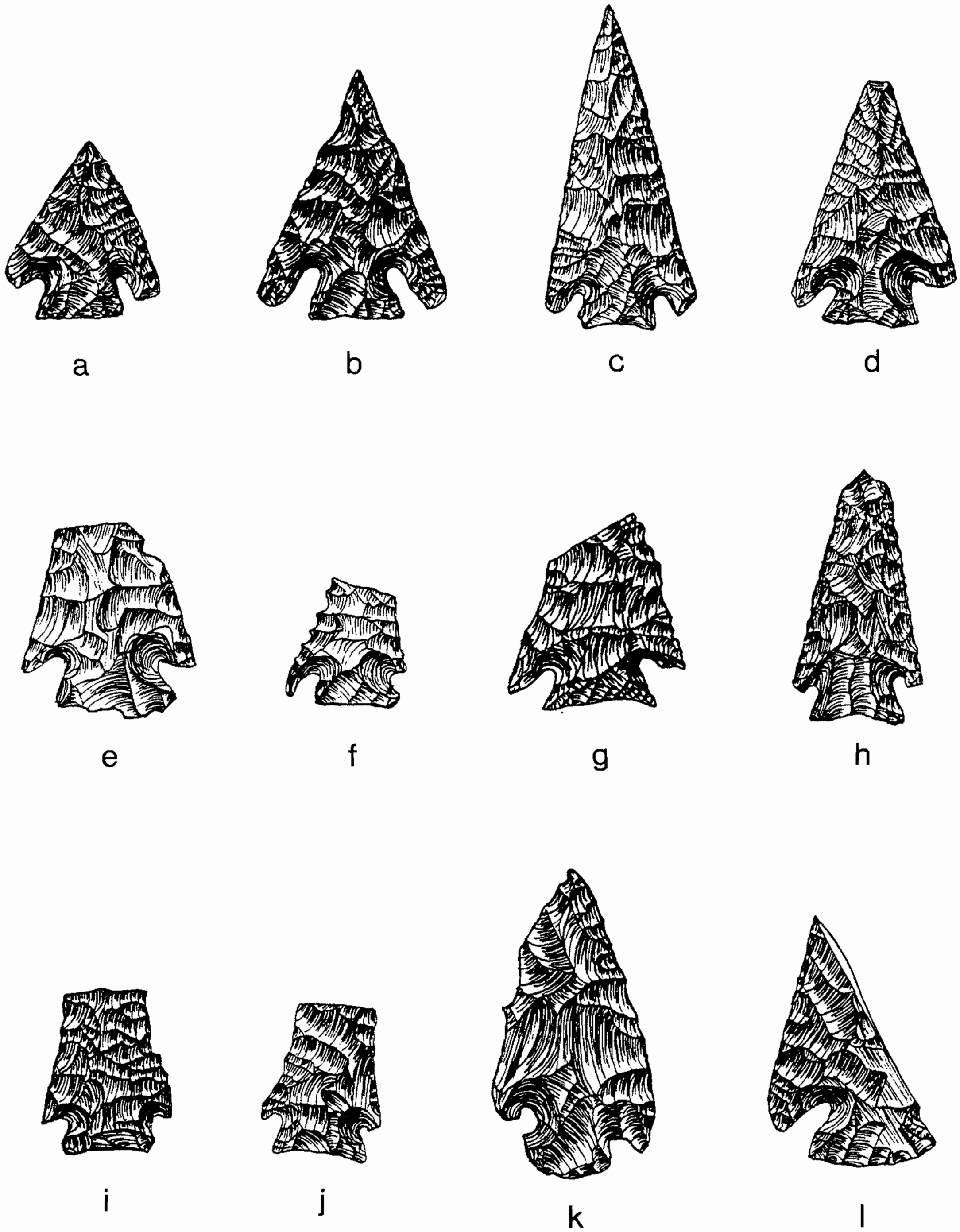


Figure 63. Projectile points, ES4 and ESI4, 35WH14.

a.	1127	d.	462	g.	413	j.	143
b.	256	e.	211	h.	560	k.	616
c.	815	f.	15	i.	880	l.	674

ES4A/ESI4A (Figure 63a-d): The 23 points in this category are shaped like ES3A/ESI3A specimens, but are slightly larger, with neck widths of 10 mm or more. All are basally notched, with long blunt barbs (either rounded or squared). Eighteen straight or slightly convex-based specimens are present (including two conjoined fragments), and five with slightly indented bases. Examples occur in roughly comparable numbers with both excavation blocks. In Block B, all but two (from levels 4 and 6) were recovered between levels 8 and 14. This suggests an association with the earlier occupation of this area. Less patterning is apparent in Block A, although here, too, at least three specimens were recovered from the basal deposits (levels 11 and 12). In addition, eight of the ten specimens in Block A cluster in the northern portion of the housepit, a pattern that may be associated with the earlier occupations in this part of the site and will be discussed later. Three specimens are made of obsidian; the remaining 20 (87%) are CCS.

Complete lengths on ES4A/ESI4A range from 26.1-47.4 mm, widths from 22.8-26.0 mm, and thicknesses from 4.0-6.1 mm. Stem lengths vary between 5.8 mm and 8.1 mm.

ES4B/ESI4B (Figure 63e-h): These ten points are analogous to their smaller counterpart ES3B/ESI3B. They are relatively thin and finely flaked, and are notched from the base at or just in from the corner, creating sharp, well-defined barbs. Lateral margins are sometimes serrated. As with ES3B/ESI3B, the indented-based variety is more common. Only one straight-based specimen is present. Lengths range from 34.9-36.7 mm, however this is based on only three complete specimens. Widths are between 16.9 and 25.7 mm, thicknesses between 4.1 and 6.0 mm. Stem lengths range from 4.3 mm to 8.4 mm.

Eight of the ten points in this category were recovered from Block B, where they range from levels 3 through 14 in elevation. The two found in association with Block A were recovered from levels 2 and 3 of two units situated along the edge of the depression (A15, A15). CCS is, again, the predominant raw material, with only two specimens made of obsidian.

ES4C/ESI4C (Figure 63i-j): This is a short-barbed variety of ES4/ESI4, which is characterized by broad, open corner-notches, short, sharp shoulders, broad bases, and relatively long, narrow blades. Complete lengths are 34.9, 35.2, and 36.7 mm, widths range from 17.3-21.3 mm, and stem lengths measure 3.8-7.3 mm. Thicknesses are between 3.5 and 6.8 mm. All 13 points are of CCS.

All but one of the eight specimens associated with Block A were recovered from the northern half of the depression, where they occur from levels 4 to 9. The five specimens from Block B encompass levels 6 through 12, including two specimens from Level 12 from the interior of House B.

ES4D (Figure 63k-l): Four specimens have been assigned to this variety. They are large, heavy points fashioned on teardrop-shaped blanks which are merely notched at the corner, so that the points retain their original convex margins. Barbs are short and broad, and project backward, ranging from rounded to pointed in shape. Two of the points are obsidian, the other is CCS. The single specimen from Block A was recovered from Level 10; the three from Housepit B were found in levels 6, 10, and 11. The sole complete specimen is 45 mm long, 24.7 mm wide, and 6.4 mm thick. The remaining three specimens, though now fragmentary, were probably originally larger than the complete point.

Unclassifiable ES4/ESI4: Nine specimens cannot be assigned to any particular variety of this type because of their fragmentary condition. Seven are straight-based, two have indented bases. Three are of obsidian, and five of CCS. The remaining specimen appears to be made of fine-grained basalt, which would make it the only basalt projectile point from the site. Specimens in and at the edge of the two house depressions range from levels 7 through 13. One fragment from the intermediate area (unit A53) was found in Level 1, possibly displaced from lower levels as a result of housepit reexcavation.

<u>CS1</u> (Figure 61l-o)): Eight points were identified as CS1 at 35WH14. They are generally consistent with Dumond and Minor's definition of this type, except for one diminutive specimen (Cat. #1103; Figure 61o) which is 20.3 mm long, almost 6 mm less than the minimum 26 mm given by Dumond and Minor (1983:172). A second specimen of 25.5 mm length (Cat. #127), falls just at the defined boundary. Another slight variation is represented by blade configuration. While blade margins of this type are usually straight or concave at 35GM9, they are consistently convex, sometimes curving inward slightly just above the barbs at 35WH14. Serration has occasionally been applied.

The three specimens found in Block A were recovered from Level 6 of units A44 and A47, near the southern margin of the depression, and in

Level 11 of A29 (this is the diminutive specimen mentioned above). Five specimens were associated with Block B, where all but one were found either along or outside the margins of the house depression. A single, heat-affected specimen was excavated from Level 10 of B26, thus from within the bounds of the pithouse. Remaining elevations encompass levels 3, 4, 6, and 11.

CS2 (Figure 64a-c): Twelve projectile points from 35WH14 are consistent with Dumond and Minor's definition of CS2. Three were recovered from Block A (along the edge in levels 3 and 6 and in the center in Level 9); the remaining nine were found towards the edge of and around Housepit B between levels 5 and 14. Raw material is predominantly CCS, although three specimens of obsidian are present as well. Three points from Housepit B appear to be made of the same raw material, a beige chert, and exhibit very similar dimensions and workmanship. Two of these were recovered the lower levels of the housepit (Level 11 in B22 and Level 13 in B18). The third, while found at a higher elevation along the edge of the depression (Level 5 in B12), may have been associated with the rim of the housepit or fill displaced in the reexcavation of one of the floors. The mutual similarity of these three points suggests a contemporaneous origin.

CB2 (Figure 64d-e): Three specimens are compatible with the type CB2 as it is defined by Dumond and Minor (1983:172). These are foliate points with pointed bases and serrated blades. In the two complete specimens, the maximum width of the point falls at the juncture of the base and blade; in the fragmentary example, the blade widens slightly,

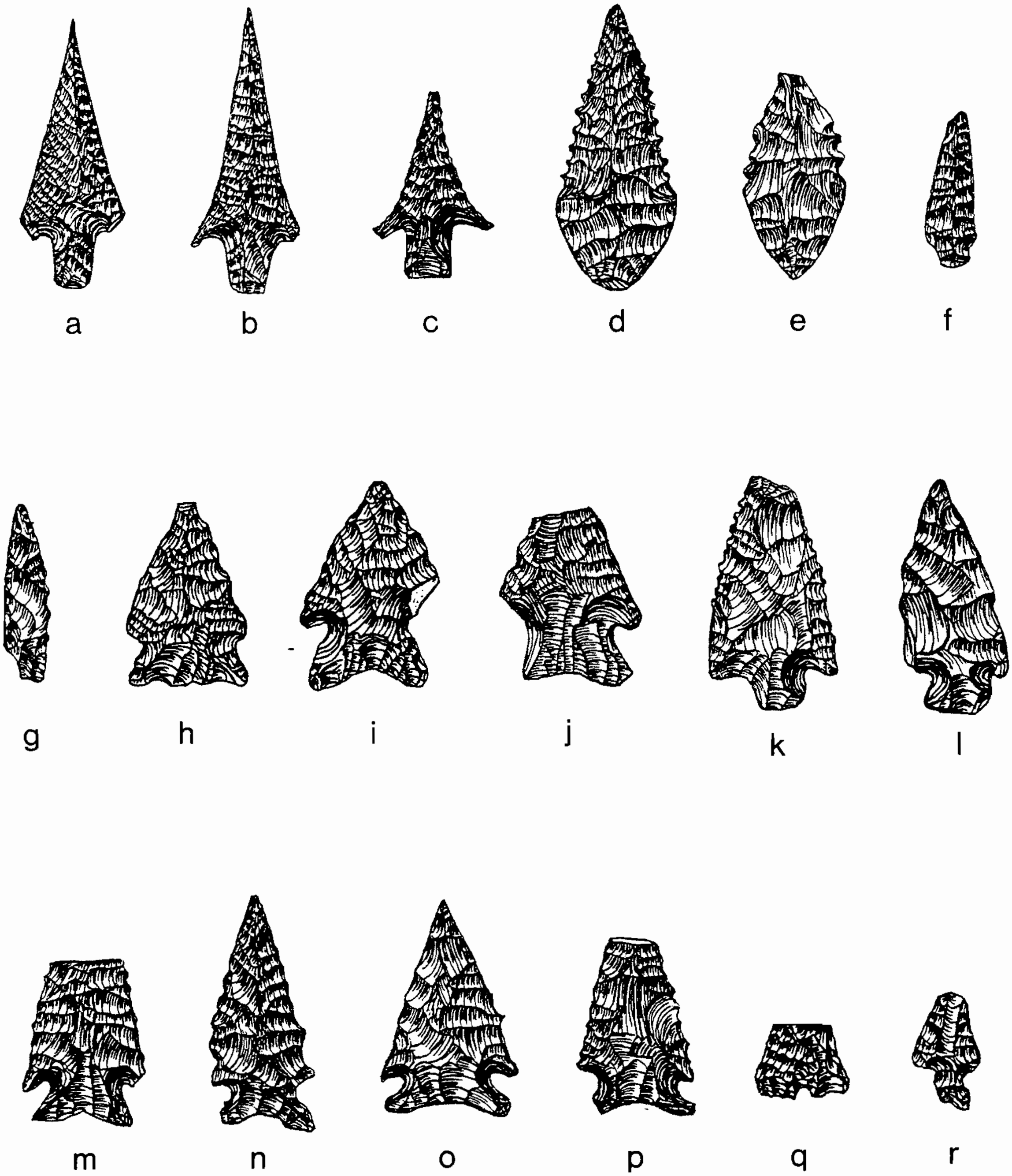


Figure 64. Miscellaneous projectile point types, 35WH14.

a. 267
b. 876
c. 797
d. 1303
e. 1157

f. 505
g. 1000
h. 244
i. 1086
j. 694

k. 554
l. 967
m. 587
n. 1055

o. 532
p. 1254
q. 1167
r. 856

suggesting a greater original length for this specimen than for the other two. All three are made of CCS. One was recovered from Level 2 of unit A52 at the southern edge of Block A; the other two are attributed to levels 7 and 12 of Block B (B9 and B22).

SN3 (Figure 64h-j): Fifteen specimens are consistent with type SN3 as defined at the Wildcat Canyon Site (Dumond and Minor 1983:171). They are generally large, heavy specimens with thinned bases that range in shape from straight, to concave, to eared. Most of the representatives of this type at 35WH14 are in fragmentary condition and a few may actually be broken Expanding Stem series points, although it is felt that incidences of misidentification are minimal. This is the only point type at 35WH14 for which use of obsidian exceeds that of CCS (53%, vs. 47%).

SN3 points are found with both housepits, though they are considerably more common in Block B. The four specimens from Block A (three of which are obsidian) are concentrated along the northern edge of the depression, a pattern which has been noted for several other point styles and will be discussed in greater detail below. They were recovered from levels 5, 6, 8, and 11. The eleven SN3 points recovered from the Housepit B show no apparent horizontal patterning, however they may be associated with the earlier occupations, one each having been excavated from levels 5, 6, 7, and 9, two specimens from Level 10, four from Level 11, and one from Level 13. This vertical distribution, the large size, and the worn surface of several of the specimens may suggest geater antiquity than many of the other types at the site.

<u>SN4</u> (Figure 64k-l): Three specimens are assigned to Dumond and Minor's SN4 type, although they have narrower notches than most of the examples illustrated in the Wildcat Canyon Site report, resulting in a somewhat more pronounced barb. Two of the present specimens are made of CCS, the third is of obsidian. They were recovered from Level 6 of A32, Level 8 of A51, and Level 10 of B3. The latter specimen (#967) appears to have been water-rolled.

<u>SN5</u> (Figure 64m-p): Twenty-two specimens are classified as SN5. The sample from 35WH14 exhibits considerably less variability than this category of points at 35WH7, although this may be explained by the lower frequencies of this point style at 35WH14 (42 points were classified as SN5 at 35WH7). Of the 19 specimens complete enough to assign to one of the varieties identified at 35WH7, one small specimen with less pronounced shoulders would be considered an SN5D, while the rest would be classified as SN5B. This variety is characterized by basal ears reminiscent of Elko Eared points of the Great Basin. While this appears consistent with the examples illustrated in Dumond and Minor's report (e.g. 1983:Plate 5), it contrasts with the predominance of concave-based specimens at 35WH7. Unlike 35WH7, the present site also produced none of the broken and substantially reworked points assigned to SN5C.

A departure from the pattern observed at the Wildcat Canyon Site is represented by the predominance of smaller neck widths at 35WH14. While Dumond and Minor indicate a range of 11-15 mm, this applies to only six specimens, or less than a third of those found at the present site. Here neck widths range from 8.6-13.1 mm, with a mean of 10.6 mm.

Serration also appears to be less common at 35WH14, possibly suggesting some significance to the presence or absence of this attribute.

SN5 type points are found throughout both excavation blocks. In Block A, they are found from levels 1 to 13, in Housepit B from Level 1 to Level 12. CCS is the predominant raw material, represented by 20 specimens (91%); the remaining two (9%) are obsidian.

SN6 (Figure 64q-r): One small side-notched point of obsidian was found in Level 7 of unit A28. While the specimen is too fragmentary to allow a detailed identification, it does not appear to resemble Desert Side-Notched points typical of the Great Basin (see Chapter 5). The concave blade margins, short basal element and what appear to be the remains of short barbs are more reminiscent of the second variety of SN6 described for 35WH7. Measurements are not given here due to the fragmentary state of this specimen (but see Appendix B).

An additional specimen has been included under this category. It is the basally-notched lower half of a small, triangular point. Unfinished Desert-Side Notched points in various stages of completion--e.g. with only a basal notch, only a side-notch, or a basal notch and a single side notch--were observed at 35WH7, where they were included under SN6. In light of its similarity to these items, the present specimen (Cat. #1167) has been subsumed under this type.

PS (Figure 63p): Only one PS point, a relatively common style at 35WH7, was recovered from 35WH14. This is consistent with a greater age of the radiocarbon-dated deposits. The single PS point from 35WH14 was found in Level 4 of unit A43.

BL (Figure 64f-g): Three specimens which do not resemble points described from the Wildcat Canyon Site are provisionally referred to as "BL", or blade-like. They are thin and narrow, ranging when complete from 23.2 to 26.4 mm in length (N=2) and from 7.3-8.5 mm in width (N=3). Thicknesses are 2.9 and 3.5 mm, weights between 0.43 and 0.57 g. All are characterized by straight-edged blades, a very slight suggestion of a shoulder, and a short, irregular and asymmetrical stem which comprises approximately 20-25% of the length of the entire specimen. It is not clear what purpose these implements served, although it does appear that they were made to be hafted. The closest analog encountered in the regional archaeological literature is Pettigrew's Type 6b from the Portland Basin (Pettigrew 1981:16-17), which does not, however, appear to exhibit the slight shoulder noted in the present specimens. Type 6b occurs only in low frequencies in the Portland Basin and is not felt to be a reliable chronological indicator (Pettigrew 1981:109).

Two of the present specimens are of CCS, the third is of obsidian. All were found in Block A: from Level 8 of A53, from Level 11 of A20, and from Level 9 of A35.

ES/SN: Twenty-eight basal elements of broken expanding-stemmed or side-notched projectile points were recovered. These include 10 specimens (36%) made of CCS and 18 (64%) of obsidian, a comparatively high representation of this material. Most of these specimens are too incomplete to allow their assignment to a particular type, however neck widths on all seven fragments in which this dimension is complete, measure more than 8 mm, indicating that they were probably derived from darts, rather than arrow points. This is consistent with the already discussed high relative proportion of broad-necked points at this site.

Bifaces

Of the 661 bifaces recovered at 35WH14, 298, or 45.1%, were complete enough to classify according to the reduction scheme employed earlier for 35WH7. The remaining 363 specimens consist of small, unclassifiable fragments which could only separated into "early stage" (N=76), "late stage" (N=97), and unknown (N=190). This group will not be treated in further discussions. Stage definitions have been discussed in the previous chapter and will not be detailed here.

Due to the more homogeneous nature of bifaces at 35WH14, this class was not divided into large and small varieties, as was done at 35WH7. The specimens assigned below to Callahan's stages are equivalent to those items referred to as "Large Bifaces" at 35WH7. All others are included under unclassifiable fragments as listed above. Descriptive information is included in Appendix B.

Stage 1: Obtaining the Blank

As Stage 1 defines the "unmodified raw material or blank" (Callahan 1979:41), rather than a bifacial tool per se, it is not of concern here. Pertinent information is presented under "Cores" and "Flake Debitage." Four specimens which are worked on one face and unmodified on the alternate face, representing Stage 1/2, and Stage 1/3, are discussed below under "Intermediate Stages."

Stage 2: Initial edging

Ninety-one specimens, or 30.54%, were classified as Stage 2/2 bifaces (Figure 65a-c). As defined, these are rather thick, bulky specimens, although several are prepared on thin flakes and are therefore thinner in cross-section. Thicknesses average 1.04 cm with a standard deviation of 0.37 cm. The preferred shape, as indicated by the 32 complete bifaces in this group, is a broad ovate, with a few specimens grading into more oval or foliate forms. Complete specimens range from 3.42 cm to 6.68 cm in length (averaging 4.79 cm), from 2.34 cm to 4.43 cm in width (with an average of 3.23 cm), and from 6 g to 53.66 g in weight. Bifaces in this group are almost exclusively of CCS, with the exception of one obsidian specimen. Many have been thermally altered, including several fragments with spalled areas and potlids which were apparently rendered unusable in this manner. Cortex is generally absent. Although evidence on use wear was not quantified because of the difficulty in distinguishing wear from platform preparation, some specimens do appear to have been utilized for cutting or scraping tasks. These do not, however, appear to represent a large proportion of Stage 2 bifaces.

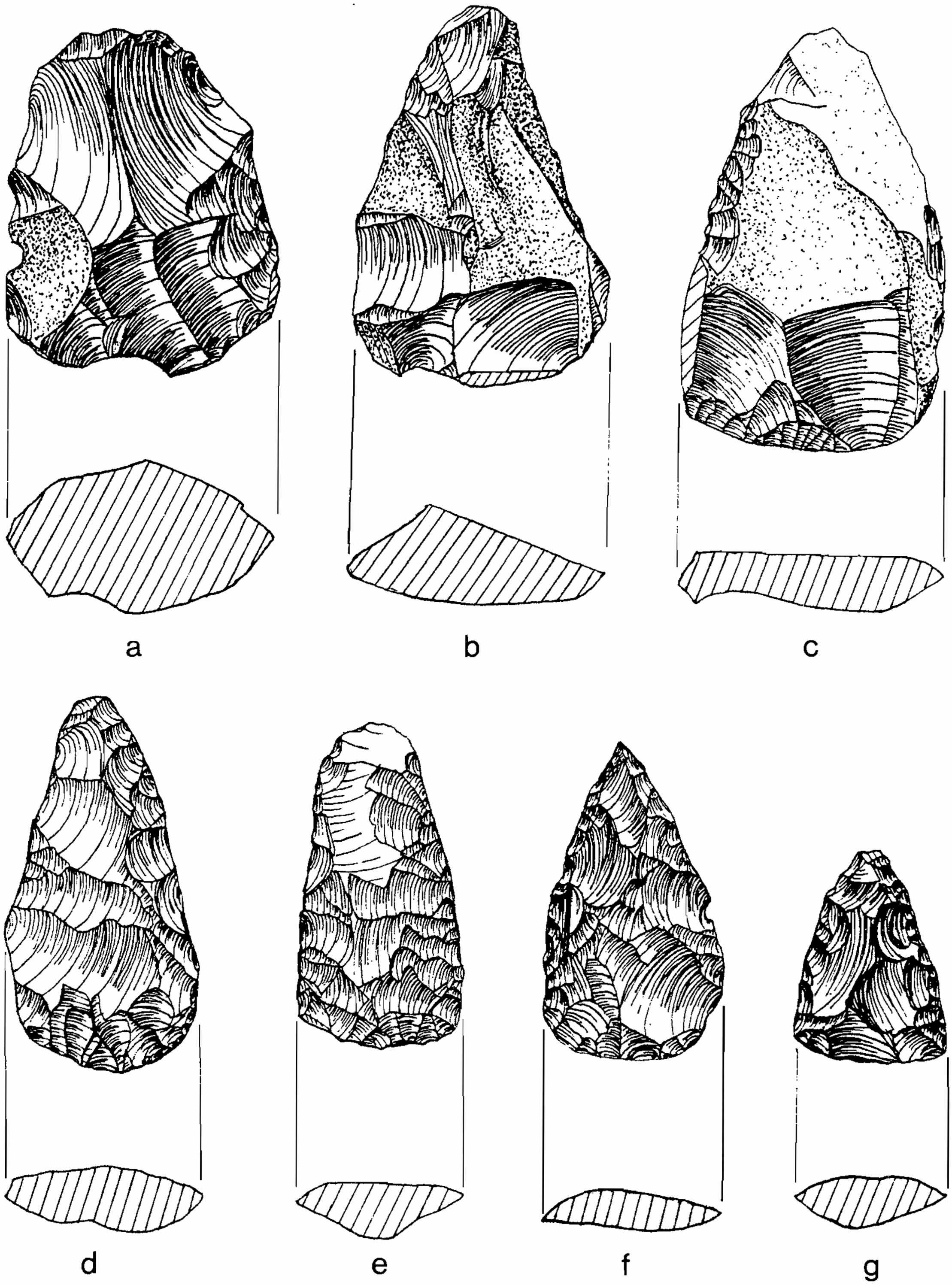


Figure 65. Bifaces, reduction stages 2/2 and 3/3, 35WH14.

a. 844
b. 405
c. 678
d. 1247
e. 1202
f. 1057
g. 1101

Stage 3: Primary thinning

Fifty-seven specimens were classified as Stage 3, only thirteen of them complete (Figure 65d-g). Bifaces in this category are more consistently shaped, with smaller edge angles, lenticular cross-sections, and straighter, centered, edges. Thicknesses average 0.79 cm with a standard deviation of 0.23 cm. Shapes vary considerably, encompassing ovate specimens, as well as triangular and foliate forms. Of the complete specimens, two are large, leaf-shaped bifaces (Cat. #592 and 784) and a third, refitted from two matching fragments (Cat. #141 and 724), probably represents a similarly shaped artifact. Projectile points produced on large foliate blanks are not present at 35WH14, suggesting that Stage 3 foliate blanks may have been intended for use as knives, although there is no evidence of their utilization as such at this stage of manufacture. Several acute-ended, distal fragments do exhibit wear on one or two lateral edges, but it is not clear if this wear is the result of use or platform preparation for further reduction.

As toolstone, CCS predominates, although as before, a small number (N=3) of obsidian specimens are present. At this stage, stone texture is homogeneous across the entire surface of the biface. In heat-affected and heat-treated specimens, most of the original, unaffected surface has presumably been removed in the shaping of the tool, which begins to emphasize thinning rather than merely edging of the piece (Callahan 1979:90ff.). Dimensions of complete specimens include lengths ranging from 3.30-9.02 cm, widths from 2.24-2.76 cm, and weights between 5.00 g and 33.24 g.

Stage 4: Secondary thinning

Forty-two bifaces (including one refitted specimen) from 35WH14 are subsumed under Stage 4 (Figure 66a-e). Specimens in this group are carefully finished projectile point preforms. Most are triangular, with straight or slightly convex blade margins and straight or convex bases. Only 10 complete Stage 4 bifaces are present, which range from 3.24-5.28 cm in length, from 1.28 cm to 2.87 cm in width, and from 0.43-0.73 cm in thickness. Weights of the 10 complete specimens lie between 1.79 and 6.38 g. These do not include four larger and heavier "square-based" fragments with greater basal widths (2.78-3.03 cm), and 90° basal angles. The former configuration of these fragmentary pieces remains unknown. An additional triangular specimen (Cat. #653) exhibits incurvate blade margins, a largely convex base, and two slight notch initiations. This appears to be a preform for a broad-necked projectile point, in which the haft shape has been delineated, but not yet completely executed.

Most of the Stage 4 bifaces are made of CCS. This group does, however, include a somewhat greater proportion of obsidian (N=8, or 19%, including two matching fragments), suggesting that this material, while absent among cores, and uncommon among earlier stage bifaces, may in

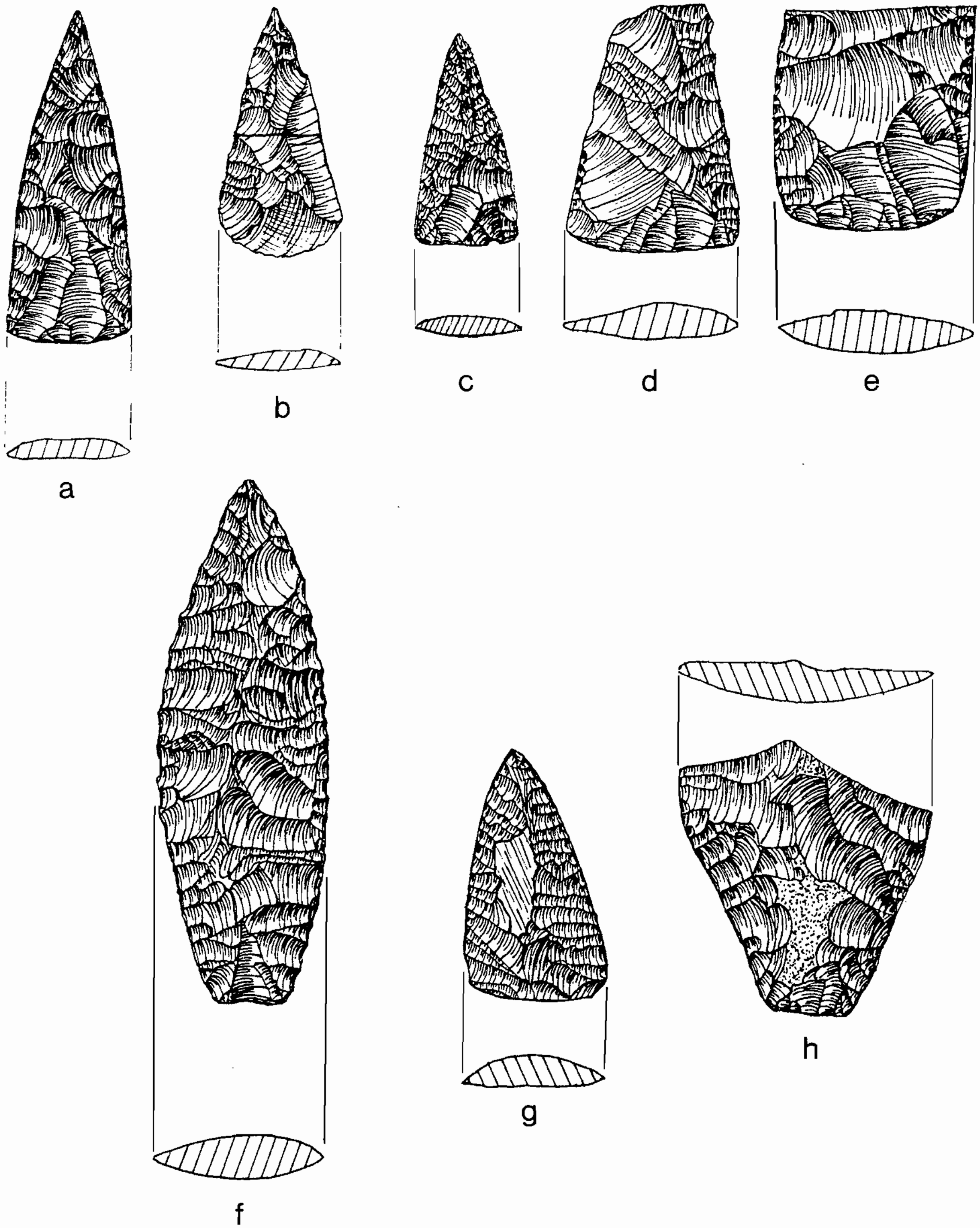


Figure 66. Bifaces, reduction stages 4/4 and 5/5, 35WH14.

a. 1271	c. 494	e. 1071	g. 692
b. 697/830	d. 571	f. 585	h. 608

some cases have entered the site as blanks, as well as finished projectile points.

Stage 5: Shaping

This is a catch-all category for seven bifaces which appear to be finished pieces, but cannot be integrated into any of the bifacially flaked tool classes discussed, in part because of their often fragmentary condition (Figure 66f-h). Most would probably be classified as knives, although their actual function cannot be determined with certainty. Specimen #608 is a broad, straight-based proximal fragment with a basal width of 1.45 cm and thickness of 0.61 cm, margins which flare outward from the base and a maximum width of 3.90 cm at the shoulder. This artifact is very similar to what is thought to be a hafted knife from the Wildcat Canyon site (Dumond and Minor 1983:Plate 2), dated to the Quinton Phase (1000 B.P. to Euroamerican contact). Specimen #535 is a distal fragment with strongly convex margins which appear to become parallel below a slight shoulder. The blade element 2.72 cm long, 2.5 cm wide, and 0.58 cm thick; the fragmentary "stem" is 1.62 cm long. Specimen #585 is a large and complete foliate biface with slightly serrated margins along the distal two thirds of its length, and a straight-edged and thinned base. It measures 7.92 cm in length, and is 2.71 wide and 0.68 cm thick. Like Cat. #608, this is probably a hafted knife. Specimens #339, 692, 793, and 993 are unclassifiable distal fragments.

Intermediate Stages

As at 35WH7, bifaces at 35WH14 frequently exhibit alternate faces which differ in degree of reduction. These include seventy-one Stage 2/3 bifaces, and fifteen Stage 3/4 specimens. Ten specimens are identified as Stage 2/4 because of portions of the original flake surface which remain on one face of the tool, however other criteria, such as thin cross-section, low edge angles and sinuosity, along with high width to thickness ratio, suggest that a later-stage classification may be more appropriate.

Also included in this category are two Stage 1/2 specimens and two Stage 1/3 specimens. The former two (Cat. #657 and 2128) are flakes which are percussion-trimmed on one face and unmodified on the opposite face. While small areas of edge damage may indicate the use of these pieces without further modification, these are minor relative to the complete circumference (between 9 and 15%) and probably represent preparation of the edge for further reduction. The two Stage 1/3 specimens (Cat. #520 and 955) may, on the other hand, represent finished tools. Both are ovate flakes that are shaped and unifacially thinned, and both exhibit lateral wear along an entire edge. All four of these specimens are made of CCS.

Discussion

To summarize, 661 bifaces were recovered from 35WH14. These include 298 which can be classified according to Callahan's reduction stages. They have been separated 91 Stage 2 bifaces (30.54%), 71 Stage 2/3 specimens (23.83%), 57 (19.13%) which are Stage 3, 15 (5.03%) Stage 3/4, 43 (14.43%) Stage 4, and seven which have been assigned to Stage 5 (1.68%). Two specimens each (1.34% combined) represent stages 1/2 and 1/3, and ten (3.36%) are classified as Stage 2/4.

Like other tool types, bifaces were recovered in greater numbers in Block B. This part of the site produced 429 specimens, or 64.9% of all bifaces, in contrast to the 230 specimens excavated from Block A (34.8%). Two specimens are unprovenienced. In Block A, major concentrations of bifaces are found in the northern half of the housepit in Units A19 and A20, in and below Level 7. In Block B, large numbers of bifaces are associated with the southwestern quadrant of the pithouse, again especially at lower elevations, in and below Level 7.

Early-stage bifaces (stages 2, 2/3, 3) predominate at 35WH14 as they did at 35WH7 and suggest the importance of chert procurement and primary reduction in this area. This inference is supported by the identification of several small quarry sites during the Pine Creek Archaeological Survey (Endzweig 1992). The various biface stages, are, in general, represented in similar proportions at both 35WH7 and 35WH14, with differences not exceeding six percentage points for the more common categories. Stage 4 bifaces provided a noteworthy exception, however, making up 4.6% of all classifiable large bifaces at 35WH7 and 14.43% at 35WH14. It appears that the entire reduction sequence was carried out at 35WH14, while unfinished blanks were probably removed from 35WH7 for final finishing elsewhere.

Drills, Perforators, and Gravers

The excavations at 35WH14 produced an array of 66 drills, perforators, and gravers, represented by a variety of shapes (Figures 67-68; see also Appendix B). This is particularly true for Block B, from which 43 specimens, or 65% of this class, were recovered, in contrast to the 23 specimens from Block A. CCS predominates, as it does in other categories of small flaked tools (N=56, or 85%), supplemented by a small amount of obsidian (N=9, or 14%). Most of the obsidian tools in this class are reworked projectile points, a circumstance which probably reflects the scarceness of this raw material in this area. As at 35WH7, drills and perforators have been separated. This division is based primarily on morphology; microscopic use wear analysis may well lead to the reclassification of certain specimens.

Drills

Nineteen artifacts are classified as drills, including one basal fragment of what may be either a drill or a perforator (Figure 67a-h,l). These include four from Block A and 15 from Block B. Most exhibit

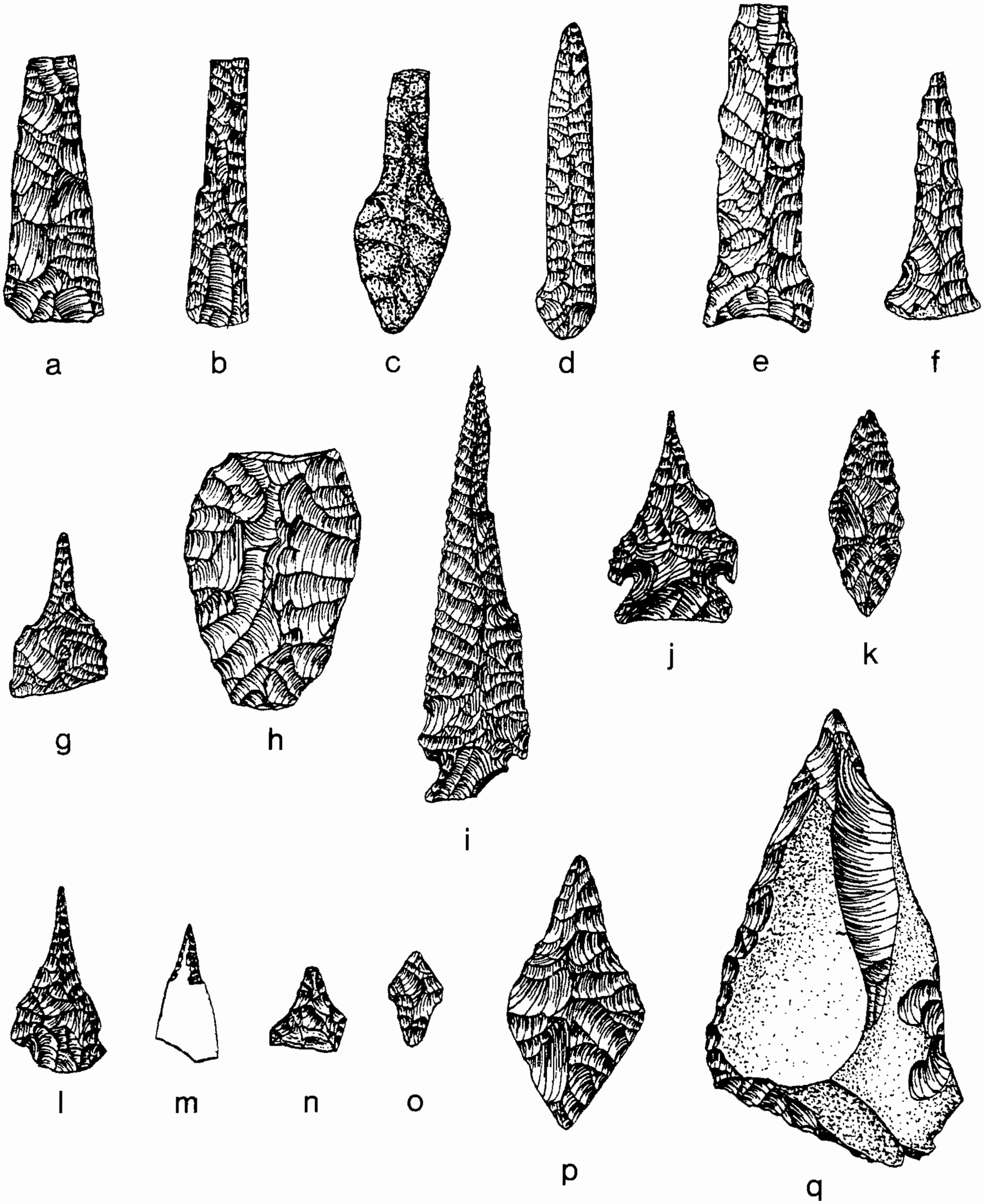


Figure 67. Drills and perforators, 35WH14.

a. 829
b. 314
c. 787
d. 228
e. 300
f. 527
g. 490
h. 48
i. 822
j. 804
k. 956
l. 660
m. 2667
n. 2893
o. 2772
p. 483
q. 2201

formed basal elements, which may or may not have been hafted. Basal elements are expanding-stemmed (Cat. #829, 1066), subrectangular (Cat. #314), diamond-shaped (Cat. #787), knob-shaped (Cat. #228), ovate (Cat. #48) or concave-based (Cat. #300). The latter specimen appears to have been made on a reworked projectile point, although not enough diagnostic attributes remain for specific identification. Two specimens expand from the bit to end in a thick, irregular base (Cat. #327, 722), and one fragment exhibits an elbow-like thickening and slight bend along its length (Cat. #443). Two smaller specimens (Cat. #490, 660) have thin, tapering bits of less than 4 mm in thickness and thin broad bases. Most drill bits, however, are long, with a thick lenticular to almost cylindrical cross-section of about 5-6 mm. Six drills (including the already-mentioned Cat. #443) are represented only by bit fragments.

Perforators

Twenty-eight implements from 35WH14 have been classified as perforators, including 10 from Block A and 18 from Block B. Like drills, perforators are characterized by considerable morphological variation, ranging from unshaped, edged flakes to formal, bifacial tools (Figure 67i-k,p-q). This category also includes implements referred to as "punches" by Dumond and Minor (1983:175), which are said to consist of "long, thin flakes with retouch on the distal end forming a sharp point suitable for piercing," (e.g. Cat. #395, 2747).

A common type of perforator is made on reworked projectile points, as represented by seven examples from Block B and one from Block A. Six of these (all from Block B) incorporate the basal element of the original point. All are broad-necked styles including ESI4, SN3, and SN5, which are also well-represented in the projectile point assemblage. Obsidian figures prominently in this particular group, and is used in six of the eight examples. It is further evidence of the value placed on this material, which was procured from considerable distances and not discarded casually.

Four bipointed perforators were recovered. These include one particularly well-made, bifacially flaked specimen of white chalcedony with a diamond-shaped base (Cat. #483). A second (Cat. #956) is small and foliate and may have been manufactured on a reworked leaf-shaped point, although this particular point style is not represented at 35WH14. Both of these are from Housepit B. The final two examples in this category are edged flakes which are only worked (Cat. #638) or worn (Cat. #892) along the functional point.

Perforators on edged flakes or chunks of raw material (N=12) are usually roughly ovate or triangular, ranging from 1.8 cm to 6.72 cm in length and weighing between 1.05 and 25.44 g (e.g. Cat. #2201, 2751). The remaining four specimens consist of two thick, bifacially flaked midsections (Cat. #128, 706), two bifacially flaked distal fragments (Cat. #706, 761) and one lateral biface fragment which has been shaped and reworked along its broken edge (Cat. #1224).

Micro-drills

Four tiny pointed implements are classified as micro-drills (Figure 67m-o), three of which were culled from the flake debris by the author. Three are from Block A, one from Block B.

The specimen from from Block B (Cat. #2893; B23, Level 2) appears to have been T-shaped, although one of the crossbars has broken. The vertical bar of the "T" is a stout point. The specimen measures 13.1 mm in length, 12.4 mm in width, and is 3.8 mm thick. It weighs 3.12 g. The piece is bifacially worked, made of CCS, and may have been hafted.

Specimen #2667 (A28, Level 10) is a broken obsidian flake, one corner of which has been retouched to form a 10.4 mm long, slender point. The tool measures a total of 20.2 mm in length, 9.1 mm in width, and is 2.2 mm thick. It weighs 0.24 g. Like the specimen previously discussed, it may have been hafted.

Artifact #776 (A12, Level 7) is a small, bifacially worked point, which appears to have broken off a larger object. It may have originally been a projectile point ear or barb, although its present configuration does not fit any of the point styles present at the site. It measures 11.4 mm in length, 9.6 mm in width, and is 0.33 mm thick. Its weight is 0.26 g.

Specimen #2777 (A18, Level 3), finally, is a roughly kite-shaped, bifacially worked object which consists of a stout point, and a thinner and narrower, but likewise pointed, contracting stem. It is not clear whether this object functioned alone or as part of a composite serrated tool which incorporated several specimens of its kind. It could, thus, have been used either in cutting or graving. The specimen is 14.1 mm long, 8,6 mm wide, and 2.4 mm thick. It weighs 0.27 g.

Gravers

Gravers, represented by eleven specimens, are relatively uncommon at 35WH14 (Figure 68f-h). They are slightly more common in Block A (N=6, vs. Block B, N=5). Members of this class are also less formalized, consisting either of flakes or chunks of raw material, on which an existing projection is retouched and used (N=6), or biface fragments with a small, flaked spur (N=5). All gravers are made of CCS.

Multipurpose Tools incorporating Perforators and Gravers

Four items from 35WH14 fall under this heading (Figure 68a-b). Specimen #165 (B25, Level 10) is a roughly pentagonal CCS flake on which most of the margins have been unifacially or bifacially retouched to provide several functional edges. These include five concave edges which could serve as spokeshaves and one sharp, stout point which would here be classified as a perforator. Specimen #349 (B1, Level 5) is an elongate CCS flake which could be referred to as a punch (Dumond and Minor 1983:175). It exhibits a unifacially and unilaterally worked perforator point, a graving spur, and a long, straight to concave, low-angle edge which could serve as a knife. Specimen #2729 (B1, Level 3)

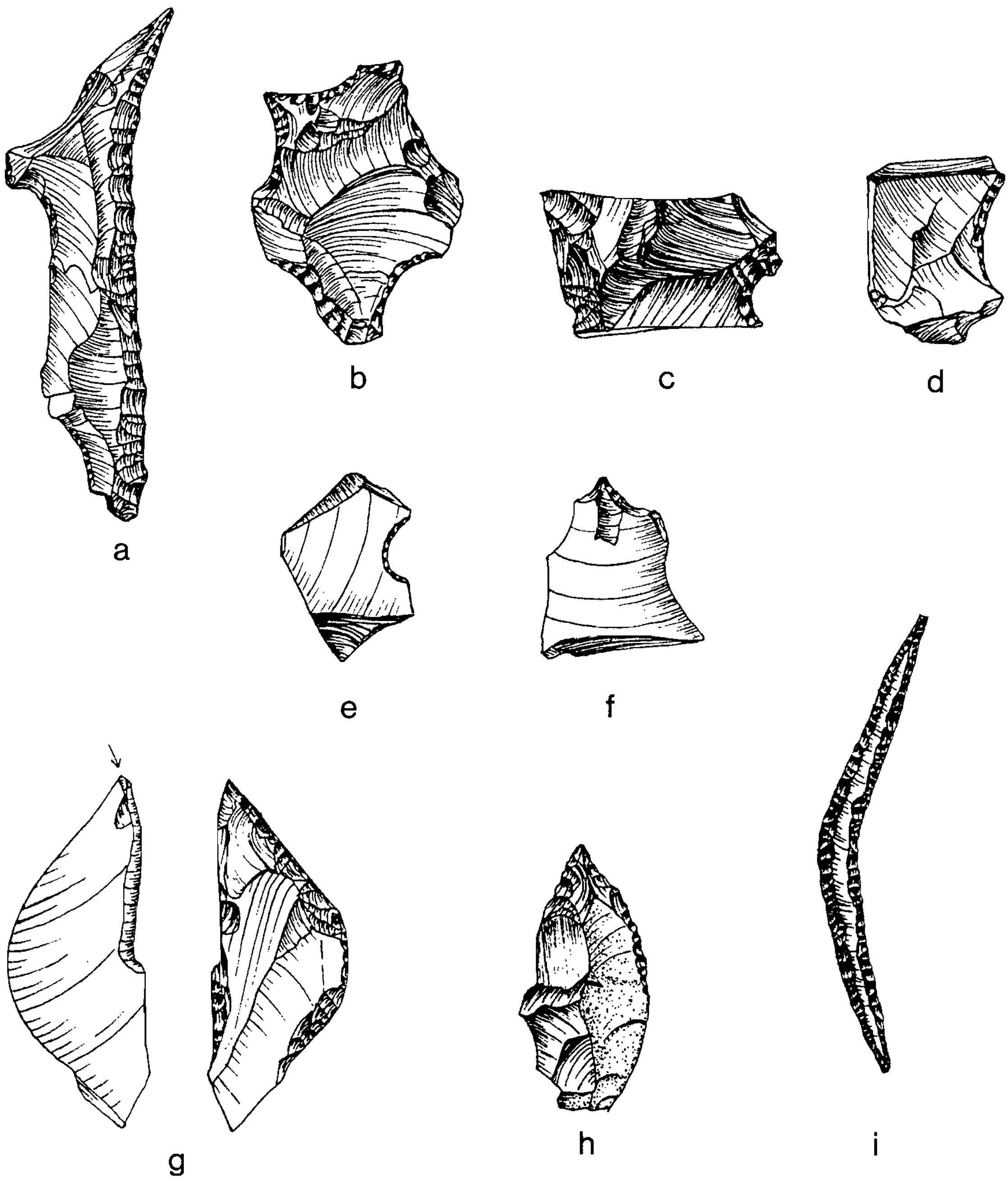


Figure 68. Multipurpose tools, notches, gravers, and flaked bipoint, 35WH14.

a. 349	d. 3141	f. 2943	h. 308
b. 165	e. 2982	g. 2729	i. 1294
c. 3114			

is a burin on a CCS flake which also exhibits a convex retouched edge. This is the only burin identified during this study. Specimen #509 (B15, Level 10), finally, is a CCS flake with a stout tip which was probably used for graving. In addition, it exhibits adjacent unifacial and bifacial edges which could have served in cutting and scraping tasks. Multipurpose tools like these are relatively rare at 35WH14. This may reflect an ample supply of raw material and the permanent nature of much of the settlement.

Notches

Eleven notches were recovered from 35WH14 (Figure 68c-e). This contrasts with the eighteen recorded for 35WH7, a site that was characterized by an overall smaller artifact assemblage. Like the specimens from 35WH7, notches from the Pine Creek Village Site are found on multipurpose tools which combine one or more notches with other types of functional edges. These include retouched edges, edges merely damaged by use wear, and, in three cases, corners or spurs which appear to have been used as gravers. All are made on flakes. Notch widths range from 8.4 mm to 19.6 mm, averaging 12 mm, comparable to a mean of 11.8 mm at 35WH7. Except for one especially large specimen which weighs 120.31 g, and measures 9 cm in length, 6.53 cm in width, and 3.13 cm in thickness, notches are generally smaller, averaging approximately 5 g in weight. All are made of CCS.

Notches were associated with both excavation blocks, although they are more frequent at Block B (N=8). Here, three were found in Level 7 of units bordering the western edge of the house. As all but one of these tools were retrieved from the flake debris by the present investgator, little more can be said about spatial associations.

Formed Unifaces

Eighty-eight formed unifaces were recovered from the site, including 36 (41%) from Block A and 52 (59%) from Block B. Most are made on flakes or angular chunks of stone, with the exception of a variety of bell-shaped scrapers which will be discussed below (Figure 69d-n). Except for one specimen of obsidian, all are made of CCS. Because of the considerable morphological variability represented in this class, as well as the fragmentary nature of most of the artifacts, it is difficult to standardize descriptions. As in the treatment of formed unifaces from 35WH7, the discussion will be presented in terms of the shape of the functional edge and its relative location on the particular artifact. Specific measurements and proveniences are tabulated in Appendix B.

Convex-edged unifaces predominate at 35WH14. These include elongate specimens with slightly excurvate lateral functional edges which would commonly be identified as sidescrapers or knives (N=11), as well as specimens with distally placed, strongly curved working edges which would be identified as endscrapers (N=14). A single specimen

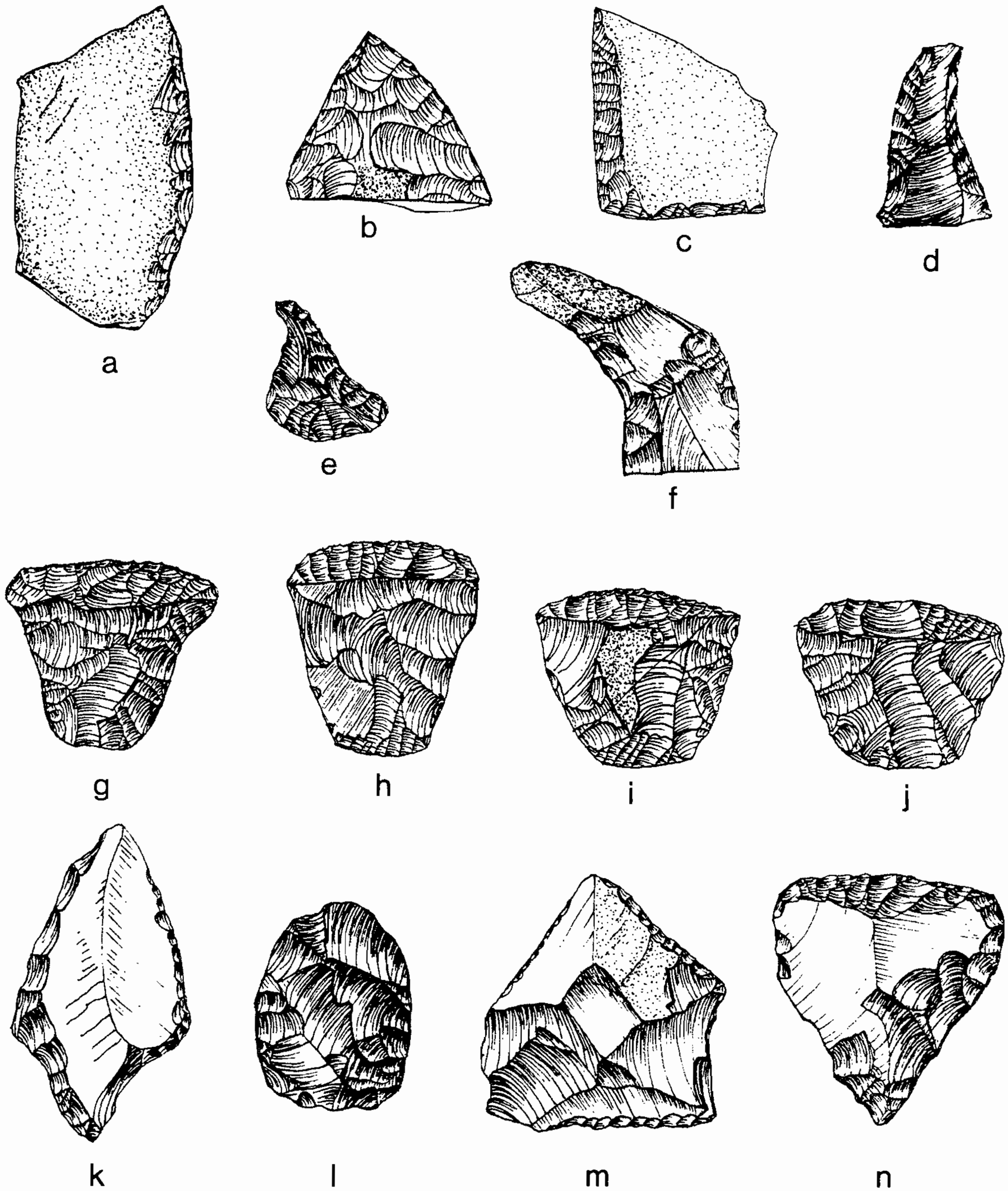


Figure 69. Seam quartz knives and formed unifaces, 35WH14.

a.	1065	e.	2582	i.	580	l.	69
b.	302	f.	429	j.	1190	m.	2924
c.	946	g.	870	k.	2068	n.	656
d.	2972	h.	708				

(Cat. #210) is a fragmentary discoidal which is shaped around most of its periphery. Edge angles are variable, ranging from 50° to 80° for the "endscrapers" and from 30° to 70° for the "sidescrapers," suggesting a range of functional uses for both groups. Most of the endscrapers are small, thumbnail-sized implements of less than 3 cm in diameter, while sidescrapers measure between 2.81 to 4.85 cm in length and between 1.08 and 3.46 cm in width. A single endscraper (Cat. #3191) exhibits a tapered stem reminiscent of the teardrop-shaped unifaces described from 35WH7, but this is the only evidence for this type of implement at 35WH14.

The most distinctive type of formed uniface observed at 35WH14 is a bell-shaped scraper characterized by a unifacially worked, beveled edge of 50°-60° on a bifacially worked body (Figure 69g-j). All eight specimens exhibit short, straight, thinned bases which run parallel to the bit, and margins which expand from the base to the bit element. Cross-sections are biconvex, unlike the planoconvex cross-sections of most other formed unifaces. All are of CCS, and most show textural changes indicative of heat treatment prior to, or at an early stage of, manufacture. It was initially assumed that these scrapers were made on broken bifaces by unidirectional flaking of a transverse break. However biface fragments observed in the collection are generally triangular or ovate in shape, and therefore widest at or near the base. If the scrapers were, in fact, recycled biface fragments, they would more likely represent distal elements, which would necessitate reworking of both ends to obtain the desired product. It is not known whether bifacially worked scapers of this type have been recorded from other sites, although two scrapers of very similar outline are illustrated for Area 5 of the Wildcat Canyon Site (Dumond and Minor 1983:Plate 6), where they were recovered from the later part of the Wildcat Phase.

Bifacially worked, bell-shaped scrapers were recovered from both excavation blocks. In units marginal and external to the housepit walls, they were found in levels 3, 4 and 7, while they were recovered from levels 12 (A19), 11 (B22), and 8 (B24) in units situated within the bounds of the housepits. This suggests their association with the lower occcupations at the site, and may explain the absence of this scraper type from 35WH7, an overall more recent site. The small sample precludes a more precise age assignment.

Other convex scrapers recovered from 35WH14 include a small ovate specimen with a retouched lateral edge (Cat. #69; Figure 69l) and a triangular specimen with a pointed, bifacially worked stem and a moderately steep (60°), almost straight distal edge (Cat. #656; Figure 69n). A spade-shaped implement (Cat. #2068; Figure 69k) with steep retouch along its contracting stem as well as one lateral margin, and evidence of wear along its opposite, sharper, lateral edge, may represent a backed and hafted knife, although it may also have functioned as a scraping or graving tool. This specimen is made of CCS, and measures 4.64 cm in length, 2.69 cm in width, and 0.92 cm in thickness. The remaining convex-edged unifaces are represented by a variety of fragments (N=23) of indeterminate shapes and varying sizes.

Straight-edged unifaces are considerably less common (N=10) and usually represented by small fragments (N=7), so that the overall tool shape cannot be determined. Specimen #1126 consists of a worked flake with two parallel, lateral edges, while Cat. #1148 is a triangular flake with a straight retouched lateral edge. A single specimen (Cat. #2578) consists of a straight, denticulate distal edge on a triangular flake.

In several formed unifaces, dissimilar types of edges are combined in one tool suggesting a multipurpose use of the implement. In five specimens, a straight lateral edge is combined with a convex distal end, while one pentagonal specimen (Cat. #2924) combines two retouched straight edges, one retouched concave edge, and one straight edge with use wear only. Four of these functional edges are, in addition, separated by pronounced projections may have served as gravers. A series of ten specimens are characterized by convergent worked margins, generally combining either two convex edges (N=6), a straight and a convex edge (N=2), or a convex and a concave edge (N=2). Most are fragmentary and appear to have broken at their widest point, making it impossible to infer their former shape. This category includes the sole obsidian specimen in the class of formed unifaces.

A final group of unifacially worked tools is represented by three curved hook-like specimens with one or two retouched margins (Figure 69d-f). Specimen #2972 exhibits two steeply retouched edges, one convex and one concave, is 2.70 cm long, and ranges in width from 0.61 cm at one end to 1.66 cm at the opposite end. It is 0.44 cm thick. Specimen #429 is only retouched along its concave edge, although it generally resembles Cat. #2972 in outline. It is 3.54 cm long and ranges in width from 0.75 cm to 1.75 cm, with a thickness of 0.5 cm. Specimen #2582 resembles a large, curved barb, which like the other two specimens is steeply retouched along one margin. It is 2.21 cm long and narrows from a 1.80 cm wide "base" to a thin, pointed tip. No patterning is evident in the distribution of these three items, the provenVIiences of which include B15, Level 7, B32, Level 11, and A40, Level 4. Their function is unknown.

Worked Flakes

Two hundred twenty-three artifacts at 35WH14 were identified as worked or retouched flakes, consistent with the definition applied at 35WH7. As at 35WH7, they are proportionately more common than formed unifaces, but less frequent than used flakes, probably reflecting an intermediate degree of effort involved in their manufacture. Almost three quarters exhibit a single unifacially worked edge, generally straight or convex, though the fragmentary nature of many of the specimens and the informal nature of much of the retouch limit the significance of this observation. A small number of specimens have bifacially flaked edges (N=20, 9.0%). Lengths range from 1.2 to 6.4 cm, widths from 0.4 cm to 5.0 cm, with averages of 2.9 cm and 2.0 cm, respectively. Thicknesses average 0.63 cm. Weights of worked flakes are generally 6 g or less (N=186, or 83.4%), and 97.8% weigh less than 16 g. Three larger specimens with weights between 43 and 48 g may have served a different function than the smaller implements. Corresponding to the predominance of CCS at the site, most of the worked flakes are of this material, which represents 95% of the entire class. Obsidian, with seven specimens, and basalt, with four, constitute rare exceptions.

Worked flakes occur, as would be expected, in association with both excavation blocks, although almost two thirds were recovered from Block B (N=146, or 65%; two specimens are unprovenienced). In Block A, worked flakes are distributed relatively evenly with regard to vertical provenience, although they occur most commonly in the northern portion of the depression. In Block B, minima of 2% in Level 3 and 7.6% in Level 8 separate higher frequencies in the surrounding levels.

Utilized Flakes

A total of 494 utilized flakes were recovered from 35WH14, representing approximately one fifth of the artifact assemblage (excluding lithic debitage) at this site. Three quarters of these exhibit a single utilized edge (75.51%), followed by flakes with two (20.24%), three (3.64%), and four (0.61%) used edges. Straight, single-edged specimens represent more than half of this class (55.01%), suggesting their likely function in expedient cutting tasks. Most are of CCS (91.70%), with the remainder made up of obsidian (4.25%) and basalt (4.05%).

Average dimensions of used flakes are almost identical to those of worked flakes, although ranges are predictably larger, given the larger sample size. Lengths average 2.8 cm, ranging from 0.4 to 7.7 cm, widths average 2.00 cm (0.5-5.7 cm), and thicknesses average 0.6 cm. Average weight is 4 g, however this distribution is skewed by nine heavy specimens of more than 20 g, while 74% of all specimens actually lie below the mean.

Liked worked flakes, utilized flakes occurred in substantially greater numbers in Block B (N=309, or 62.55%; Block A, N=184, or 37.25%; no provenience, N=1, or 0.2%). The highest concentrations are found in units within the house depressions, in particular in the northwest quadrants of both pithouses (units A19, 20, and B6; Figure 70). This suggests a deliberate spatial patterning of associated activities, perhaps in relation to the entryway, which may have been located along the southern edge of both houses (see Features). Vertically, counts of used flakes show slight peaks in levels 2 and 7 through 9 of Block A, while in Block B, counts increase gradually from the surface through Level 6, double between levels 6 and 7, and gradually decrease with depth from there.

Cores

One hundred ten cores were recovered from 35WH14, comprising an aggregate weight of 5,170.75 g, or 11.4 lbs. Most are of CCS (N=106, or 96.36%), with a small number of basalt specimens (N=4, or 3.64%). No obsidian cores were recovered, and it is likely that this material only entered the site in the form of preforms or finished tools. Most cores

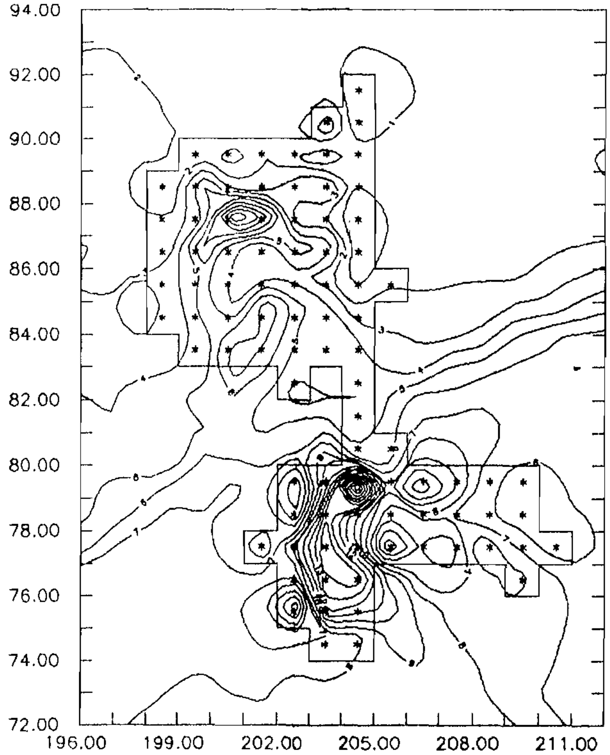


Figure 70. Horizontal distribution of utilized flakes.

were expediently produced, or "amorphous" (see Chapter 5 for discussion of terminology). This category represents 82.73% of the collection (N=91). A few more formal cores are also present, including biface cores (N=7, or 6.36%), block cores (N=8, or 7.27%), and discoidal cores (N=4, or 3.64%), however they make up only a relatively small proportion of the collection. Cortex was observed on many of the cores, although, as at 35WH7, some of what was identified as cortex may actually be the result of heat altering, rather than the original, weathered surface.

Individual cores at 35WH14 range in weight from 2.89-852.60 g, with an average of 47.01 g. The distribution is skewed by two exceptionally large specimens (Cat. #522 at 399.95 g, and Cat. #1177, at 852.60 g), however. Without these, weights would average 36.28 g. This is considerably less than cores recovered from 35WH7, which averaged more than 85 g (N=106).

Cores were recovered from both excavation blocks, although Block B, with 80 specimens, produced more of this artifact type than Block A, with only 30 cores. In Block A, cores are most numerous in Level 3 (N=6, or 20% of the cores from this area), and in levels 6, 7, and 9, which produced 50% of the cores in this block. No cores were recovered from Level 8 of Block A. Cores show a more even vertical spread in Block B, with slight peaks in levels 6, 8, and 10 through 12.

Of the eighty cores from Block B, a large number (N=34) were concentrated in the southwestern corner of this area. In those excavation units situated primarily within the rim of Housepit B (B22, B23, B31, B32, B36), most cores were recovered from levels 7 through 12, while of those recovered at the edge of, or outside the rim (B30, B34, B37, B38), most are associated with higher elevations. It is likely that primary reduction of raw material was an activity associated with the earliest occupation of the pithouse, and that material was displaced outward and upward in the course of its reexcavation by later residents.

This conclusion is strengthened by the homogeneous nature of much of the raw material recovered from this area. Almost half of the cores recovered from 35WH14 consist of a white to grey, lustrous, semi-translucent chalcedony, much of which exhibits fractures and textural changes generally associated with the effects of heat on cryptocrystalline silicates. Of the 49 chalcedony cores, 38 were recovered from Block B, twenty-two of these in the southwestern quarter of the block (west of 205x and south of 78y). Within this part of the site, they are associated with the lowest occupation floor, as discussed above. It is possible that the chalcedony was affected by the heat produced at Feature 4, a scatter of charcoal, burned clay, and ash which has been radiocarbon-dated to 2450 ± 40 B.P. Insufficient information is present to conclude whether the raw material was intentionally altered in this manner, however the absence of a well-defined, excavated hearth does not preclude this possibility (cf. Luedtke 1992:100).

Seam Quartz Knives

Thirty-one implements of flaked seam quartz were recovered from 35WH14 (Figure 69a-c). Because of this substantial number, they are discussed as a separate artifact class. The majority (N=20) are thin slabs with one or two straight or convex, bifacially flaked edges, which probably served as knives. Thicknesses range from 3.3 mm to 12.4 mm, averaging 6.71 mm. Three specimens exhibit single, unifacially worked edges. The remaining eight specimens in this class are referred to as bifaces. In these specimens cortical material has been removed beyond the functional edge(s), and the piece has been shaped, possibly for continued reduction.

Only six seam quartz tools were recovered in Block A (19.4%), whereas Block B produced 24 (77.4%). Provenience on one misnumbered specimen is unknown. While the sample size from Block A is too small to identify spatial patterning, all but three of the specimens from Block B were excavated from or below Level 7. Seven were recovered from levels 7, 9, and 10 of units B28, B29, and B33, which would place them above, later than, and marginal to the main pithouse occupation. Seam quartz tools do not appear to cluster with the large activity area in the southwest of Housepit B.

Flaked Bipoint

Specimen #1294 is a flake of heat-treated CCS which has been worked to a narrow, bipointed, blade (Figure 68i). One face is retouched along two edges, the opposite face along a single edge. On both faces, part of the original flake surface has been preserved. The specimen is slightly angled at mid-length. It measures 6.39 cm in length, 0.69 cm in width, and 0.41 cm in thickness, and weighs 1.5 g. Some crushing of the inner (concave) edge is present, but it is not clear if this is related to manufacturing or use. Similar specimens are referred to as "flaked crescents" at the Wildcat Canyon Site (Dumond and Minor 1983:174) and the Portland Basin (Pettigrew 1981:19), where they are, respectively, associated with the Wildcat and Quinton phases, and with the Merrybell Phase (500 B.C. - A.D. 1750; 600 B.C. - A.D. 200). The present specimen was recovered from Level 10 of A27. This unit is adjacent to the charcoal scatter and associated metate radiocarbon-dated at 1500 ± 25 B.P. It can most likely be assigned to this date, suggesting a somewhat more recent age than appears to be typical for the Portland Basin. The artifact had been identified as an awl in the original artifact catalog, however its ends are thin and appear too fragile for extended use in perforating resistant materials. Consistent with this, they bear no evidence of wear. Other hypotheses proposed regarding its function include a fishing-related hook or a decorative ornament of some kind, in particular a nose ornament, used like the dentalium shells recorded during historic times for some Plateau peoples (Strong 1959:161). It should be noted, however, that nose piercing was absent among southern Plateau groups interviewed for Ray's Culture Element Distributions (Ray 1942, Element 3395).

During the course of the present study, a distinct residue was observed on the specimen. In light of its unknown function, the piece was submitted to Archaeological Investigations Northwest, Inc. for blood residue analysis. The results are reproduced in Appendix F and are only briefly summarized here.

Cross-over electrophoresis tests were conducted on the residue using 15 known antisera, including bear, bovine, cat, chicken, deer, dog, duck, goat (which will react with most artiodactyls), horse, human, rabbit, rat, sheep, trout (which is known to react well with steelhead and chinook salmon), and pigeon (Barr Williams, Appendix F). The analyses produced positive reactions to the human as well as the rabbit antiserum. Whereas the human antiserum will only cross-react with other primate species, the rabbit serum used in the analysis will only react with domestic, cottontail, and jack rabbit blood proteins (Barr

Williams, Appendix F). The results do not positively identify the function of the object, however they do not appear to support a salmonid-fishing related use. Use as a nosepiece cannot be ruled out, though the accumulation of blood residue along the entire length of the piece seems inconsistent with this function.

Edge-Modified Chunks

Edge-modified chunks include 18 amorphous pieces of CCS and one of basalt with used or retouched edges. These are expedient, unshaped tools, most of which were retrieved from material set aside as debitage. In many, the amorphous shape is attributable to the effects of heating. Weights range from 7.74 g to 57.83 g. Spatially, edge-modified chunks occur in Block A (N=9) and Block B (N=10). In Block A, all are found either within or at the edge of the house depression. In Block B, these artifacts are generally found around the edge of the house depression, above the main pithouse occupation. While their location in this area may be a function of floor cleaning and the corresponding removal of angular pieces of rock from the house floor, this must, in light of the small sample size, remain speculative.

Ground Stone

A wide variety of ground stone items was recovered from 35WH14. These include 53 grinding stones, five abraders, two anvils, five manos, thirteen pestles and mauls, two matching pieces of a pestle in the process of manufacture, one edge-ground cobble, one atlatl weight, one possible net weight, and eight unidentifiable fragments. Their distribution will be treated below after discussion of the individual artifact types.

Grinding Stones

Thirty-seven grinding stones remain at Hancock Field Station, the base for the OMSI archaeological fieldwork, and were not examined for the present study. Dimensions of these specimens were, however, recorded in the original artifact catalog. As grinding stones were described either as "metates" or as "milling stones" in the catalog, width-to-height ratios were calculated for complete specimens in both categories in an attempt to determine if the two differences in labeling corresponded with differences in shape. A distinction between grinding slabs and block metates or hopper mortars was postulated. However, no difference was found between the two distributions ($t=1.09$; $df=26$; $p < 0.05$). A histogram of combined width-to-height ratios for complete grinding stones labeled both as "metates" (N=11) and "milling stones" (N=17), on the other hand, indicates ratios between 0.5 and 2.5 for 75% of the specimens (including a major peak of 35.71% at ratios of 1.5 to 2.0) and a secondary group at ratios of 3 to 4 (Figure 71). A single outlier is found between 6 and 6.5. This distribution compares favorably with mean ratios calculated for block and slab metates at

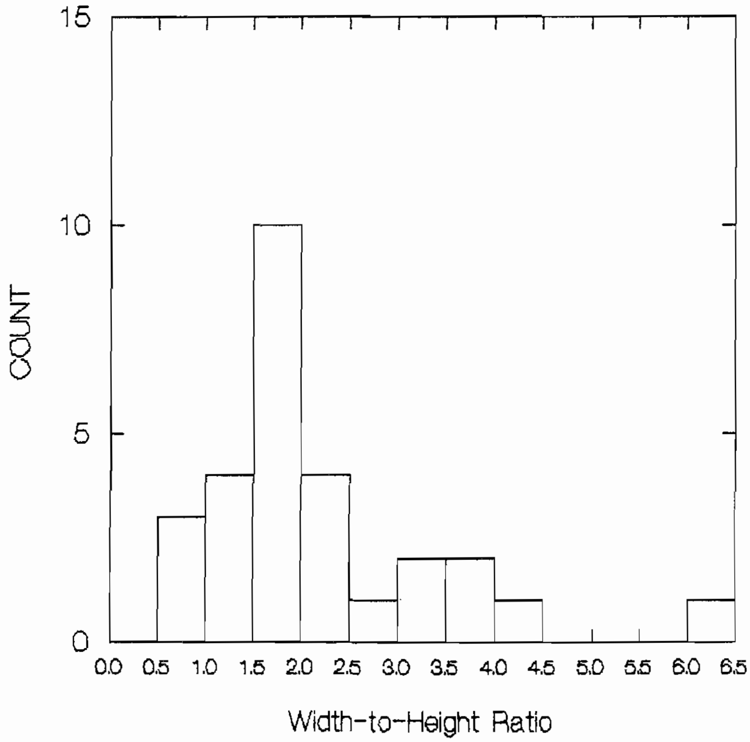


Figure 71. Distribution of width-to-height ratios for unexamined grinding stones, 35WH14.

35WH7 which are 1.92 (N=14) and 3.2 (N=4), respectively. The ratio of 6.42 calculated for Cat. #683 (the above-mentioned outlier), is comparable to the ratio of 5.75 for Cat. #438, which is classified below as a palette. Thus, while all types of grinding stones appear to be present at 35WH14, block types predominate. Whether these are hopper mortar bases or metates, however, cannot be determined from available data.

The inferences just discussed were supplemented by analysis of 16 fragmentary specimens which were available during the present study. Due to their fragmentary nature, the shape of the complete artifact can generally not be determined. Several observations are, however, in order. In all specimens, grinding surfaces appear to be flat and exhibit wear across the entire face of the artifact. Wear occurs with equal regularity on either one or two faces (N=6 in both cases). The remaining four specimens are surface fragments only. It appears that both slab and block metates are represented, consistent with the complete metates described earlier. A single specimen (Cat. #438) consists of a lateral fragment with a curved outer edge, which is only 1.36 cm thick. This artifact is best referred to as a grinding palette (Figure 75c). On the whole, metates represented among these broken specimens are extremely well-used specimens with incontrovertible, smooth wear.

Pestles/Mauls

Twelve artifacts from 35WH14 are classified as pestles and pestles/mauls (Figures 72-74). Mauls exhibit evidence of heavy pounding wear, such as spalling of flakes from impact. Two examples of distal-lateral spall flakes were recovered from the site (Cat. #889 and 1295). Pestles are, in contrast, used either for grinding or for the crushing of less resistant materials such as plant matter and meat. The distal ends of pestles are, correspondingly, smoother. Four specimens which exhibit both types of wear indicate that these uses are not mutually exclusive.

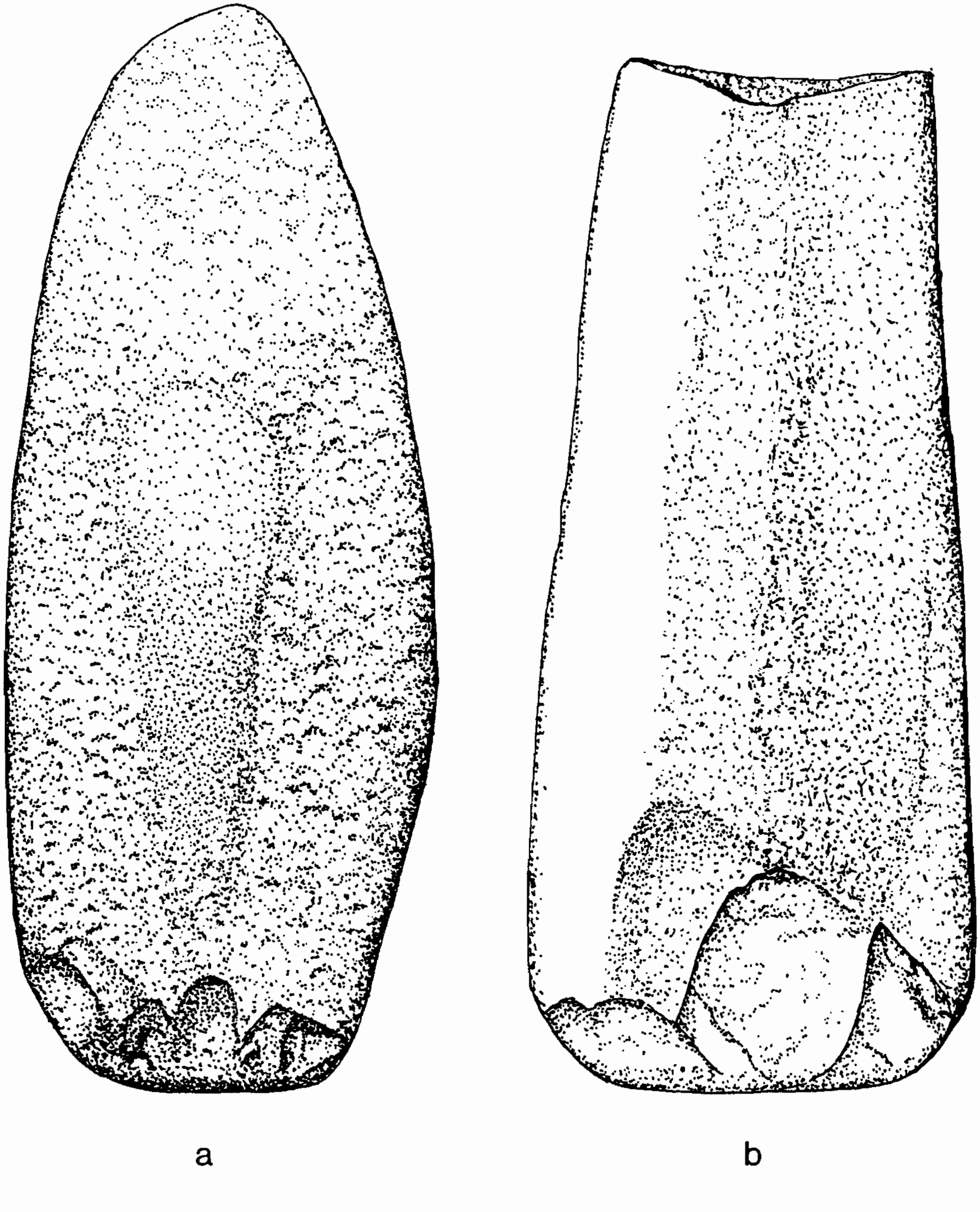


Figure 72. Pestles, 35WH14.

a. 107 b. 1198

Pestles and/or mauls found at 35WH14 are conical in shape, with straight to excurvate sides. Cross-sections range from round to squarish, where areas of the original rock cortex remain. With one exception, which will be discussed below, none are decorated. The only two complete specimens, both pestle/maul combinations, are 14.73 cm long, with a maximum diameter of 5.71 cm (Cat. #107; Figure 72a) and 21.10 cm long, with a maximum diameter of 7.22 cm (Cat. #1155). The proximal end of Cat. #1155 is coated with red ochre, and the upper two thirds of this specimen exhibit a moderate deposit of this pigment. One side of the distal end has spalled off, suggesting that use shifted to the proximal end after the base became damaged. The specimen was recovered from Level 10 of A48. It was located on the basal occupation floor of Pithouse A in an area characterized in the field as an ochre-working station.

Pestles and/or mauls from 35WH14 include the two complete specimens already discussed, and two distal ends (Cat. #1198, heavily burned, Figure 72b; and Cat. #533) which are consistent in morphology with the previous two specimens. An additional cylindrical midsection (Cat. #624) measures 6.94 cm in diameter and probably represents a larger, more cylindrical implement than those already discussed. A single conical proximal fragment (Cat. #348; Figure 74a), on which cortical material has been removed to form a pecked band about 4 cm below the top of the object, has been reused as a pestle at both its upper terminus and its broken, lower end. Traces of red ochre adhere to the upper exterior of the artifact. This is the only pestle or maul with any indication of decorative embellishment.

Two matching fragments of dressed stone which, when conjoined, form a pestle-shaped implement, but show neither wear nor the careful surface preparation of finished artifacts in this class, probably represent a pestle broken in production (Figure 73a). The two halves (Cat. #304 and 574) were found in B14 (Level 13) and B15 (Level 14), adjacent units and levels associated with the lowest occupation of House B. Specimen #556, finally, is an unmodified, albeit roughly conical rock which appears to have been used as a pestle and exhibits ochre residues at its distal end. Parts of other tools in this class include one partial basal fragment, one medial fragment, and two proximal fragments (Cat. #564, 1112, 456, and 1107, respectively). All are made of basaltic rock.

Manos

Five specimens from 35WH14 are classified as manos. These range in shape from a well-shaped, fragmentary loaf-shaped specimen (Cat. #549; Figure 75a) measuring 8.76 cm in length, 8.15 cm in width, and 3.5 cm in thickness, to palm-sized rocks with little or no modification and light to moderate unifacial grinding wear (Cat. #123, 944, 305). All are made of basalt. A single elongate fragment (Cat. #82), probably part of larger, loaf-shaped mano, exhibits a lightly ground facet on one edge and possibly some pecking on the opposite edge. Longitudinal

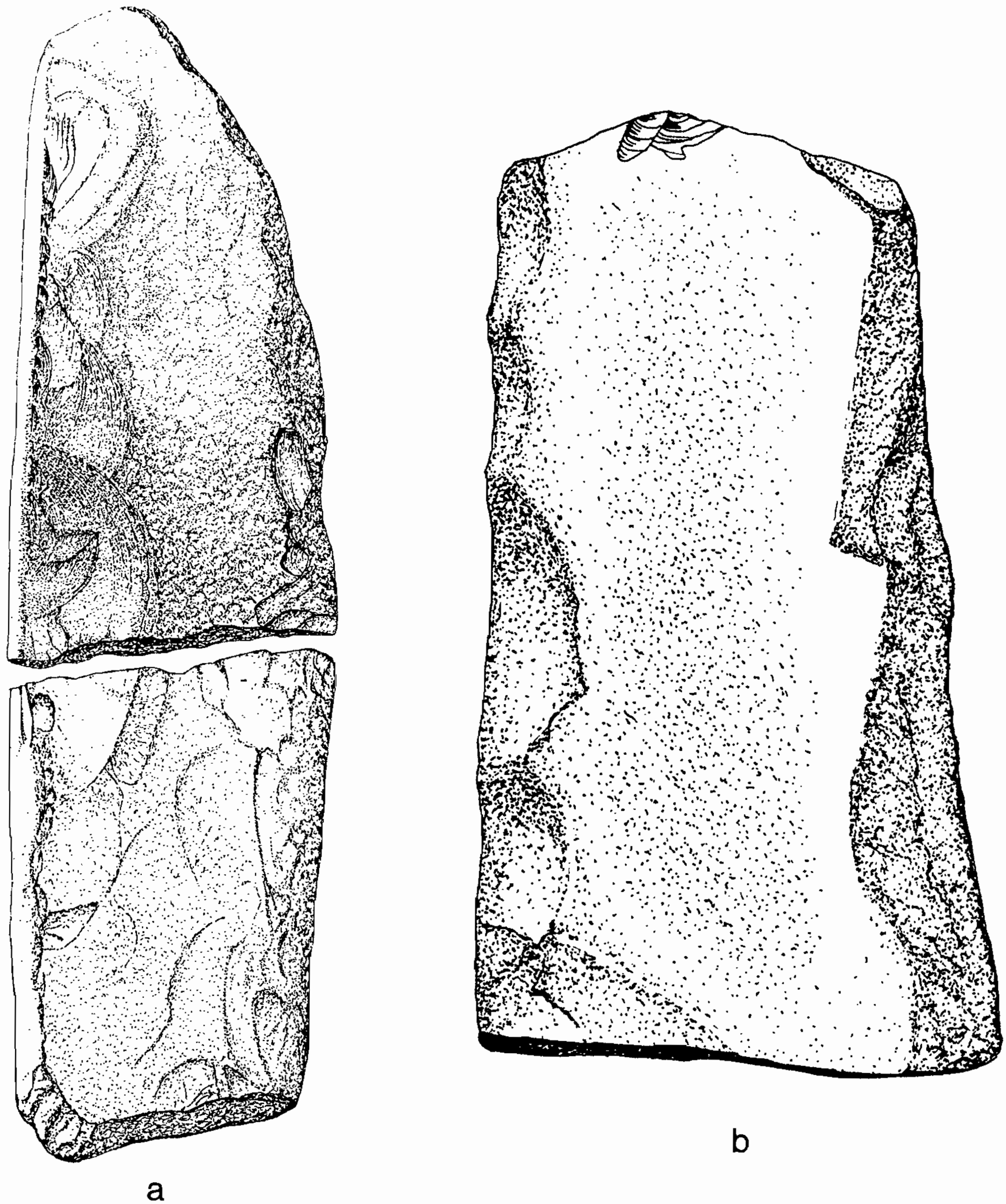


Figure 73. Pestle preform and abrader, 35WH14 (pestle preform 50% of actual size).

a. 304/574 b. 374

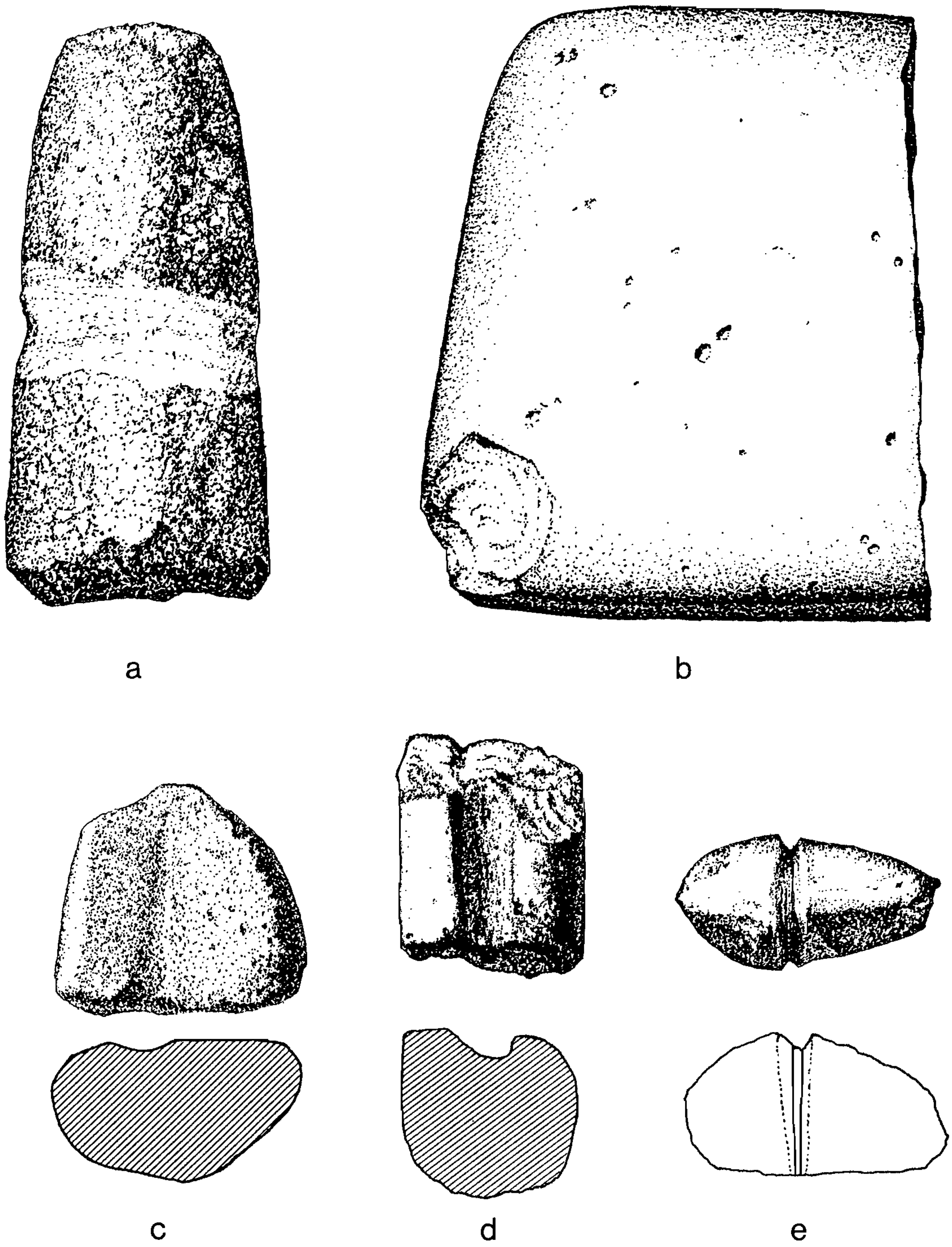


Figure 74. Miscellaneous ground stone, 35WH14.

a. 348
b. 42
c. 600
d. 934
e. 597

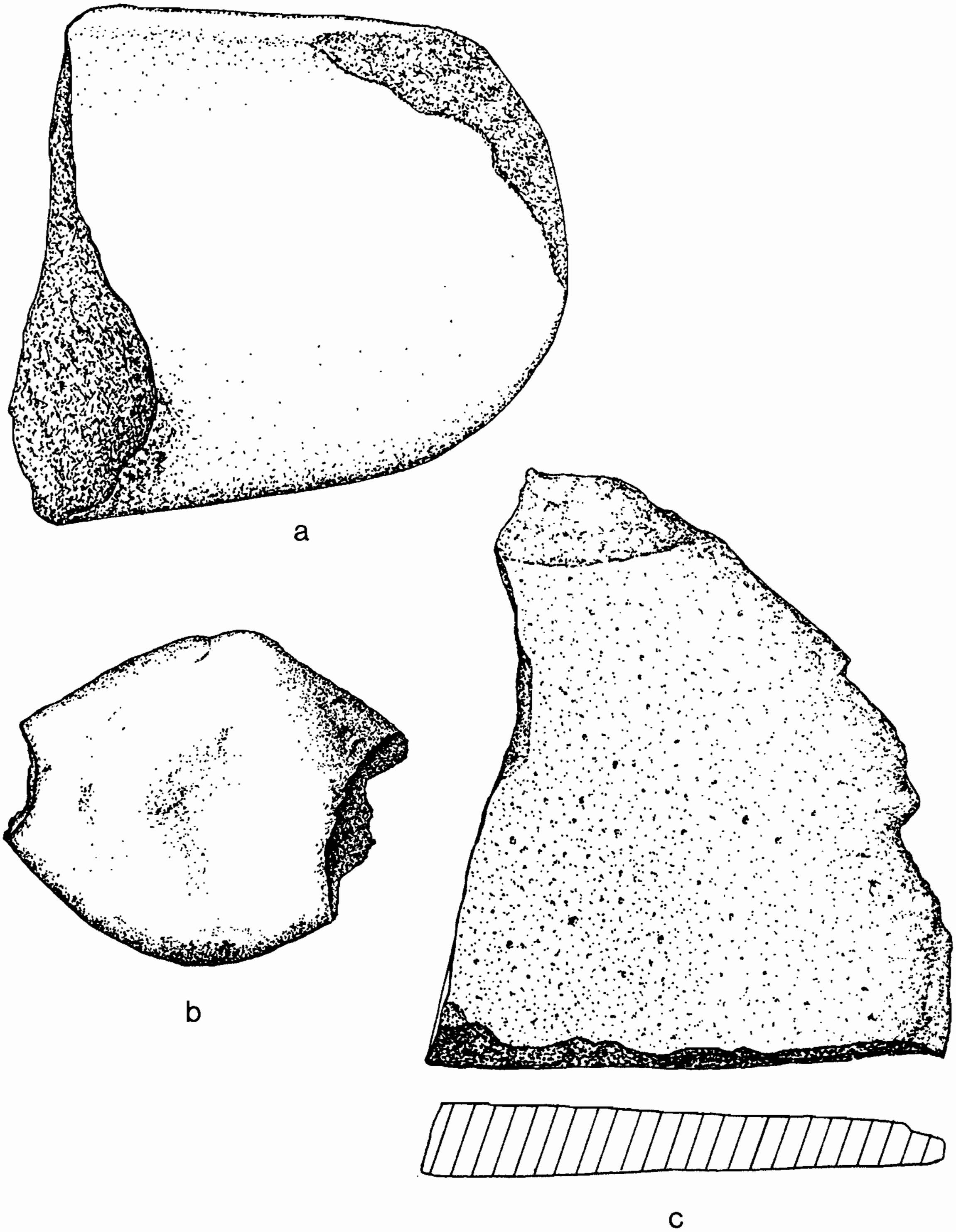


Figure 75. Miscellaneous ground stone, 35WH14.

a. 549 b. 881 c. 438

abrasions are present on one face of the artifact, as well. This specimen, classified as a mano and edge-ground cobble, measures 12.26 cm in length, and is 9.85 cm wide and 4.06 cm thick.

Edge-Ground Cobble

Specimen #42 is a fragmentary, loaf-shaped basalt specimen measuring 7.80 cm in length, 8.98 cm in width, and 3.33 cm in thickness. One of the long edges is ground to a flat facet (Figure 74b). A flake appears to have spalled away from impact to one of the corners, possibly from use as a hammerstone, although lack of further damage suggests that this occurred during a single event.

Abraders

Four abraders and one unmodified piece of abrasive stone were recovered from 35WH14 (Figures 73-74). Cat. #934 (Figure 74d) is a medial fragment with smooth, flat sides and and a pronounced longitudinal groove, combining three functional edges. Cat. #600 (Figure 74c) is also fragmentary. Unlike the previous specimen, which is subrounded in cross-section, this abrader is plano-convex, with a slight indentation adjacent to the break on the flat face. No groove is present, but the flat and convex faces may have, in themselves, served in abrasive tasks. Cat. #915 is a small fragment with a curved exterior, but otherwise unidentifiable shape. These three specimens are made of pumice.

Two further items are discussed under this class of artifacts with some reservation. One, Cat. #374 (Figure 73b), is a rectangular length of prismatic basalt. Its rough, granular cortex has been flaked, pecked, and ground away from two opposite longitudinal edges. Two large spalls, have in addition broken off one face of the narrower short side of the piece, creating a wedge-like shape. Diagonal striations are, finally present in the center of one of the two flat faces of the implement, where "soft" rubbing wear (as opposed to sharp abrasion) has removed part of the cortex. While this specimen is classified under abraders because of it apparent surface wear, it is possible that the tool edges were used in crushing and grinding. Alternatively, it has been suggested by a colleague that the implement may have been hafted as an adze, with the wear created by rubbing against the wood of an L-shaped shaft (S. Byram, personal communication, 1993).

Finally, a half-oval, plano-convex piece (Cat. #817) of an abrasive stone may have been intended for use as an abrader. No wear is present, however, and the piece can only be considered a manuport in its present state.

<u>Anvils</u>

Two small cobbles each exhibit a small pecked area two to three centimeters in diameter on one face, suggesting their use as anvils.

Cat. #467 is 14.20 cm long, 8.68 cm wide, and 5.24 cm thick. Cat. #926 is 12.80 cm long, 9.84 cm wide, and 5.42 cm thick. The latter specimen also exhibits wear from heavy battering on two corners, possibly from additional use as a hammerstone.

Atlatl Weight

Specimen #597 is a small, date-sized piece of locally available tuffaceous sandstone which probably served as an atlatl weight (Figure 74e). It was recovered from Level 9 of unit B36. The piece is girdled around three quarters of its circumference, with the groove slightly offset towards one end of the piece. The base is not girdled, but is flat and longitudinally scored. It measures 3.98 cm in length, 2.13 cm in width, and 2.15 cm in height.

The present specimen is consistent with the atlatl weight style classified by Butler and Osborne (1959) as Type IIIa. This "loaf-shaped" type is said to extend from the Portland Basin to the Vantage area of central Washington, also occurring on Vancouver Island (Butler and Osborne 1959:219). Centers of distribution are placed in the Dalles-Deschutes region, and, secondarily, in the Portland-Vancouver area and at the mouth of the John Day River. A Type III atlatl weight with an offset groove (like the present specimen, but more intricately carved and decorated) was also found attached to an atlatl by a collector in a cave east of Condon (Strong 1969:102), some 25 miles northeast of 35WH14. The weight is said to have been attached to the shaft with two-ply cordage and pitch, which might explain the scoring at the base of the present specimen. A single Type III atlatl weight has been reported from Summer Lake, the only such artifact described from the Oregon Great Basin (Butler 1962, cit. in Mildner 1974).

At 18.70 g, the present piece is well below the range of 53-298 g (with an average of 174 g) indicated by Butler and Osborne (1959) for Type IIIa atlatls. The significance of this is not clear. Weights of this type may have been used in tandem (Perkins 1993), and are, in fact, frequently found in pairs, whereby different varieties may be matched (Strong 1958). It is possible that the present piece, which appears irregular and eroded, was originally somewhat heavier, and in addition, functioned together with a second, heavier specimen. An alternative hypothesis is, however, presented by the Condon atlatl which, while carefully crafted, is said to have been "too slight, too delicate to cast a dart; the handle is too small to grasp and the holes are unfit for inserting the fingers" (Strong 1969:102). Strong attributes the small format of the Condon atlatl to a non-utilitarian function, interpreting it as "a symbol of rank, or an object upon which to expend an artistic expression" (Strong 1969:103). Alternatively, it could have been made for use by a child. The same explanations could apply to the atlatl weight from 35WH14. As well as can be determined from the published photograph of the atlatl (Strong 1969:Figure 56), the weight appears to be essentially identical in size to the specimen from the Pine Creek Village Site.

Butler and Osborne estimate an age range of between 500 B.C. and A.D. 1400 for atlatl weights in the Pacific Northwest. A more recent report from the Portland Basin along the lower Columbia River seems to favor the earlier end of this range (Pettigrew 1981:119), while evidence from the Wildcat Canyon Site (Dumond and Minor 1983) is inconclusive. A radiocarbon date obtained on a fragmentary atlatl found together with the Condon atlatl discussed above placed it at "about 1,500 years" (Strong 1969:98). The present specimen was recovered from Level 9 of B36. It is thus mostly likely associated with the intermediate occupation of Block B. Whether this occupation is contemporaneous with the earliest radiocarbon-dated occupation of Block A (1500 ± 25 B.P.) cannot be determined with certainty, however the correspondence between this age and that of the Condon atlatl supports the validity of this inference.

Possible Netweight

Specimen #881 is a roundish pebble of coarse-grained basalt from which two opposite ends have been snapped off (Figure 75b). It may have served in a manner similar to notched netweights known from other sites on the Columbia River (e.g. Cressman et al. 1960:Fig. 48; Dumond and Minor 1983:Plate 6; Pettigrew 1981:Fig. 42). The present specimen is 6.03 cm long, 5.38 cm wide, 2.27 cm thick, and weighs 79.65 g. It was recovered in Level 6 of unit B12.

Miscellaneous Ground Stone

Most of the remaining ground stone items are unidentifiable fragments with slightly ground, abraded, or pecked surfaces. A single portion of a stream cobble (Cat. #1174) exhibits part of a banded area from which the original cortex has been pecked away and may represent part of a decorated pestle or maul similar to Cat. #348 (see above). Specimen #1137, finally, is a roughly fist-sized cobble on which cortical material has been trimmed from around one face by percussion flaking. The result is a roughly pyramidal rock with partially trimmed sides and one cortex-covered, untrimmed flat surface. One edge of the flat surface and the apex of the "pyramid" show slight evidence of grinding, in addition to the marginal retouch. The function of this object is unknown. It is 9.92 cm long, measures 9.39 cm in width, 8.17 cm in thickness and weighs 868.5 g.

Distribution of Ground Stone

Grinding stones were recovered from both excavation blocks (Figure 76). They include 23 from Block A and 29 from Block B. At least three were found in the area between the two house depressions, including two specimens from unit A53 (levels 2 and 10) and one specimen from B1 (Level 11). These are relatively small numbers and it is difficult to draw definitive conclusions based on them. Several observations are of note, however.

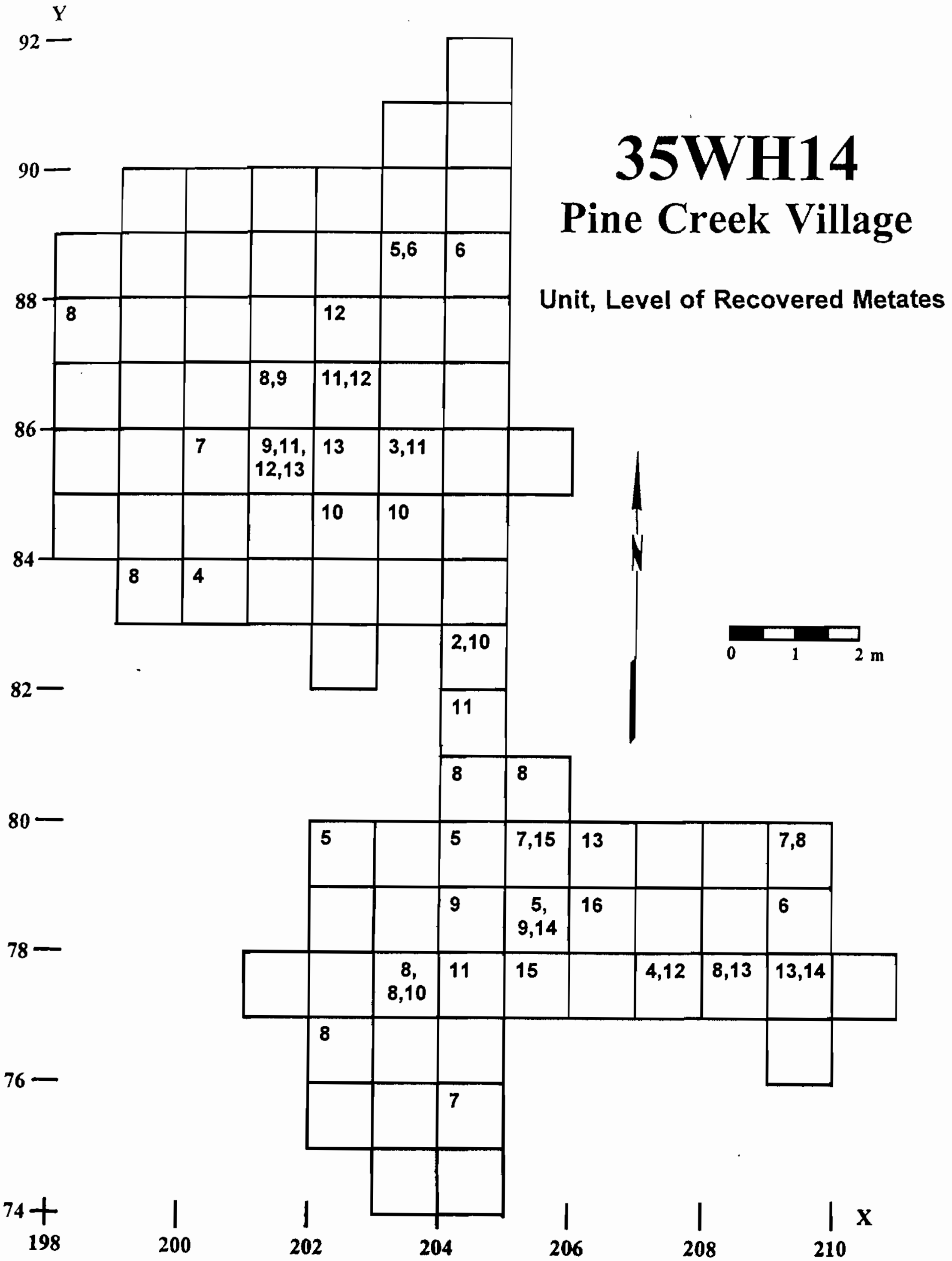


Figure 76. Spatial distribution of grinding stones. Numbers in squares represent levels in which grinding stones were recovered.

In Block A, grinding stones are found in all but levels 1 and 3. However, 16 specimens, or almost 70%, are associated with levels 8 through 13. Grinding stones found at higher elevations (levels 2, 4, 5, and 6) tend to be found around the perimeter of the pithouse, possibly representing material cleared from the interior of the pit during the course of cleaning and reexcavation. Specimens recovered from lower elevations are generally found in the center of the pithouse. In the lowest levels (levels 12 and 13) this is the result of a termination of field excavations in surrounding units; this limitation, however, does not apply to levels 7 through 10. Grinding stones are frequently found at comparable levels in adjacent units, such as in Level 10 of units A43 and A44, in Level 13 of units A34 and A35, and in Level 12 of A28 and A34. It is not clear whether top or bottom elevations were measured on grinding stones so it is not possible to determine precise associations with occupation floors, however the grouping of multiple grinding stones in the center of the pithouse appears to be a persistent pattern.

In Block B, grinding stones are absent in levels 1, 2, and 3. Several peaks are recognizable below this, including a maximum in Level 8. Levels 7, 8, and 9 were assigned to an "intermediate occupation" during the OMSI excavations, situated above the basal excavated housepit. Above this, four specimens were recovered from Level 5 (one, Cat. #572, however, is of questionable provenience); below, eight specimens are associated with levels 13, 14, and 15, which are assigned to the earliest occupation. Grinding stones in Block B are less clearly patterned in their horizontal distribution, although, here too, all lower elevation specimens (below Level 8) come from within the housepit. Additional conclusions are limited by the incomplete excavation of House B. Again, grinding stones are sometimes found in adjacent units in the same level (e.g. Level 9, units B14 and B15), and in two cases, more than one specimen was recovered from the same unit, e.g. two from Level 13 in B27 and two from Level 8 in B22. Specimens from Level 8, where the largest numbers were found, are scattered across the excavation block.

Other types of ground stone generally correspond with the distribution of grinding stones as just discussed. Sixteen specimens were recovered from Block A, twenty-two from Block B. None were found in the first two levels of Block A, and only one each in levels 3 and 4. Counts increase gradually to a maximum of four in Level 8, with none in Level 9 and three recovered from Level 10. One specimen each was found in levels 11 and 12.

In Block B, none are found in levels 1, 3, and 5, and only one or two each in levels 2, 4, 6, and 7. Below this, counts are higher in levels 8 through 13, comprising 68.2% of the total number found in this area. While pestles and mauls, and unidentifiable ground fragments are present in approximately equal number in both blocks, unique types, occur, on the whole, more often in Block B (commensurate with the overall larger sample size). Thus, Block B produced the only edge-ground cobble found at the site, the only atlatl weight, the only potential net weight, etc. Four of the five manos recovered were also associated with Block B, where they occur in Level 8 and below.

Cobble Tools

Thirty-five artifacts from 35WH14 are classified as cobble tools. These are tools used for heavy processing, generally probably either in chopping or pounding, although a few large scraping, adzing, and cutting implements have also been included under this category (Figure 77). Cobble tools from this site include 17 choppers, nine hammerstones, four adzes, one scraper, one worked flake, one knife, one wedge, and one multipurpose tool that could probably be accommodated under the choppers, but also exhibits a heavily ground edge.

Choppers

This is one of the few artifact categories with a slight bias towards the northern Block, as indicated by nine specimens from Block A and eight from Block B. All members of this class would fall under the term "light choppers" as defined for 35WH7 (see Chapter 5). Weights are between 119.27 g and 886 g, a somewhat wider range than at the previous site, probably reflecting the larger sample. Heavy choppers, two of which were observed among the 35WH7 collection, and which weigh several pounds each, were not observed at 35WH14.

Overall, choppers are morphologically comparable to those discussed for 35WH7. They are fist-sized tools, generally with a single, percussion-flaked, moderate to steeply angled edge. Raw material is generally basalt, including fine-grained stream cobbles of

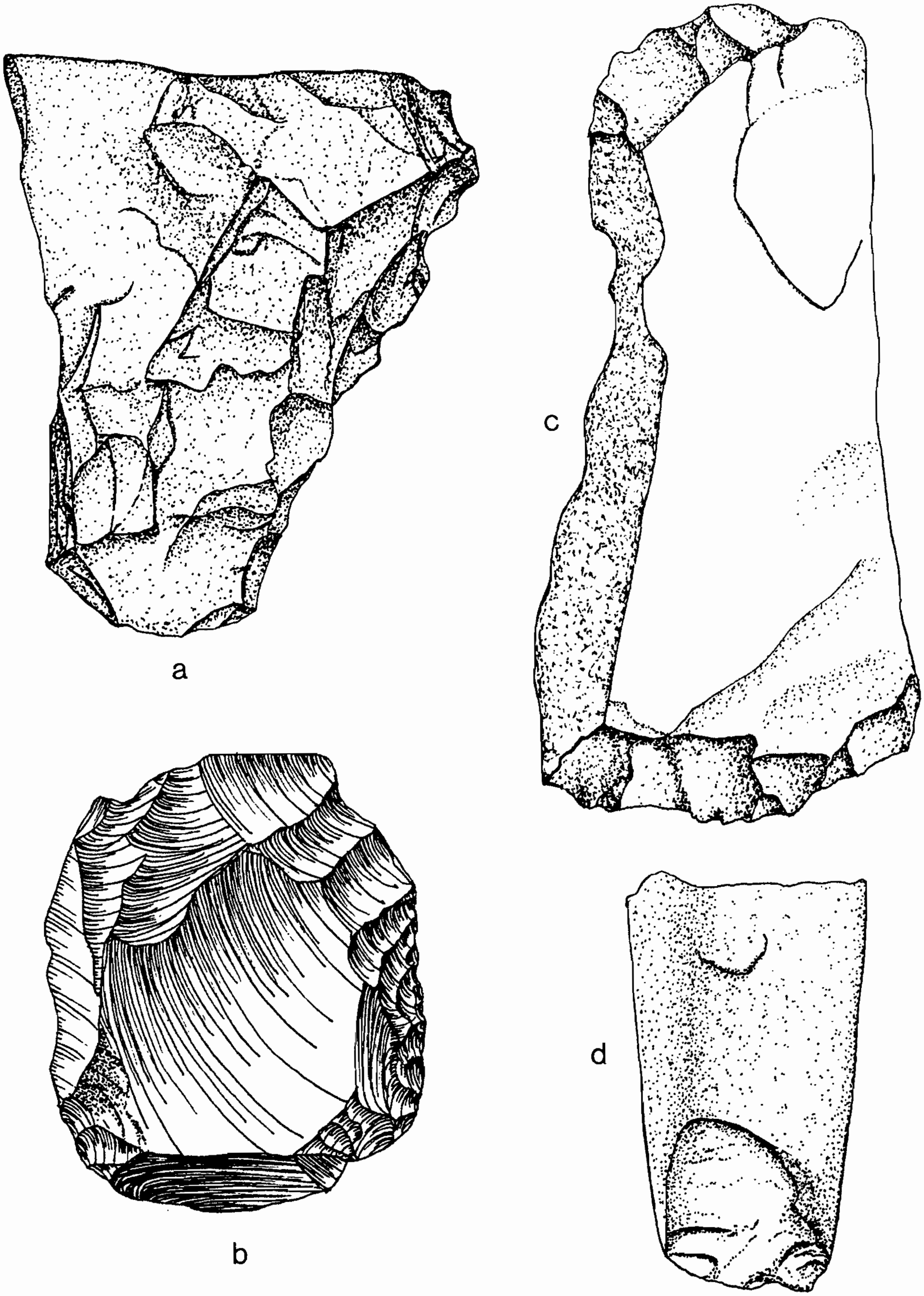


Figure 77. Cobble tools, 35WH14.

a. 2289 b. 942 c. 325 d. 1285

aphanitic basalt, and coarser, angular specimens. As at 35WH7, choppers made on stream cobbles show pecking wear on the cortex of their proximal ends. In one case (Cat. #1225), traces of ochre were observed in the pecked area, again reminiscent of several choppers at 35WH7. One small fragment (Cat. #1187) appears to be part of the bit end of a stream cobble chopper.

Choppers show little vertical patterning in their distribution in Block A, occurring in small numbers throughout the deposits (it should be noted that two of the specimens from Block A have questionable provenience assignments). In Block B, choppers are only present in and below Level 9, with three occurring in Level 9, one in Level 10, one in Level 11, and three in Level 13, and can thus be assigned to the intermediate and lower occupations of the pithouse. Six choppers (36%) were recovered from the area in between the two houses, including units A51, A53, and B01, and may be part of the "ring zone" typically accumulated around the rims of Columbia Plateau pithouses by repeated episodes of cleaning and reexcavation, and often characterized by discarded cobble tools, along with fire-cracked rock, river pebbles and cobbles and faunal remains (Schalk 1983b:52).

Hammerstones

Only nine artifacts are classified as hammerstones although other artifact types show wear from battering and probably served as hammers in addition to their more apparent function. Several hammers show evidence of multiple types of wear, including Cat. #932, a broken cobble with a pecked, battered, and ground edge, and #387, a split cobble on which the edges of the break show evidence of pecking, as well as abrasion or polish. Hammerstones are seen here to have served as percussors, rather than in the reduction of less resistant materials, a function which would have been served by pestles. All are made on stream cobbles.

Six hammerstones were recovered from Block B and three from Block A. Like choppers, specimens in Block B are only found in lower levels, including one each in levels 8, 10, 12, and 15, and two in Level 11.

Adzes

Four elongate and wedge-shaped cobble tools with unifacially flaked edges at one or both ends are classified as adzes (Figure 77c). Their most likely use would have been in heavy woodworking tasks. Specimens #603 and 325 are of comparable dimensions--between 12 and 14 cm long and 5 to 6 cm wide, although they vary somewhat more in height or thickness (5.38 cm and 2.46 cm). The first is of CCS and exhibits a single unifacial edge with an angle of about 60°. The second is of basalt, with two 60° edges. Cat. #603 exhibits damage on the face opposite the flaked edge, as does Cat. #325 on the broader of its two functional edges.

Specimen #2071 is a split pebble with one unifacially worked end. It is smaller than the other two implements, measuring 7.24 cm in length, 5.53 cm in width, and 2.01 cm in thickness. The bit end is incomplete, precluding an assessment of wear. The fourth (Cat. #651) specimen in this category is a cobble of tabular slate, which is broken at both ends. Because of the exfoliating condition of the specimen, it is difficult to determine its full shape, but it appears that at least one end is unifacially retouched. The opposite end shows evidence of damage, but it is not clear if this is due to direct use, retouch, or indirect use from contact with a hammerstone. The four implements were, respectively, recovered from units A04 (Level 3), A15 (Level 9), B30 (Level 5), and B07 (Level 5).

Specimen #651 was, additionally, refitted with two matching, exfoliated flakes, which were associated with Level 9 of unit A42 (Cat #1045) and Level 8 of Unit A42 (Cat. #1315). The original piece (Cat #651) has weathered to a somewhat lighter shade of brown than the other two fragments, and may have been reused after they broke off, although this cannot be stated with certainty. This circumstance would, however, explain the spatial separation between the larger fragment (B07, Level 5) and the two smaller pieces.

Wedge

Specimen #1285 is a small, split stream pebble with a broad flat end opposite a bifacially-worked, sharp, chisel-shaped bit (Figure 77d). Small flake scars have been removed through crushing along the edge of the bit, as well as around the edge of the flat platform. The tool is thought to be a small wedge, probably used in woodworking, as has been suggested for the adzes above. It measures 6.24 cm in length, and is 3.79 cm wide and 2.73 cm thick. The bit is approximately 2.6 cm long. It was recovered in Level 7 of Unit B10.

Worked Cobble Flake

Only one specimen, Cat. #1238, is assigned to this class. This is in contrast to 35WH7, which, in spite of an overall smaller assemblage, produced a dozen artifacts of this type. It consists of a large coarse-grained CCS flake with a single, lateral, percussion-flaked edge. The artifact is fragmentary and may originally have had a more substantial functional edge. It measures 10.19 cm by 9.2 cm and is 4.11 cm thick. It weighs 388.08 g, and was recovered in Level 12 of A19.

Flake Scraper

Specimen #942 is the only member of its class. It is a discoidal CCS flake with a shaped and unifacially retouched convex edge (Figure 77c). It is 6.80 cm long, 5.90 cm wide, 1.86 cm thick, and weighs 80.85 g. It was found in Level 8 of unit B03.

Tabular Basalt Knife

One artifact, Cat. #2289, finally, is classified as a tabular basalt knife. It is thin relative to its size and unifacially flaked along one straight edge (Figure 77a). It is 8.97 cm long, 7.48 cm wide, and 1.81 cm thick. It weighs 128.16 g and was recovered from Level 4 of unit B30.

Bone and Antler Artifacts

Fifty-nine bone and antler artifacts were recovered from 35WH14. These include 20 specimens from Block A, 38 from Block B, and one unprovenienced specimen. For the present description, these are divided into bone tools, bone ornaments, unclassifiable worked bone fragments, and worked antler. Selected examples are illustrated in Figure 78. Descriptive information is presented in Appendix B.

Awls

Bone awls make up the largest share of the category of bone tools, with eleven specimens. Most are fragmentary, retaining well-formed, intact tips, but incomplete proximal ends. Therefore little can be said about their original shape. One is antler; the rest appear to be made of fragmentary large mammal longbone. Specimen BN-57 (Figure 78b), a complete lateral metapodial awl (definition after Dalley 1970b) is the

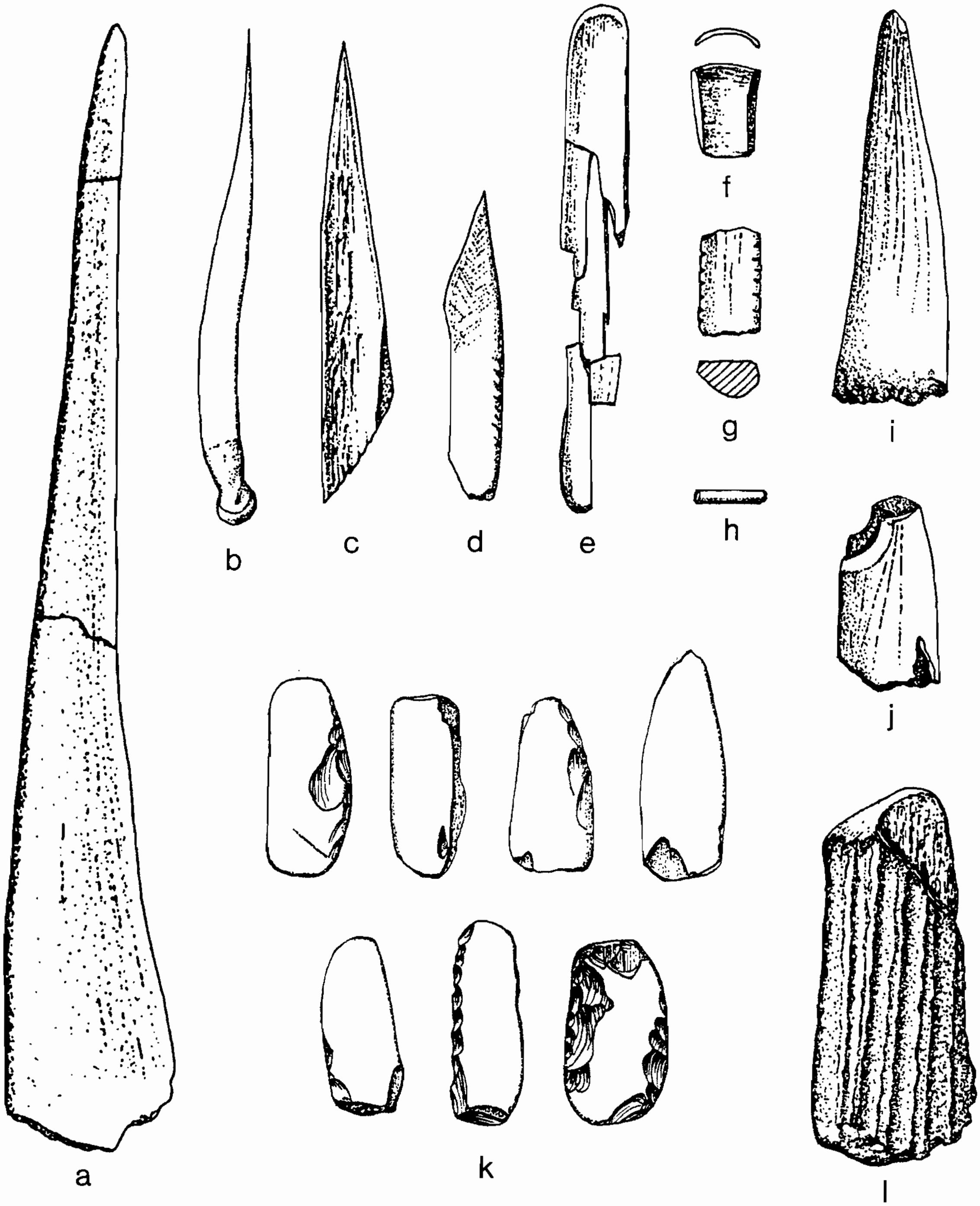


Figure 78. Worked bone and antler, 35WH14.

a.	BN-44	d.	BN-402	g.	BN-165	j.	BN-766
b.	BN-57	e.	BN-1549	h.	BN-113	k.	BN-722
c.	BN-402	f.	BN-472	i.	BN-64	l.	BN-736

single exception. It is 7.21 cm long, 0.76 cm wide, and 0.54 cm thick, weighing 1.45 g. Specimen BN-656, a distal fragment, differs from the rest in its long, narrow shape and round cross-section and may represent part of a needle. Most of the specimens in this class exhibit a highly polished surface finish.

Flat Bone Tools

A second category of bone tools is represented by six elongate implements which, unlike the awls just discussed, are flat in cross-section. Distal end configurations range from tapering and acute (BN-1330, BN-1545), to tapering and bluntly pointed (e.g. BN-44), to a spatulate shape which has been likened in appearance to a popsicle stick (BN-935 and 1549; cf. Oetting 1990b:204).

BN-44 is the largest of the bone tools (Figure 78a). It appears to be made of an artiodactyl rib, and is 17.5 cm long, 2.31 cm wide at its maximum breadth, and 0.35 cm thick, weighing 7.09 g. Its function is unknown. Parallel-sided, spatulate artifacts with rounded ends such as BN-1549 (Figure 78e) and possibly BN-935 (although this specimen is too fragmentary to to allow an assessment of its shape with any certainty) have sometimes been referred to as flakers (eg. Cressman 1942:675). The recovery of similar specimens with embedded microflakes (eg. Hattori 1982:107), or in a context suggesting their use as part of a flintknapper's kit (Oetting 1990b:52), tends to support this interpretation. The polish on the functional ends of BN-1549, however, as well as its delicate structure, suggest that this particular piece may have been used on a softer, less resistant material. The interpretation of a similarly shaped bone implement (albeit of Upper Palaeolithic age) as a burnisher used in dressing skin (Semenov 1976:178) offers a plausible interpretation. An alternative explanation is that it was served as a part of a stick or hand game. The present specimen was found in Feature 142, a shallow pit excavated into yellow clay along the perimeter of House A (A16, Level 8) (see Features).

Dimensions for the other specimens are presented in Appendix B. Because of their fragmentary condition, they will not be discussed further.

Bone ornaments

Three decorative or decorated bone objects were recovered from 35WH14. These include two beads and one piece of incised bone. Specimen BN-113 (Figure 78h) is a tiny tubular bone bead which measures 1.07 cm in length and 0.25 cm in diameter. One end is ground, the other is incomplete, but appears to have been worn after the break, leading to some rounding of the irregular edge. It was recovered in Level 10 of Unit B6.

A second bead is represented by BN-472 (Figure 78f), a lateral fragment of a larger, thin-walled cylindrical bead. Judging by its curvature, the complete specimen may have measured approximately 1.5 cm in diameter. It is 1.4 cm long, and ground at both ends. This specimen was recovered from Level 13 of B14.

Specimen BN-165 (Figure 78g), finally, is a small segment of bone, plano-convex in cross-section, with a cancellous interior. It exhibits six incisions along and at right angles to each of its two longitudinal edges. The piece is 1.55 cm long, 1.03 cm wide, and 0.66 cm thick. It weighs 0.59 g, and was recovered from unit A30, Level 6.

Unclassifiable Worked Bone Fragments

The remaining members of this class include miscellaneous fragmentary specimens of unknown function with evidence of shaping and/or polishing. A single split and calcined longbone has been scraped and smoothed along the broken, interior edge, resulting in an elongate piece with a broad channel or trough (BN-1547). It is possible that many of the other fragments represent types of implements already discussed.

Antler

In addition to bone, six pieces of worked antler were recovered from 35WH14 (in addition to the single specimen referred to under Awls). At least four exhibit evidence of charring. Specimen BN-64 (Figure 78i) is a tine tip which has been roughly cut or chopped at the base and longtitudinally scraped along the exterior, as evidenced by a multitude of sharp, convergent striations. The distal end is rounded and polished, probably from use as an awl or similar tool, against a relatively soft material. It was recovered from Level 10 of unit B6.

BN-736 (Figure 781) is a 5.71 cm long section of antler beam. One end has been worked to a bulb, the opposite has either been cut or broken by ringing. Artifacts classified as antler "cylinders" recovered from The Dalles were believed by Cressman to be flakers, presumably for percussion-flaking (Cressman 1960:42). It is possible that the present specimen was used in a similar manner. BN-736 was recovered from Level 6 of A22.

Specimen BN-391 is a lateral fragment of antler beam. The presence of several flake scars at one end of the beam suggest its removal by ringing and breaking. A small area on the surface of the opposite end appears to be smoothed somewhat. The piece was found in B2, Level 13. Its function is unknown.

The remaining three pieces are unclassifiable pieces with evidence of cutting, shaping, or notching. They were recovered from A43, Level 12 (BN-1312) and A30, Level 5 (BN-154). The provenience of BN-766 is unknown.

Fossilized Bone Artifacts

Seven flat, roughly rectangular pieces of fossilized longbone were recovered from Level 13 of unit B8 (BN-722 A through G; Figure 78k). The objects range from 2.66 cm to 3.46 cm in length, from 1.12 cm to

1.51 cm in width, and from 0.34 cm to 0.43 cm in thickness. Weights are between 1.13 and 1.67 g. The pieces appear to be finished to varying degrees. While BN-722E has been ground and smoothed along all four edges and corners, specimen A is merely a parallel-sided bone sliver with some shaping along one short edge. A single piece, BN-722B, exhibits continuous retouch along one long side. Retouch may have served in the initial shaping of the artifacts, as indicated by the presence, on several of the pieces, of marginal flake scars which have been obliterated by subsequent smoothing.

A single set of coordinates, 206.73x/79.30y, elevation 95.70 m (B08, Level 13) is given for all artifacts in this group. This spatial clustering may indicate their use (or intended use) as gaming pieces or dice. A study of games among North American Indian tribes found dice games to be widespread and materials to be varied (Culin 1907:45). Dice games are listed in Ray's Plateau Culture element distributions for all surveyed groups (Ray 1942:183). While beaver teeth are somewhat more commonly reported as gaming pieces in this area, bone dice are indicated for the Tenino and Umatilla. Bone pieces were also used in a common Northern Paiute hand game (Stewart 1936:398-399; Fowler and Liljeblad 1986:453).

Although different in appearance, prehistoric bone artifacts identified as gaming pieces are reported from the Wildcat Canyon Site (Dumond and Minor 1983:181) and the Dalles-Deschutes region (Strong, Schenck, and Steward 1930:58-59; Strong 1959:Figure 90). They were also found at the Alderdale Site (45KL5) on the Columbia River, approximately

65 miles upstream from the Dalles (Oetting 1986a), where they are assigned to the early subphase of the Wildcat Phase (ca. 500 B.C. to A.D. 1). This would be consistent with the age of the specimens at 35WH14, which are associated with the early occupation of House B. While archaeological finds of this type appear to be infrequent in the southern Plateau, sets of bone objects similar to those recovered at 35WH14, and interpreted as gaming pieces, are more common in the American Southwest (cf. Dalley 1970b and sources). The absence of incised or painted markings may be the result of their unfinished condition.

Discussion

Classifiable bone and antler artifacts at 35WH14 are comprised primarily of utilitarian items, such as awls, and ornamental, as well as possibly recreational objects. Bone implements traditionally related to fishing, such as harpoon parts comparable to those recovered from the Columbia River (e.g. Strong, Schenck, and Steward 1930; Cressman 1960; Dumond and Minor 1983) or bone bipoints like those found in the Klamath Basin to the south (e.g. Cheatham 1991), are absent.

While bone and antler artifacts are found in both blocks, their distribution is not even. In Block A, members of this class were recovered primarily from lower levels (levels 11 and 12) in the southern half of the house or from higher elevations around its periphery (levels 5 through 8). In Block B, too, worked bone and antler are associated in large part with the lowest floor, with a scattering in higher levels around the margins of the house. Only a single item, BN-905, a small unclassifiable fragment from Level 1 of A42, was found above Level 4. This distribution will be returned to at the conclusion of this chapter.

Beads

Stone Beads

Five stone beads were recovered from 35WH14 (Figure 79). They are made of a variety of materials, most of which are locally available. One exception will be discussed below. Materials were identified by Dr. Gregory Retallack, Department of Geology, University of Oregon.

Specimen #248 (Figure 79f)is a small gravel-sized piece of basalt or fine-grained volcanic with a straight drilled hole. A 0.5 mm wide area of string wear on one face of the bead suggests that is was sewn to a backing rather than merely strung. The specimen has a maximum diameter of 6.1 mm.

Specimen #639 (Figure 79g) is a cylindrical bead with a straight bore and flat sides, and may have been cut from a longer section. It is made of ash flow tuff from the local John Day Formation. The specimen measures 6.5 cm in diameter.

Specimen #958 is a fragmentary, biconically drilled disc bead of an unidentifed stone, possibly quartz. It has flat faces and rounded

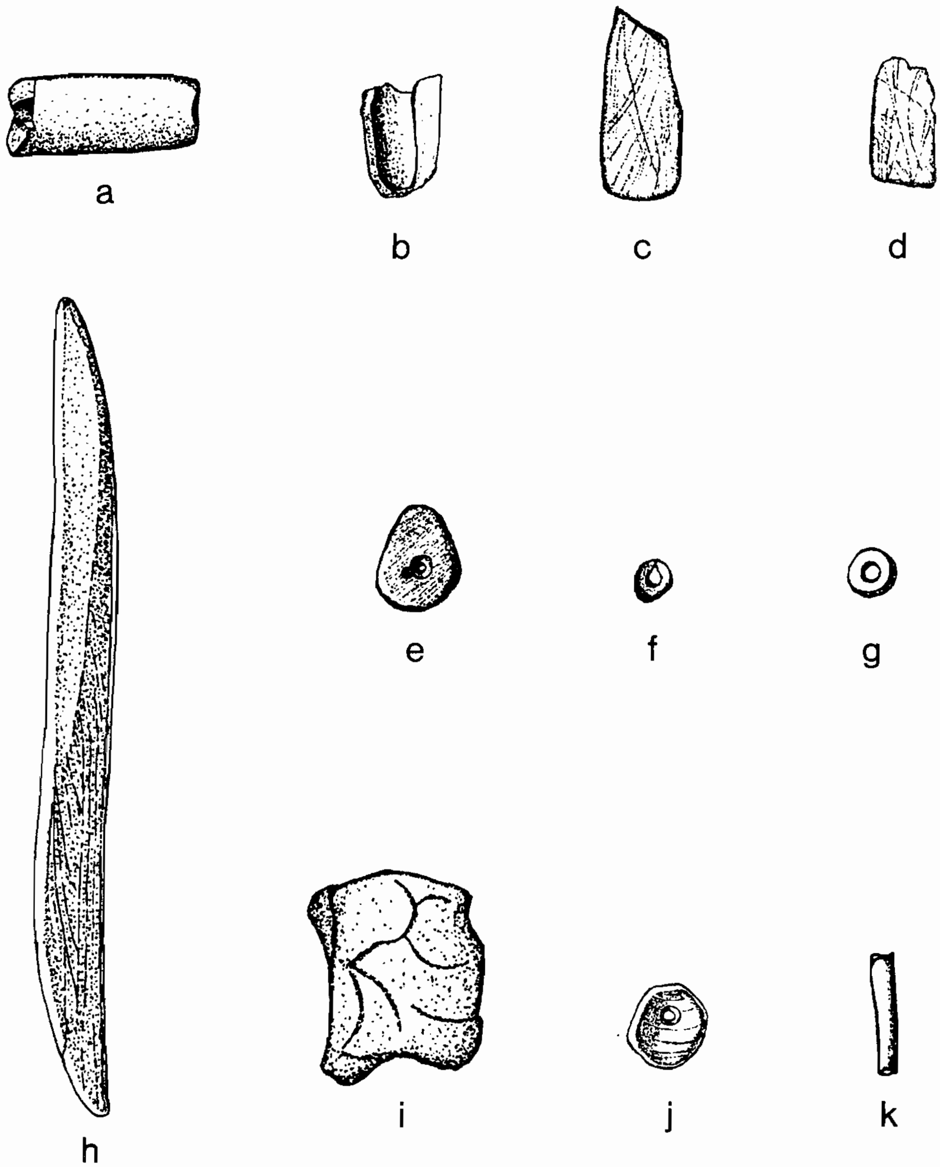


Figure 79. Decorative and/or unique artifacts, 35WH14.

a.	565	d.	2356	g.	639	j.	BN-393
b.	1242	e.	1063	h.	939	k.	BN-472
c.	BN-51	f.	248	i.	2997		

edges and may have been ground to attain this shape. It measures 1 cm in diameter.

Specimen #1063 is a subtriangular flat pebble of serpentinite with a biconical bore. It has rounded edges and exhibits fine, multidirectional scoring across both faces. This material is not locally available and may have been procured from the Canyon Mountain Complex in vicinity of present-day John Day some 90 miles to the southeast of Pine Creek (Joseph Jones, personal communication, 1993; Walker 1977). This area is also the main source of obsidian for the Pine Creek sites (see Chapter 7). The bead measures 13.9 mm by 11 mm.

The final member of this group (#255) is a broken disc bead of an unidentified stone. It is biconically drilled. The mode of manufacture is not entirely apparent, but it may have been cut and ground. It measures 10 mm in length, 5 mm in width, and is 1.8 mm thick.

While beads were found in both excavation blocks, only one, Cat. #639, was recovered from Block A (A25, Level 5). The remainder were associated with Level 9 of B03 (Cat. #958), Level 10 of B06 (Cat. #248 and 255), and Level 12 of B08 (Cat. #1063). Whether the recovery of these beads from units located near each other, and even from identical units and levels, reflects a single prehistoric activity or merely exceptionally keen perception on the part of the excavators is not known.

Shell Beads

Two shell beads were found at 35WH14 in addition to the stone beads already discussed (Figure 79j-k). Both were originally curated with worked and unworked bone, as indicated by the catalog prefix "BN". BN-393 (Figure 79j) was recovered from Level 10 of B29. It is a small, circular, saucer-shaped bead with ground edges and a small, biconically drilled, central perforation. It measures approximately 11 mm in diameter and is 2 mm thick at its maximum, with a hole diameter of approximately 1.5 mm. The species of origin is unknown.

Specimen BN-472 (Figure 79k) was associated with Level 13 of unit B14. It is a burned segment of dentalium shell, measuring 15.6 mm in length and ranging from a diameter of 3.6 mm at its broad end to 2.9 mm at its narrow end. Its broad end is rough and appears to be broken; its distal end appears unmodified. Its use as a decorative item and/or medium of exchange may be be inferred from ethnographic accounts and portraits (cf. Erickson 1990:94-105).

Dentalium shells, of which Dentalium pretiosum was most commonly circulated throughout the Columbia Plateau, are found along a large portion of the Pacific Coast. Their procurement appears, however, to have been limited to the shallow beds surrounding the coastal islands of British Columbia (Erickson 1990:131), hundreds of miles from the Pine Creek drainage basin. It has been suggested that the trade in dentalium shells developed sometime between 2000 and 3000 B.P., implying a change--either shift or expansion--in existing trade patterns. The association of the present specimen with the earliest occupation of House B, as well as its provenience near the radiocarbon-dated features on this floor places it in this period of changing trade relations, and testifies to connections between Plateau and Coastal groups at this time.

Tubular Stone Artifacts

Specimens #565 and BN-1242 (Figure 79a-b) are tubular fragments of bored stone. Specimen #565 was recovered from Level 13 of unit B15. It is a cylindrical piece of local siltstone, measuring 2.43 cm in length, and ranges in diameter from 1.0 cm at the ground and finished end to 1.1 cm at the opposite, broken end. It weighs 2.59 g. The specimen has been drilled slightly off center with a 0.43 cm diameter straight bore. It tapers slightly just above the finished end, but is otherwise parallel-sided. The finished end is also slightly darkened, suggesting possible use as the mouth piece of a tubular pipe. No smoking residue is, however, present.

Specimen BN-1242, recovered from Level 6 of unit A14, was originally mistakenly catalogued as bone and has not been recatalogued. It is a tubular, longitudinally split, terminal segment, made of a soft, orange stone which tapers from approximately 0.9 to 1.07 cm in diameter. The partially complete, narrow end appears to be ground to a smooth finish, though the fragmentary state of the piece limits inferences. Bore diameter is approximately 0.49 cm except at the narrow end of the piece where the bore appears to constrict slightly. Internal striations are parallel to the length of the piece, suggesting a longitudinal rather than a rotational drilling motion. The function of the piece is unclear. It may be part of a tubular pipe, but any evidence of residues or wear is missing. It weighs 0.54 g.

Sun-Dried Clay

Two pieces of clay were found by the author while sorting debris from 35WH14. Specimen #2997 is from Level 6 of unit B28 (Figure 79i). It is thin, roughly rectangular, and may be part of a larger artifact. One face is flat and somewhat porous and appears to have been pressed against a resistant surface, possibly a rock. The opposite face is slightly convex and exhibits several curved cracks or grooves which may represent fingernail incisions. The piece appears to be sun-dried. It is 2.84 cm long, 2.18 cm wide, and 0.75 cm thick. It weighs 3.70 g. Inclusions appear to be minimal, but no freshly broken surfaces are visible for a more precise determination.

Sun-dried clay figurines have been recovered from the Wildcat Canyon Site (Dumond and Minor 1983:183) and elsewhere along the Columbia River (Endzweig 1989 and references). Temporal associations have remained uncertain but can generally be assigned to the last 2,000 years. The presence of clay artifacts would therefore not be out of place at 35WH14, although their presence cannot be ascertained at this point.

Specimen #2306 is part of a hardened clay cast of a grassy plant stem. The stem appears to have measured approximately 1.0-1.5 cm in diameter. The exterior of the piece is irregular and exhibits a slight lustre on raised areas. It was recovered in Level 7 of B33. Its function is unknown. It may have been part of the superstructure of a house, but other possibilities, including a fortuitous and/or natural origin are equally likely. The close spatial proximity of both clay specimens (in adjacent units and consecutive levels) is at present unexplained.

Historic Artifacts

Only two Euroamerican artifacts were found at 35WH14, both of which may be modern in age. Specimen #1129 is a white, four-hole porcelain button with convex face and back and a depressed central hole panel. It measures 7/16 inches in diameter and about 1/16 inch in thickness and was recovered from Level 2 of unit A33. Buttons of this type were introduced in the 1840's (South 1964) and stocked by the Hudson's Bay Company at Fort Vancouver (Ross 1976). They are, however, still made today and do not represent a reliable chronological indicator.

Specimen #593 was identified by a colleague as a "mushroomed" lead bullet (D. Jenkins, personal communication, 1993). It was recovered from Level 3 of unit A24. It measures 11/16 inches in diameter, is 6/16 inches thick, and weighs 12.83 g. The base measures ca. 0.43 inches in diameter, suggesting 40 caliber-range ammunition, specifically perhaps a 41 caliber bullet. According to Jenkins, bullets of this type were present in the previous century, however, like the button discussed above, they have a wide potential age range and constitute poor time markers.

Lithic Debitage

A total of 50,606 flakes were recovered from 35WH14, or an average of 509.11 flakes per m^3, based on a total excavated volume of 99.40 m^3 (Table 23). Based on the size of the flakes retained, it is likely that quarter-inch mesh screens were used, suggesting that this figure could have been considerably higher, had smaller-mesh screens been employed. This assumption is supported by anecdotal evidence, such as comments like, "there are also dozens of small flakes which are too small to be collected" (Riddle, fieldnotes, July 8, 1981, with reference to Level 13 of B24). During the course of investigations at the site, flakes were separated by raw material (CCS, obsidian, and basalt), counted, and weighed by OMSI lab assistants. The following summary utilizes this data. While all flake lots were examined for overlooked tools during this analysis, resulting in the retrieval of more than 1150 formed or used artifacts, debitage was not re-counted.

Of the 50,606 flakes found at the site, 20,982 were recovered from Block A (41%) and 29,624 (59%) from Block B. Translated into density values, this indicates an average density of 401.95 flakes per m^3 in

Table 23. Distribution of Lithic Debitage by Level and Excavation Block, 35WH14

Level	Block A		Block B	
	Count	Percent	Count	Percent
1	919	4.38	757	2.55
2	2100	10.01	1836	6.20
3	2591	12.35	1567	5.29
4	2525	12.03	1909	6.44
5	2017	9.61	2280	7.70
6	1691	8.06	2258	7.62
7	1842	8.78	2843	9.60
8	1653	7.88	3080	10.40
9	1678	8.00	3054	10.31
10	1314	6.26	2763	9.33
11	1616	7.70	2435	8.22
12	706	3.36	2484	8.39
13	316	1.51	1903	6.42
14	14	0.07	396	1.34
15	-	-	59	0.20
Total	20982	100.00	29624	100.00

Block A and 627.63 flakes in Block B, correponding to the overall denser concentration of artifactual material in Block B. Most of the flakes are of CCS, comprising 87% of the assemblage, with small proportions of obsidian (6%) and basalt (7%). Relative frequencies of raw materials are almost identical for both excavation blocks (Table 24), with obsidian making up 7% of the assemblage in Block A and 5% in Block B, and basalt comprising 7% of all flakes in both blocks.

Compared by unit, proportions of obsidian range from a minimum of 0 in units with very low flake counts overall (e.g. A1), to a maximum of 14%. Unit A45, with 55 obsidian flakes (23% of this unit's flake assemblage), represents an exception. Almost 70% of the obsidian flakes in this unit were found in levels 2 and 3, which correspond to the

Table 24. Distribution of Lithic Debitage by Excavation Block and Raw Material, 35WH14

Excavation Area	Raw material			Total
	CCS	OBS	BAS	
Block A	18,125	1,400	1,457	20,982
Block B	26,143	1,482	1,999	29,624
All units	44,268	2,882	3,456	50,606

obsidian flake scatter recorded as Feature 101. Proportions of basalt by unit range from 1% (e.g. in A50 and B33) to several units with more than 20% in the northeast of Block A (A1, 25%; A2, 20%; A15, 22%).

The horizontal variability in flake counts, caused by the "smearing" of former discrete activity areas and the presence of multiple, sloping, living surfaces, is probably responsible for the absence of clearly recognizable and significant peaks in lithic debris which could be correlated with the postulated floors. This is true both for individual units as well as across each excavation block. Nonetheless, some behavioral inferences are possible.

Counts for Block A show a substantial number of flakes below the elevation of the lowest, radiocarbon-dated feature of Block A (N=2652, or 12.6%), supporting occupation prior to 1500 ± 25 B.P. In Block A, in general, flakes tend to cluster in the northern portion of the block, shifting from its northwestern quadrant in levels 2 through 5, to a more uniform distribution in Level 6, and then in subsequent levels to the northern and eastern portions of the excavation block. This final reorientation coincides with the localization of debris within the pithouse margins and is particularly striking in Level 11 (Figure 80). The concentration of flakes and tools in this area complements the distribution of pit features and metates in the opposite (southern and eastern) portions of the lowest floor. It suggests a deliberate spatial separation of lithic reduction activities from food processing and storage areas.

The distribution of debitage in Block B is somewhat different. Unlike the northern portion of the site, where flake counts peak in levels 3 and 4, then gradually decline, flake counts in Block B gradually increase to a maximum in levels 8 and 9, corresponding to Floor 2. The significance of persistent high counts in unit B22 is not clear, and interpretation is complicated by a field reference to "eroded soil from pothunter's mound in northwest corner [of Level 1]" (Excavation Unit Level Form, B22), the observation of "many rodent runs" in levels 1 through 5 of B21, and a rodent hole at the bottom of Level 2 (Excavation Unit Level Form, B21). The suggestion of post-depositional disturbance within this particular area makes any inferences regarding prehistoric cultural use highly questionable.

From Level 8 downward, debitage becomes increasingly concentrated within the housepit margins. Highest densities are centered on unit B23 in Level 12 and units B14 and B24 in Level 13. While this places the highest flake densities of Floor 3 towards the western margin of the space occupied by grinding stones and pit features, the absence of information from the unexcavated southeastern portion of House B

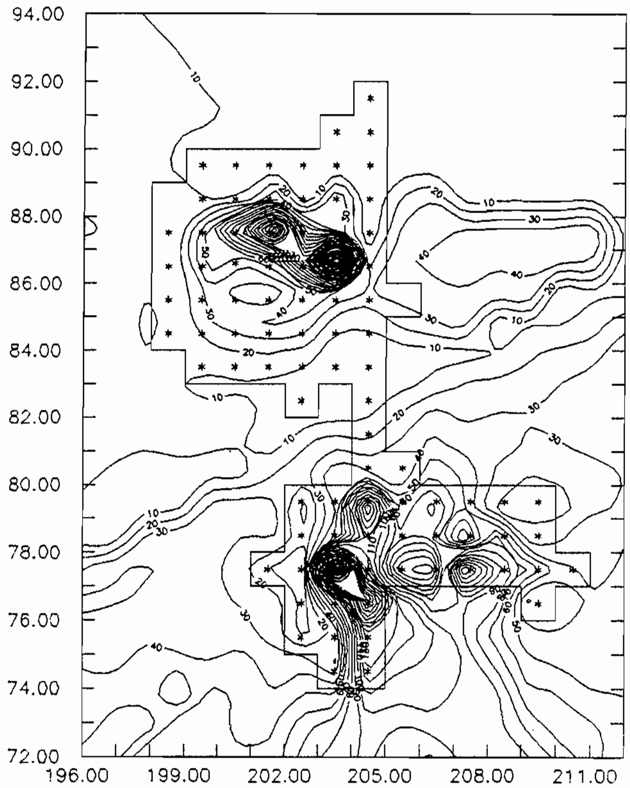


Figure 80. Horizontal distribution of lithic debitage, Level 11.

precludes firm conclusions regarding the spatial organization of activities in this part of the site.

Miscellaneous Rocks and Minerals

Specimens included in this category are geological specimens which were either catalogued by the original OMSI staff or removed from debris bags during the present analysis. They include modified and unmodified locally available minerals or rocks, as well as at least one item of non-local material which must have been brought to the site.

Quartz

Specimen #2550 is a small chunk of rock crystal which was retrieved from the debris of unit A32, Level 6. It measures 3.54 cm x 3.30 cm at the base and is roughly 2.32 cm tall. This clear, crystalline quartz occurs locally in the Pine Creek drainage.

Muscovite

A small sheet of unmodified muscovite (Cat. #3234) was recovered from Level 8 of unit B38. According to Joseph Jones (written communication, October 1993), muscovite is found in the Wallowa Mountains or the Elkhorn Mountains, some 110 to 140 miles east of the Study Area. It is not known whether local sources exist.

Pebble

A symmetrical ovoidal stream pebble with a small heat-spalled area was collected from Level 10 of unit A35 (Cat.# 1026). The specimen measures 2.63 cm in length and about 2 cm in diameter, and weighs 15.75 g. The pebble is brown with light speckles, resembling a bird egg, and may have been curated as a keepsake.

Schist

Specimen #939 is an elongate, needle-like piece of local schist (Gregory Retallack, personal communication, 1993) with asymmetrically tapering ends (Figure 79h). It was recovered from Level 9 of unit A41. Surface striations appear to reflect intentional shaping but no wear is evident. The specimen is 10.64 cm long, 1.07 cm wide, and 0.86 cm thick. It weighs 13.90 g.

Vein Quartz

Cat. #2366 is a blocky rectangular chunk of vein quartz with cortical material on both exterior faces. It could have served as a core for tool production. The specimen measures 7.25 cm in length, 3.5 cm in width, and 2.5 cm in thickness, and weighs of 115.25 g. It was recovered in Level 4 of unit A47.

Cryptocrystalline Silicates

Specimen #2647 is a small, tabular piece of local CCS (Gregory Retallack, personal communication, 1993). One face is flat, polished, and exhibits parallel striations, the other consists of a rough cortical surface. It is 2.57 cm long, 1.19 cm wide, 0.59 cm thick, and weighs 2.32 g. The specimen was found in Level 2 of A47.

Slate

Six small pieces of platey slate are included under this heading. All but one (Cat. #2385) exhibit multiple uni- or multi-directional striations on one or two faces (Figure 79c-d). One fragmentary specimen from Level 4 of unit A13, Cat. #BN-51 (formerly miscatalogued as bone) exhibits parallel sides and smoothed edges, and may have been intentionally shaped (Figure 79c). Dimensions of BN-51 are 2.42 cm x 1.2 cm x 0.19 cm. Its weight is 0.8 g. The other specimens in this group are of comparable size or smaller. They include Cat. #2356, 2372, 2385, 2795, and 3236, from B33/L-10, A19/L-3, A19/L-2, A6/L-2, and A26/L-1, respectively. The recovery of all but one of these items from the upper four levels of units clustered in an eight square-meter area suggests a more than accidental association, possibly the result of a single activity.

Ochre

Red ochre was reported from both blocks at 35WH14. Three larger fragments were collected by OMSI personnel and catalogued (Cat. #237, 440, 514). The rest were weighed by level, bagged with the flake debris, and noted as a separate entry in the flake catalog. For the present analysis, weights have been extracted from these data and combined with weights from the three numbered specimens. In general, material which was identified as "ochre" appears in large part to be burned rock with exposed areas of red, crumbly material, which could presumably serve as a pigment with further processing. During the present analysis, only a single, compressed lump of solid red pigment was observed (Cat. #237), which could be used without further manipulation.

A combined weight of 141.5 g of red ochre was recovered from Block A. Most ochre found in this area clusters along and outside of the northern margin of House A, regardless of elevation. An exception is represented by a large concentration (38.5 g) observed in Level 11 of unit A41. This material appears to be associated with a combination of features identified by excavators as an ochre processing area (features 153 and 159; see Specialized Activity Areas, under Features, Block A).

A total of 288.7 g of ochre was recovered from Block B, more than two times the amount recorded for Block A. Unlike in Block A, ochre appears to be present thoughout Block B, although it is possible that this is merely the result of differential collection strategies. Ochre found in the center of the block tends to be recovered from the lower elevations (levels 9 though 15), while material is, in addition, also found at higher elevations towards the margins of the house feature. This distribution suggests an association with the two lower floors of House B. 178.2 g, or 62% of the ochre recovered from Block B, was found in the five eastern units (B19, 27, 28, 29, 33). Its significance is unknown.

In addition to the ochre residues observed on the cobble tools discussed earlier, traces of red coloring were observed on specimen

#133, a flat, split river cobble measuring 4.45 cm x 5.74 cm x 2.01 cm, with a weight of 82.50 g. The pigment on this specimen is not powdery and appears to be firmly bonded to the rock surface, possibly by the addition of binding agents. The cobble is from Level 10 of unit B27, consistent with the distribution of ochre in Block B as indicated above.

Other

Specimen #3176 is a small, prismatic piece of dark gray to green stone with dense parallel striations on all surfaces. It was recovered from the debris of unit B18, Level 10. The specimen measures 2.12 cm in length, 0.93 cm in width, 0.8 cm in thickness, and weighs 1.82 g.

Specimen #3235 is a thin, tabular piece of soft sedimentary rock with irregular striations on both flat faces. It is 1.54 cm long, 1.03 cm wide, and 0.24 cm thick. It weighs 0.50 g. The piece was recovered in Level 4 of unit A49.

Faunal Remains: Vertebrates

As for site 35WH7, faunal remains were identified by Dr. Joanne M. Mack of Pomona College, Claremont, California. Mack's report is reproduced in Appendix C. It is abstracted for the present discussion, and expanded with additional contextual information. The same cautions recorded in Chapter 5 regarding screen size and the application of shellac to selected specimens apply here and will not be repeated. An additional complication of the 35WH14 assemblage is the often fragmentary condition of the bone, which Mack (Appendix C) attributed to the prehistoric occupants of the site:

> The vast majority of the bone items are not only partial but can only be described as fragmentary, often the medial section of long bones. This is only partly due to the extremely poor condition of some of the bone. Much of these bone pieces seem to have resulted from manual breaking of the bone, likely to extract marrow.

This circumstance is reflected by the presence of only 39 complete elements in the site.

The analyzed assemblage consists of three parts. Specimens BN-1 through BN-877 were catalogued by OMSI staff and frequently represent point-provenienced items. In additional, fieldworkers collected screened "debris" which included overlooked artifacts, flakes, charcoal, and bone. Because of limited funds, only a sample of the bone from this debris was examined. The sample includes all material from selected one-meter grid squares comprising three transects. The transects were selected to cross-cut the house depressions in close proximity to radiocarbon-dated features, and to incorporate areas exhibiting high densities of faunal material as indicated by talleys derived from OMSI counts. The two transects across Block A span units A39 to A45 from west to east and units A7 through A52 from north to south, totaling 14 one-by-one units. The third transect extends from west to east across Block B, encompassing 10 units between B20 and B29. Specimens BN-878 through BN-1349 represent identifiable specimens withdrawn from the debris sample, which have been individually counted, examined, and classified to the extent possible. Specimens BN-1350 through BN-1544 consist of individual lots of undentifiable bone which were weighed only and will not be further considered here.

Distribution

A total of 1,341 specimens were assigned to a taxonomic level of class or better (apparent discrepancies between catalog numbers and specimen counts are the result of the occasional inclusion of more than one specimen under a single catalog number). Of these, 364 were recovered from Block A and 845 from Block B, corresponding to the overall greater richness of artifactual material observed in Block B. Provenience was unknown for 132 specimens. Classes identified include birds, mammals, fish, and reptiles, and are represented by sixteen identifiable species and twenty genera. Taxa are tabulated below by excavation block and level (Table 25).

As at 35WH7, mule deer dominate the assemblage, with 286 specimens (21.3% of identifiable items). Many of the 32 specimens identified as "Cervidae" and the 170 specimens identified as "Artiodactyla" can probably also be attributed to mule deer, as can in all likelihood many of the 507 bones assigned to "large mammal," boosting the proportion of deer even higher. Other artiodactyls represented in much smaller numbers are bighorn sheep (NISP=9), elk (NISP=40), and pronghorn (NISP=4).

Leporids constitute the second most important family, represented by 47 specimens of cottontail, five specimens of jackrabbit, and two

Table 25. Identifiable Faunal Remains at 35WH14, by Block and Level

Prov.	Block A																Block B																
Taxon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	?	Tot.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	?	Tot.	Unk.
Birds	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	2	-
Large	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-
Medium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	2	-
Passerine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-
<u>Numenius americanus</u>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-
<u>Bonasa umbellus</u>	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-
Fish	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	2	1	-	-	-	-	-	-	3	-
Large	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	1	-	2	-	-	-	-	-	-	-	-	3	-
Medium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	2	-
Mammals	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	1	-	1	4	1	3	2	-	-	14	1
Artiodactyla unspec.	1	-	1	9	6	5	3	5	2	5	-	1	-	1	-	39	-	2	3	-	7	5	12	10	8	11	9	22	10	-	-	99	32
<u>Antilocapra americana</u>	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	1	-	-	-	-	-	3	-
<u>Ovis canadensis</u>	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	1	-	-	2	-	-	-	1	-	-	9	1
Cervidae unspec.	-	-	1	4	-	-	-	1	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	7	-	-	2	11	-	-	20	6
<u>Cervus canadensis</u>	-	-	-	2	1	-	1	-	1	1	-	-	-	-	-	6	-	-	-	-	-	2	1	-	6	6	3	5	9	-	-	32	2
<u>Odocoileus</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-
<u>Odocoileus hemionus</u>	-	3	6	12	5	1	4	4	5	7	14	5	-	-	1	67	1	-	1	5	4	9	12	14	25	22	10	50	23	6	-	182	37
Carnivora unspec.	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-
<u>Canis</u> sp.	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-
<u>Canis latrans</u>	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-
<u>Felis concolor</u>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	1
<u>Procyon lotor</u>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-
Rodentia unspec.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	1	4	1	-	1	-	-	-	-	7	-
<u>Spermophilus</u> sp.	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	2	-
<u>Eutamias</u> sp.	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-
<u>Marmota flaviochtris</u>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	2	-
<u>Thomomys talpoides</u>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	2	1
<u>Zapus princeps</u>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	1
<u>Microtus</u> sp.	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	1
<u>Neotoma cinerea</u>	-	-	-	1	1	-	-	-	-	1	-	-	-	-	-	3	-	-	-	-	-	-	1	-	1	-	-	-	1	1	-	4	-
<u>Erethizon dorsatum</u>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-
Leporidae unspec.	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-
<u>Sylvilagus nuttallii</u>	-	-	-	-	1	2	1	-	1	-	-	4	-	1	-	10	1	-	-	-	4	1	3	11	5	1	-	2	3	-	-	31	6
<u>Lepus</u> sp.	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	4	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-
Mammal, large	-	2	2	31	17	31	23	10	4	13	28	2	5	2	-	170	-	-	-	9	15	14	19	23	48	33	25	79	31	5	-	301	36
Mammal, medium-large	-	-	2	4	2	6	2	6	3	2	2	1	-	-	-	30	-	-	-	3	5	6	5	10	8	6	4	17	7	1	-	72	4
Mammal, medium	-	-	-	3	-	-	1	2	-	-	-	-	1	-	-	7	-	-	-	-	-	-	2	-	4	3	5	14	6	1	-	35	2
Mammal, small-medium	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-
Mammal, small	-	-	-	-	-	-	-	1	3	-	-	-	-	-	-	4	-	-	-	1	2	1	1	1	1	-	-	2	-	-	-	9	1
Reptiles																																	
<u>Clemmys marmorata</u>	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-
Colubridae unspec.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-
Total	2	5	12	70	34	47	41	31	20	31	44	15	7	4	1	364	2	2	4	18	40	40	62	80	121	93	61	202	105	15	-	845	132

unidentifiable leporids. The problem of screen mesh size bias for small body-size taxa has been treated for 35WH7 and will not be detailed here; while it may affect the specimen counts to some extent, it probably does not alter the fundamental relationships observed. Other small mammals consist of a variety of rodents, the smaller of which may be natural residents of the site rather than culturally introduced. Rodents include ground squirrel (NISP=3), chipmunk (NISP=1), yellow-bellied marmot (NISP=2), northern pocket gopher (NISP=3), western jumping mouse (NISP=1), unspecified voles (NISP=3), woodrat (NISP=8), and porcupine (NISP=1). A small number of carnivores observed at 35WH14 includes coyote (NISP=1, also Canis sp., NISP=2), cougar (NISP=2), and raccoon (NISP=1).

Avian species include long-billed curlew (NISP=1) and ruffed grouse (NISP=2), as well as an unidentified passerine (NISP=1), and a few specimens identified only as "medium" and "large" bird (NISP=2 and NISP=1, respectively). Eight specimens were assigned to unidentifiable pisces (three specimens of "large" and two specimens of "medium" fish). Reptiles are comprised of two elements of western pond turtle and one element of snake.

Whereas the most commonly represented species are found in both excavation blocks, many rare taxa are found in Block B only, where bones are more than twice as abundant as in Block A. These include, for example, all specimens of fish, raccoon, chipmunk, pocket gopher, cougar, porcupine, marmot, snake, and long-billed curlew. In order to determine whether the diversity of Block B is merely a function of its larger sample, relative percentages of specimens of common species (NISP>10) and rare taxa (NISP<10; with birds, fish, and reptiles each treated as a single taxon) were compared for both excavation blocks. The results indicate no significant distributional difference between Blocks A and B (X^2=1.47, df=1, p<0.25). This suggests that sample size, rather than, e.g., cultural preference is, in fact, the reason for the difference in diversity between the two excavation blocks. It does not, of course, explain the higher density of material in Block B (17.9 identifiable specimens per m^3 as compared to 7.0 identifiable specimens per m^3 in Block A).

In order to assess the relationship of the intensively analyzed transect sample to the smaller sample of specimens catalogued by OMSI staff, the present investigator compared frequencies and taxonomic composition of "catalogued" specimens from the transect with those of the "debris sample" specimens (material removed from debris including BN-878 through BN-1349). Frequencies for each excavation unit are presented in Figure 81.

Comparison of the two sets shows increases in counts of identifiable specimens which range from zero to 71 (an average of 17.6), reflecting gains of between zero and 1200 percent (an average increase of 313%). While addition of the transect sample generally increases the volume of bone examined, the gains tend to favor the most common taxa, as well as fragmentary specimens which can only be identified to the level of class, order, or family. Only one taxon previously unaccounted for from the site as a whole was "discovered" as a result of examining

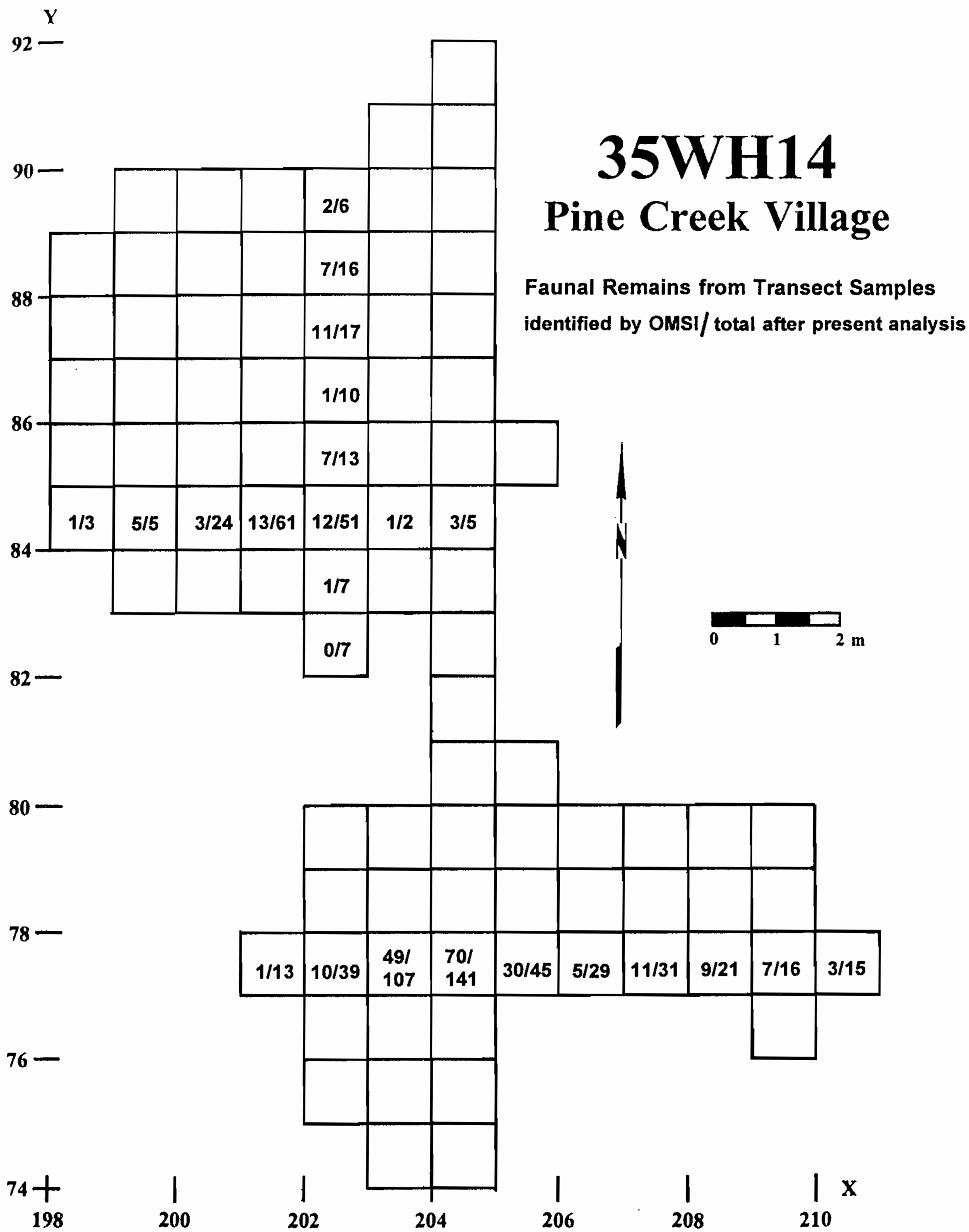


Figure 81. Distribution of faunal remains recovered from transect samples.

the debris sample, namely the single raccoon element. "Rare" taxa (NISP<10) were generally not recovered from the debris sample (Table 26). It is concluded that the faunal materials originally catalogued by OMSI staff are, in fact, representative of the range of taxa present at the site, albeit perhaps not of their total counts. No significant further information gain would be expected if all debris samples were analyzed.

The vertical distribution of identifiable faunal remains in the two excavation blocks generally parallels the occupation floors already identified on the basis of stratigraphy and features. Peaks of more than 10% of all identifiable specimens (calculated separately for each excavation block) occur in levels 4, 6/7, and 11 of Block A and in levels 9/10 and 12/13 of Block B. Only Floor 1 of Block B is not characterized by high bone counts, perhaps indicating less emphasis on the processing of game in this part of the site at the time of its latest occupation.

Implications

As for 35WH7 (see Chapter 5), Hancock Field Station Director Joseph Jones was consulted regarding the present distribution of faunal taxa recovered from 35WH14. Acccording to Jones, most of the identified species are found within less than a mile of 35WH14, with a few exceptions that occur from one to five miles from the site (Jones, written communication, 1993). Bighorn sheep, western pond turtle, and

Table 26. Rare Taxa Recovered from Transect Sample, 35WH14

Taxon	Catalog Nos. 1-877	Catalog Nos. >877
Birds	7	3
Fish	5	1
Snake	1	-
Ovis	8	-
Canis	3	-
Microtus	3	-
Neotoma	6	1
Erethizon	1	-
Felidae	2	-
Thomomys	3	-
Lepus	3	-
Sylvilagus	44	3
Eutamias	2	-
Marmota	2	-
Spermophilus	3	-
Procyon	-	1
Zapus	1	-
Clemmys	1	1
Antilocapra	2	1
Cervus	33	7

long-billed curlew are exceptions which are only encountered at a distance of more than ten miles from the site. The first two of these have been discussed under 35WH7 and will not be further treated here. Long-billed curlews are migratory birds which today are associated with perennial grasslands of the lower John Day River brakes (Jones, personal communication, December 1993). It is possible that they were more widespread before grazing restricted this particular habitat.

Tentative inferences regarding seasonality of site occupation at 35WH14 can be made on the basis of identified juvenile individuals and species with seasonally variable availability. A total of 38 specimens representing juveniles were identified, including mule deer, bighorn sheep, elk, coyote, cottontail, chipmunk, and unidentifiable rodents. Nine of these, all jaw fragments and teeth, allow a more precise determination of age at death. They represent a bighorn sheep aged to between 30 and 32 months, an elk aged to 18 to 20 months, and mule deer aged to 18 to 20 months, 23 to 24 months, and approximately 2.5 years. Most of these cases probably represent a single individual, although two maxillary fragments of 2.5-year old mule deer could conceivably represent two individuals, given their degree of spatial separation within the site (B07, Level 12 and B31, Level 10). Based on the artiodactyls observed at the site, Mack concludes (Appendix C):

> The juvenile Artiodactyla mandibles and teeth which can be accurately aged indicate they were taken in late Winter or early Spring and late Spring or early Summer. Mule deer fawn are born from April through June, while both elk and big-horn sheep are born from May to June. Since the juvenile mule deer and elk age to approximately a year and a half old and the sheep to two and a half years old, they must have been killed in late Winter or early Spring. The two-year old deer would indicate presence in late Spring or early Summer. Since the males shed their antlers in March or April, the males represented in the assemblage may have been killed in early summer, but the large specimens likely represent specimens killed in late Summer or even Fall.

In addition to inferences derived from juvenile individuals, tentative suggestions are possible based on the presence of species which migrate, hibernate, or estivate for part of the year. The question of pond turtles has already been discussed and cannot be resolved at this point. Other relevant taxa are marmot, ground squirrel, long-billed curlew. Yellow-bellied marmots, a common source of food for southern Columbia Plateau peoples, are characterized by a combination of hibernation and aestivation (Hunn 1990:142), spending winter, as well as late summer and fall, asleep in their dens. The pale yellow-bellied marmot (Marmota flaviventris avara), which ranges throughout the low country east of the Cascades, is said to appear earlier and hibernate earlier than the related Marmota flaviventris flaviventris which disappears in August or September and reappears in February or March (Bailey 1936:160), although no specific times are given by Bailey for this particular subspecies. According to Jones (personal communication, 1993), marmots are active from mid-March through July in the Pine Creek basin.

Townsend's ground squirrels were, similarly, a popular source of food among Plateau peoples (Hunn 1990:142). Like the yellow-bellied marmot, they spend much of the year in their burrows, an adaptation which is attributed to the long, dry summers of their semi-arid habitat (Bailey 1936:153). Townsend's ground squirrels are typically active between late February or early March into the early part of July (Bailey 1936:153). According to Hunn (1990:142), a common practice of Mid-Columbia River Indians was to flush ground squirrels out of their burrows by diverting a stream or hauling in water. If this was possible at any season, it would, of course, limit the value of this particular species as a seasonal indicator. It is perhaps equally or more likely that the three specimens attributed to this species are present naturally at the site and not a reflection of cultural behavior at all.

Long-billed curlew, finally, are migratory birds which winter from northern California south to Guatemala (Peterson 1961:80). According to Jones (written communication, 1993), the species is present along the lower John Day River from May through September. The risks inherent in projecting present seasonal patterns to species in the past have been discussed with particular attention to migratory birds by Grayson (1984:174-177) and are compounded at 35WH14 by the presence of only a single specimen of curlew bone. While all potential sources of information are considered here, it must be emphasized that any conclusions must be treated as hypotheses to be tested in future studies rather than as answers in themselves.

All present faunal evidence on seasonality of site use is presented in Table 27. Identified seasonal indicators span late winter through summer in Block B (levels 8-12) and late winter through early summer in Block A (levels 4-9).

In the earlier discussion of specialized activity areas at 35WH14, several features were identified as bone scatters (Table 18). In Block A, these include Feature 6 (A43, top of Level 9), Feature 118 (A42, Level 4), and Feature 119 (A35, base of Level 4, top of Level 5 at an elevation of 97.30 m). In Block B, they are represented by Feature 2 (B23, levels 11 and 12), Feature 147 (B22, levels 9-10), and Feature 149 (B31, levels 9-11). It was suggested that the latter three features be viewed as part of the same single activity or longer-term refuse deposition.

The bone scatters listed above consist in large part of artiodactyl remains. Specimens described in fieldnotes as Feature 6 (BN-764 and BN-769 through BN-773) include pronghorn and mule dear, as well as unidentifiable large mammals. Additional specimens from this level represent less specifically identifiable taxa including

Table 27. Potential Seasonal Indicators in the Identified Fauna, 35WH14

	Block A			Block B		
Taxon	Unit	Level	Season	Unit	Level	Season
Ovis	A42	4	late winter/early spring			
Cervus	A16	9	late winter/early spring			
Spermophilus	A51	6	late winter/early summer	B19	10	late winter/early summer
				B1	11	late winter/early summer
Odocoileus				B31	10	late winter/early spring
				B7	12	late winter/early spring
Numenius				B2	9	spring-late summer
Marmota				B13	8	spring-early summer
				B32	12	spring-early summer

artiodactyls, cervids, and large mammals. Materials from the other two bone scatters in Block A similarly represent these categories, with the absence of pronghorn. Feature 118 also included four specimens of 2.5 year-old bighorn sheep.

Whereas the three bone scatters located in Block A consist of a combined total of roughly 84 specimens, the units and levels which comprise bone scatters designated as Features 2, 147, and 149 in Block B produced more than 200. Here, too, artiodactyls predominate, together with unidentifiable large mammal bones, most of which are probably also from artiodactyls, and the occasional isolated element of porcupine, packrat, grouse, raccoon, and marmot. Leporid remains, which make up 4.5% of all identifiable bone from 35WH14, are absent from the scatters described for Block A, as well as Block B. The paucity of rabbit bone is particularly evident in the richest level of the site, Level 12 of Block B, which produced 202 identifiable specimens, or 17% of all provenienced and identifiable bone from 35WH14. Leporids represent only 1% of this material. It is evident that artiodactyls were the favored game resource at 35WH14, even if potential screen size bias is taken into account.

Faunal Remains: Invertebrates

A small amount of mussel shell (102.7 g in all) was recovered during excavations at 35WH14. A few larger pieces were collected *in situ*, but most was bagged, weighed, and tabulated by OMSI personnel as a separate entry under screened "debris." For the present analysis, OMSI's original weights have been used and supplemented by those of the three *in situ* specimens. Shell stored with the flake debris was not examined separately, primarily because of the deteriorated condition of most of this material. The spatial distribution of mussel shell by weight has been plotted in Figure 82. Two in situ specimens, from Level 11/12 of A40 and Level 3 of A53, are valves which are complete enough to identify. Both appear to represent *Margaritifera* sp., a freshwater mussel commonly used as food by prehistoric peoples on the Southern Plateau (Lyman 1980). This identification is consistent with mussel shell recovered from 35WH7.

Because of the small amount of this material, little can be said regarding its use at this site. Mussel shell was recorded in both excavation blocks. In Block A, all mussel shell was recovered in and immediately around the house feature, making a cultural origin likely.

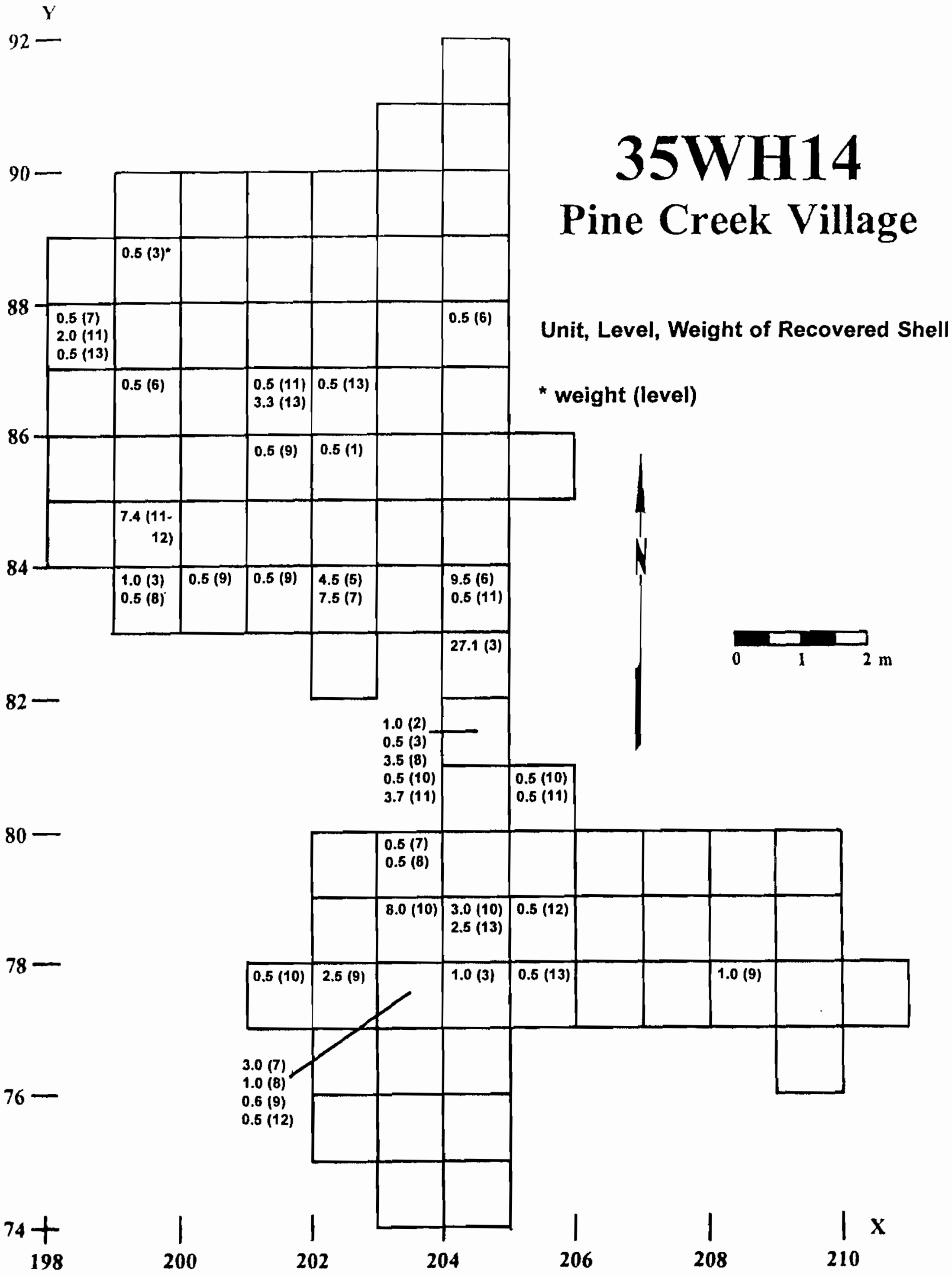


Figure 82. Spatial distribution of unmodified shell (all weights in grams).

Most shell found in Block B was recovered from its northwestern quadrant.

Macrobotanical Analysis

The few soil and charcoal samples collected at 35WH14 were submitted to Dr. Nancy A. Stenholm for macrobotanical analysis. From Block A, two soil samples, two charcoal samples, one wood sample, and one vial of material that had previously been floated by OMSI personnel were analyzed. Samples examined from From Block B included two soil samples, one charcoal sample, one wood sample, and another vial of previously floated material. Most of the samples are associated with radiocarbon-dated features. Results are therefore grouped by excavation block and feature for the following discussion. Stenholm's report is reproduced in Appendix D.

Block A

Feature 3, a slab-lined hearth radiocarbon-dated to 890 ± 29 B.P., is represented by one soil sample and one charcoal sample. Botanical taxa from both the soil sample and the charcoal sample consist exclusively of juniper (both burnt and unburnt), along with two pieces of lithic debitage. Several juniper fragments which may have been culturally modified were identified by Stenholm (Appendix D):

> A small amount of juniper (9 pieces at 0.2 g) ... appears artifactual in nature. These are fragments from possibly

> two incompletely charred artifacts. The fragments have surviving lengths which vary from 3.5 mm to 18 mm each. The pieces may represent two skewer-like items with square to rectangular cross sections (they vary from 3.5 x 3.5 mm to 3.5 x 2.5 mm in cross section) and they have a slight curvature at the tip.

Carbon content of the soil sample is relatively high, at 0.94%, in keeping with its hearth association.

Three samples submitted from Feature 5 included a soil sample, a charcoal sample, and a sample of wood. Feature 5 is characterized as a charcoal scatter with an associated metate. It was radiocarbon-dated to 1500 ± 25 B.P. The soil sample submitted for flotation from this area exhibits a very low carbon content of 0.02%. Cultural debris is, however, somewhat higher than in the preceding samples, including eleven flakes, red pigment and burned earth, as well as a small amount of calcined and unburned bone. Plant remains are represented by juniper, buckthorn or cascara, as well as "a trace of hardwood twigs, a fragment of leathery seed coat, and epithelial tissue which could not be identified further" (Stenholm, Appendix D). The charcoal spot sample contained a large proportion of serviceberry (82%), as well as smaller quantities of juniper and buckthorn, while the sample of wood was identified as unburned juniper with good surface and excellent interior condition.

A final sample from Block A was associated with Level 13 of unit A27, which appears to represent the basal occupation floor of House A. The material consisted of a vial of plant matter previously separated through flotation by OMSI staff. Contents were identified as yellow pine (either ponderosa or lodgepole, Stenholm personal communication, 1993) and bitterbrush charcoal.

Block B

Feature 103 consists of a metate, a pit, and a posthole associated with the lowest occupation floor of House B, and radiocarbon-dated to 2580 ± 80 B.P. Charcoal and wood samples were submitted from the vicinity of this feature. The charcoal sample was found to contain approximately equal parts of juniper and lodgepole pine. The wood sample consisted of six pieces of charred, semi-charred, and uncharred lodgepole pine, probably from a single branch.

Another sample from the early occupation of House B was represented by a soil sample from Feature 4, a charcoal scatter radiocarbon-dated to 2450 ± 40 B.P. This sample was characterized by a higher carbon content than the other flotation samples from this site (1.09%), as well as a relatively high content of cultural debris, comprised of flakes (N=21), burned and unburned mammal bone, and a small amount of bivalve shell. Botanical remains consisted of a large amount of charcoal from a mature poplar.

Two final samples from 35WH14 were submitted for analysis. One consisted of a small soil sample from Level 11 of B33. Project records indicate that it was collected from the base of metate #832, at what appears to be the eastern margin of the lowest occupation floor in House B. No specimen bearing this number was catalogued, however, precluding a description of the object itself. The second sample consisted of floated botanical material from unit B26, which was labeled merely as "upper occupation." Its association with the upper floor of Block B indicates a likely origin in Level 2 (see Feature 116).

Carbon content in the soil sample was very low (less than 0.01%). Lithics and uncharred bone were present in small numbers. Botanical materials included a trace of conifer, which, based on the spot samples, is attributed to lodgepole pine, and a fragment of an edible fruit pit which may represent a member of the rose family, probably cherry or hawthorn (Stenholm, Appendix D). The second sample produced only a small amount of herbaceous tissue.

Most of the species present at 35WH14 were also identified in the macrobotanical samples from 35WH7, and their potential uses are discussed in the previous chapter (see Table 28). Additional taxa recovered from 35WH14 include buckthorn or cascara; a member of the rose family, such as cherry or hawthorn; and lodgepole pine. Buckthorn bark was used as an emetic or laxative by native Plateau peoples (Hunn 1990:357), and its wood may have served as construction material (Stenholm, Appendix D). The rose family specimen probably represents a food source, a conclusion which may be strengthened by its apparent association with a grinding stone on the lower floor of House B (cf. Hunn 1990:128). Lodgepole probably served as fuel, although it is also cited for medicinal uses (Hunn 1990:356). Its name suggests structural connotations as well, and the association of lodgepole remains with the

Table 28. Macrobotanical Samples and Associations, 35WH14

No.	Type	Provenience	Associations
1	Charcoal	A22, 204x/87y	Feature 3, 890±20 B.P.
2	Soil	A21, 202.90x /87.10y	97.35m (L-6), presumably Feat. 3
3	Charcoal	A28, 202x/86y	Feature 5, 1500±25 B.P.
4	Soil	A28, 202x/86y	With metate, contemp. w. Feat. 5
5	Flot. sample	A27, 201x/86y	96.70-96.60 m (L-13)
6	Wood	A35, 202x/85y	97.00-96.90 m (L-9), contemp. w. F.5
7	Charcoal	B24, 205x/77y	Feature 103?, 2580±80 B.P., 95.45 m
8	Wood	B24, 205x/77y	Feature 103?, 2580±80 B.P., 95.45 m
9	Soil	B32, 204-204.40x /76-76.50y	Feature 4, 2450±40 B.P., 95.53-95.51 m
10	Flot. sample	B26, 207x/77y	Upper occupation, no elevation
46	Soil	B33, 209.20x /76.50y	Base of metate #832, 95.70 m (L-11)

pit, metate, and *posthole* of Feature 103 may suggest use in house construction.

Lodgepole poses the only problem with regard to local availability of the botanical taxa identified at 35WH14. According to Joseph Jones, director of OMSI's Hancock Field Station (written communication, 1993), all other plant species mentioned, presently grow within a radius of no more than five miles from the site, and most within less than one mile. Lodgepole pine, however, is now found in the vicinity of Kinzua, roughly fourteen miles northeast of 35WH14 and at an elevation of over 3000 feet, about 800 feet higher than the site. The significance of the lodgepole wood at 35WH14 is not known. As a pioneer species, lodgepole pine is a rapid invader of severely disturbed sites, frequently becoming established after fires, logging, and on volcanic pumice and ash soils

(Franklin and Dyrness 1973:185). Its presence may reflect changes in local edaphic conditions. The wood may, alternatively, have been brought to the site for purposes other than as fuel. It is, on the other hand, also possible that the samples represent ponderosa pine, the branch material of which is often difficult to distinguish from lodgepole (Stenholm, personal communication, 1994). Unlike lodgepole, ponderosa pines grow within five miles of 35WH14 today.

The species from Feature 3, the slab-lined hearth in Block A, suggests that this feature was used primarily for heating. Animal bone is absent. Feature 5, on the other hand, is interpreted as "general purpose midden," reflecting "several activities, such as food (faunal) or possibly tool preparation featuring hardwoods" (Stenholm, Appendix D). Little can be said about the sample of yellow pine (ponderosa or lodgepole) from Level 13 of Block A, other than noting its similarity to material identified from the lower floor of Block B.

Botanical material from the lower levels of House B may indicate food preparation activities involving the processing of hawthorn or cherries, although conclusions based on a single specimen must remain speculative. Presence of wood for use as fuel or structural elements has been suggested. The lack of significant findings from the upper occupation does not contradict the impression of a more ephemeral later use of the site inferred on the basis of other analyzed evidence. Limited information on seasonality which can be derived from the seed coat and the possible fruit pit tissue suggest summer activity (Stenholm, Appendix D).

Discussion

The radiocarbon dates from 35WH14 suggest long-term or repeated occupation of this site. The disparate ages of 1500 ± 25 B.P. and 890 ± 20 B.P. from Block A and 2450 ± 40 B.P. and 2580 ± 40 B.P. from Block B, taken at face value, would seem to imply that the two house occupations were greatly separated in time. The dates alone do not, however, adequately represent the ages of the two house depressions. This question will now be addressed.

The presence of multiple occcupation components in each of the houses at 35WH14 was suggested in a small unpublished paper, the only known previous analysis of this material (Sheldon 1981). In an attempt to identify individual living floors by peaks in the density of cultural materials, Sheldon (1981:3) used a "PDP-11 timesharing computer" to plot counts of artifacts by 10-cm excavation levels in both housepits. Separate plots were produced, both for the assemblage as whole, as well as for several individual classes, including milling stones, abraders, and projectile points. Counts were graphed separately for the "upper" and "lower" "pithouses" (referred to as Blocks A and B in the present analysis).

While the graphs for milling stones and abraders are inconclusive because of the small artifact samples involved, two other analyses proved instructive. For the entire assemblage, Sheldon's results indicate two peaks in the vertical distribution of specimens in both excavation blocks, separated by a small trough, which occurs at Level 6 in both cases. Peaks are found in levels 2 through 5 and Level 9 in Block A, and in levels 4 and 9 in Block B. Projectile point distributions show peaks in levels 6 through 9, and Level 11 in Block A, and levels 7 through 10 and Level 12 in Block B. Graphs for both blocks are remarkably similar in shape, with a slight bimodal tendency during the intermediate peak. Block A, in addition, shows a peak in Level 3 which is absent in Block B. If artifact counts are equated with intensity of site use, both sets of graphs suggest early and middle phases of occupation in the two excavation blocks, followed by a late peak in Block A only. The "middle occupation" as graphed for Block A encompasses the two later dates returned from the site (Feature 5, radiocarbon-dated to about 1500 B.P., is situated in the uppermost portion of Level 10 and can therefore probably be included under Level 9). The "early occupation" in Block B would appear to be correlated with the early dates of 2450 B.P. and 2580 B.P. from that structure.

Sheldon's graphs have been updated using the current artifact counts (Table 29) and are shown in Figures 83 and 84. The general picture remains the same, though some differences can be attributed to the larger sample of artifacts (including artifacts removed from the debitage during the current analysis) and the correction of errors in provenience records. Two major additions appear in the graphs depicting the entire assemblage. These consist of a small but distinct peak in Level 2 of Block B, and small, comparable peaks in Levels 11 of Block A and Level 12 of Block B, corresponding to the early occupations in these areas. The peaks representing projectile point concentrations have

Table 29. Inventory of Artifacts by Excavation Block and Level, 35WH14

Tool Class	Block A														Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	Oth	
Proj. pts. (class.)	2	6	13	10	4	8	10	10	9	7	8	6	3	1	97
Proj. pts. (frag.)	2	7	14	7	5	9	7	4	12	4	8	2	1	1	83
Bifaces	9	26	15	26	17	10	22	28	27	12	17	10	8	3	230
Formed unifaces	2	4	5	4	5	3	3	4	3	1	-	1	1	-	36
Worked flakes	4	8	8	7	8	6	7	6	7	5	2	5	1	-	74
Used flakes	4	23	15	14	12	13	23	19	21	17	13	7	3	-	184
Cores	1	1	6	1	1	5	4	-	6	1	3	1	-	-	30
Drills/gravers	-	1	5	2	-	1	3	4	2	3	-	1	1	-	23
Notches	-	-	1	1	1	-	-	-	-	-	-	-	-	-	3
Seam quartz tools	-	-	1	1	2	-	-	1	-	-	-	1	-	-	6
Edge-mod. chunks	1	-	-	3	1	1	-	-	2	-	1	-	-	-	9
Worked bone/antler	1	-	-	2	2	4	3	1	-	-	5	2	-	-	20
Cobble tools	-	1	3	1	2	-	-	1	3	-	3	2	-	-	16
Other ground stone	-	-	1	1	2	-	3	4	-	3	1	1	-	-	16
Metates	-	1	-	1	2	2	1	3	2	3	3	3	2	-	23
Pipes	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
Clay	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Rocks/minerals	-	1	-	2	-	1	-	-	1	1	-	-	-	-	6
Slate	1	2	1	1	-	-	-	-	-	-	-	-	-	-	5
Historic items	-	1	1	-	-	-	-	-	-	-	-	-	-	-	2
Stone beads	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
Shell beads	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Flaked bipoints	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Tool Total	27	82	89	84	65	64	86	85	95	58	64	42	20	5	866
Debitage Total	919	2100	2591	2525	2017	1691	1842	1653	1678	1314	1616	706	316	14	20982
Ident. Faunal Remains	2	5	12	70	34	47	41	31	20	31	44	15	7	5	364

Table 29. (Continued)

Tool Class	Block B 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Oth	Blk B Total	Blk A Total	No Prov	Grand Total
Proj. pts. (class.)	2	3	3	6	8	13	10	15	11	17	12	16	6	2	-	-	-	124	97	1	222
Proj. pts. (frag.)	1	6	3	5	8	5	17	5	11	11	9	9	5	2	-	-	1	98	83	2	183
Bifaces	8	21	17	37	25	25	42	46	56	51	34	34	27	5	1	-	-	429	230	2	661
Formed unifaces	-	4	2	3	2	4	5	6	7	4	6	4	2	3	-	-	-	52	36	-	88
Worked flakes	3	11	3	12	10	13	15	11	16	18	12	12	9	1	-	-	-	146	74	3	223
Used flakes	4	13	15	19	23	23	43	38	34	33	19	25	15	2	2	-	1	309	184	1	494
Cores	1	2	3	2	6	10	7	12	6	8	10	11	2	-	-	-	-	80	30	-	110
Drills/gravers	2	3	2	4	3	3	4	5	7	5	-	3	1	1	-	-	-	43	23	-	66
Notches	1	-	-	-	1	1	3	-	-	1	-	1	-	-	-	-	-	8	3	-	11
Seam quartz tools	1	1	-	-	1	-	3	1	5	4	4	3	1	-	-	-	-	24	6	1	31
Edge-mod. chunks	1	-	-	-	4	-	2	1	1	-	-	-	1	-	-	-	-	10	9	-	19
Worked bone/antler	-	-	-	4	-	3	1	2	-	5	5	4	13	1	-	-	-	38	20	1	59
Cobble tools	-	-	-	1	2	-	1	2	3	2	3	1	3	-	1	-	-	19	16	-	35
Other ground stone	-	2	-	2	-	1	1	4	3	2	3	-	3	1	-	-	-	22	16	-	38
Metates	-	-	-	1	3	1	3	7	2	1	2	1	3	2	2	1	-	29	23	1	53
Pipes	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	1	-	2
Clay	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	2	-	-	2
Rocks/minerals	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	6	-	7
Slate	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	5	-	6
Historic items	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2
Stone beads	-	-	-	-	-	-	-	-	1	2	-	1	-	-	-	-	-	4	1	-	5
Shell beads	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	2	-	-	2
Flaked bipoints	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Tool Total	24	66	48	96	96	103	158	156	163	166	119	125	93	20	6	1	2	1442	866	12	2320
Debitage Total	757	1836	1567	1909	2280	2258	2843	3080	3054	2763	2435	2484	1903	396	59	-	-	29624	20982	-	50606
Ident. Faunal Remains	2	2	4	18	40	40	62	72	121	93	61	202	94	14	1	-	-	845	364	132	1341

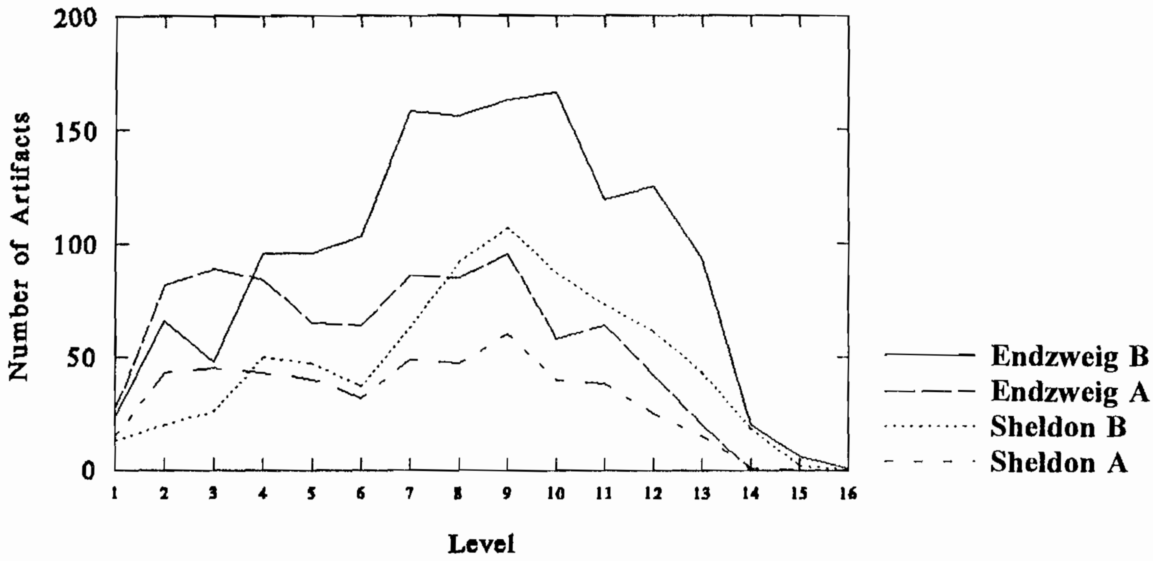


Figure 83. Vertical distribution of artifacts by block and level.

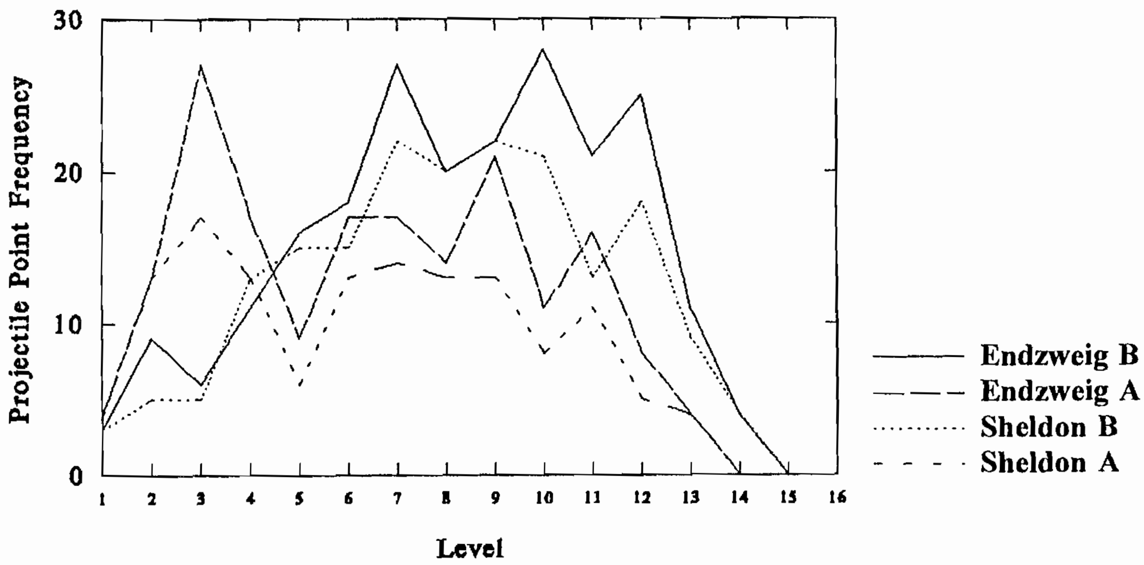


Figure 84. Distribution of projectile points by block and level.

become more pronounced, and a small late peak is now apparent in Level 2 of Block B. In sum, both sets of graphs show comparable vertical patterns of artifact distribution for the two excavation blocks, reflecting four "episodes" or periods of occupation within each area. They may also indicate roughly contemporaneous occupation, a question will be further addressed below by comparison of associated projectile point types.

The information produced by the graphs suggested that the cultural assemblage could be divided into components, which could then be compared to each other. Initial attempts at defining components on a square-by-square basis by either stratigraphy, debris densities, or a combination thereof, failed. In the first case, this was due to inadequate records, which, while mentioning the presence of floors anecdotally, do not provide consistent information on stratum breaks. In the second case, widely variable distributions of debris in adjacent excavation units made a simple correlation of density peaks impossible. As a consequence, it was decided to partition the deposits by specific levels across each excavation block, determining cutoff points from field observations and feature descriptions, as well as from artifact and debris frequencies. This accommodates topographic variation to some extent, but must clearly be considered an approximation of the true cultural stratigraphy.

For reasons discussed below, Block A was divided into three components which are numbered from bottom to top. Component A-III encompasses the first four levels and includes the already-mentioned peaks in projectile points and artifacts. It is associated with the shallow upper "floor" identified between levels 2 and 4 (see Features). Component A-II extends from levels 5 through 10. It incorporates both the second and third occupation floors dated to about 890 and 1500 B.P. While this component could arguably be subdivided further, this was not done for several reasons, including the stratigraphic uncertainty of the break, the potentially relatively short duration of the two intervals, the advantage of larger sample size, and the achievement of better comparability between excavation blocks. Component A-I consists of all material recovered from Level 11 and below, generally no deeper than Level 13. This incorporates any deposits predating the 1500 B.P. floor and includes peaks in Level 11 of artifacts, debitage, and faunal remains, as well as the activity area postulated on the basis of pits and grinding stones.

The deposits of Block B were, similarly, divided into three components. Component B-III encompasses levels 1 through 3. This component includes Floor 1, identified in Level 2, and is marked by minor peaks in artifacts and flakes, albeit not in faunal remains. Level 4, which includes material associated with the underlying house rim (see Occupation Floors, Block B), was assigned to component B-II, which extends from Level 4 through Level 10. Project fieldworkers observed an intermediate occupation within this elevational range, associated with a layer of brown silt (see Features). It is not clear whether more than one floor is present, a problem which is complicated by inconsistencies in the elevational assignment of the occupation surface (in Levels 7/8 of units B6 and B7, in Level 7 of B22, and in Level 9 of units B15 and B25). However, both debitage and faunal remains show single peaks towards the base of the component as defined here, as do artifact frequencies. The large number of projectile points which occur in Level 7, are clustered around the rim of the house and therefore probably do not represent a discrete floor. A genuine peak in projectile points is, however, found throughout Level 10. Component B-I, finally, extends from Level 11 to the base of the cultural deposits, including the roughly 2500-year old radiocarbon-dated features (Features 4 and 103).

In order to compare relative densities of cultural material, the volume of cultural deposits was calculated for each component on a square-by-square basis. For this purpose, a constant 0.1 m^3 volume was assumed for each level, ignoring sloping surfaces in the top and bottom levels. The results indicate highest artifact densities for components B-I and B-II (36.8 and 36.2 artifacts per m^3, respectively) (Table 30). Not unexpectedly, B-III trails with only 12.1 artifacts per m^3. Flake densities show the same relative distributions, with 735.1 and 702.2 flakes per m^3 in B-I and B-II, and 364.9 flakes per m^3 in B-III.

In spite of relatively low artifact *counts*, the lowest component of Block A (A-I) exhibits the highest *relative densities* of cultural materials in this area of the site, a function of a low volume of excavated deposits, with excavation frequently terminated at the base of the intermediate component around the housepit margins. The A-I average density of 22.1 artifacts and 454.8 flakes per m^3 is trailed by the 17.2

Table 30. Density of Cultural Materials by Block and Cultural Component

Cultural Data	Block A				Block B			
	I	II	III	All	I	II	III	All
m^3 Excavated	5.8	26.3	20.1	52.2	9.9	25.9	11.4	47.2
Total Artifacts	128	453	282	863	64	938	138	1440
% of Total	14.8	52.5	32.7	100.0	25.3	65.1	9.6	100.0
Artifacts/m^3	22.1	17.2	14.0	16.5	36.8	36.2	12.1	30.5
Flakes	2638	10195	8135	20982	7277	18187	4160	29624
Flakes/m^3	454.8	387.6	404.7	402.0	735.1	702.2	364.9	627.6
Ident. Fauna	66	204	89	359	383	454	8	845
Fauna/m^3	11.4	7.8	4.4	6.9	38.7	17.5	0.7	17.9

artifacts and 387.6 flakes per m^3 produced by A-II. A-III, with only 14.0 artifacts per m^3, exhibits the lowest artifact densities of Block A, but does not, however, show a comparable decline in average flake density (404.7 flakes per m^3). This circumstance is consistent with the large peak in projectile points identified for A-III (Figure 84), as well as with a distinct peak in faunal remains in Level 4. This point will be taken up later in the summary of indvidual components.

Cumulative frequency graphs were created to allow comparison of the six components (three recognized in each excavation block) by their relative proportions of artifact types. All artifact classes were plotted, with the exception of lithic debitage and rare types represented at the site by fewer than ten specimens. The results are presented in Figure 85. The six components are almost indistinguishable from one another with regard to artifact type and frequency composition. This applies, in particular, to projectile points, bifaces, scrapers and

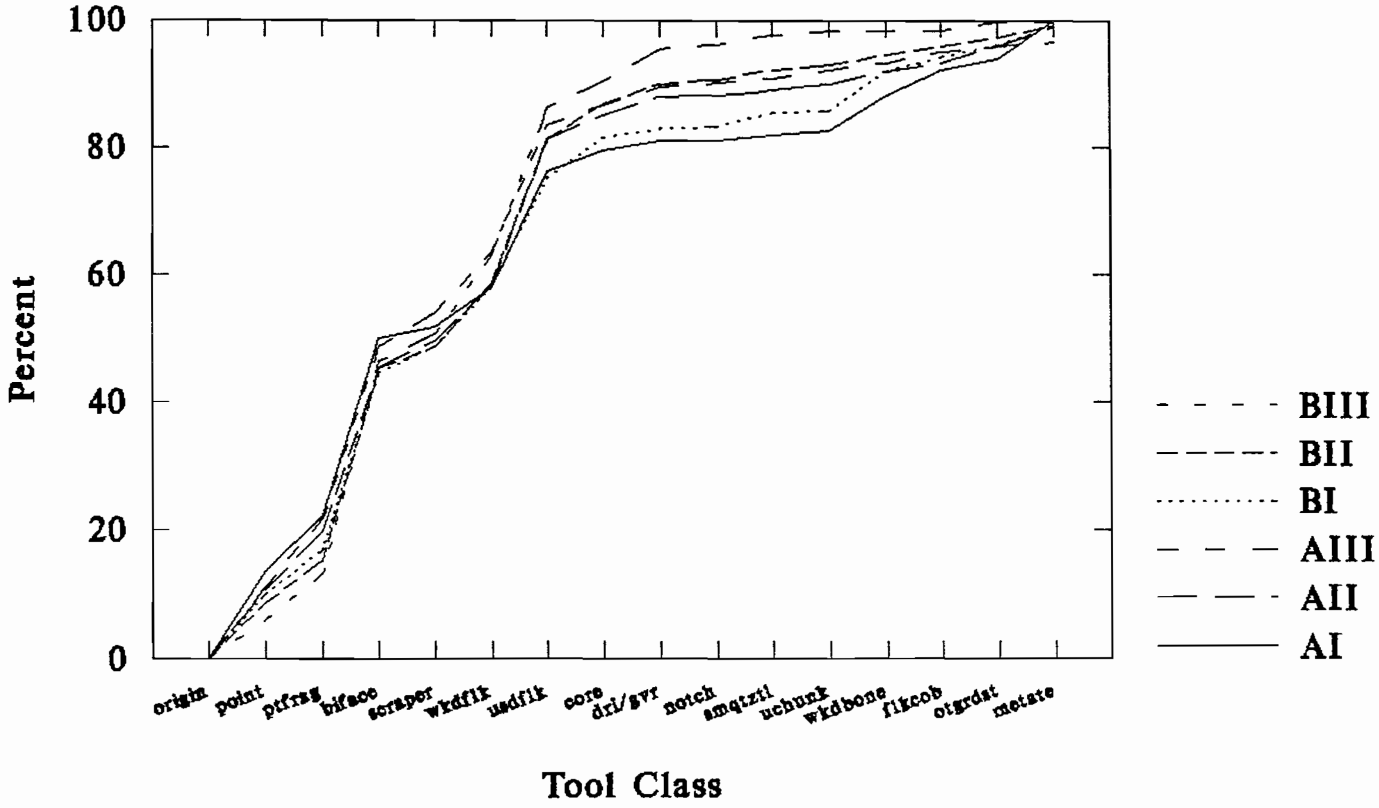


Figure 85. Cumulative frequency graphs, by component and artifact type.

worked flakes, although projectile points make up a somewhat higher proportion of A-I, for example, and a somwhat lower proportion of B-III. Components A-I and B-I tend to cluster together and somewhat apart from the remaining four components by virtue of smaller proportions of used flakes and larger proportions of worked bone. This closer relationship between these two components supports the existence of a postulated pre-1500 B.P. occupation in Block A, comparable in function to the early floor of Block B. Component B-III is, as already mentioned, set off by somewhat lower proportions of classifiable projectile points, and higher proportions of bifaces and drills/perforators/gravers. The differences are slight, however, in the face of the striking similarity of the graphs.

An attempt to order the components by relative frequencies of diagnostic projectile point types was undertaken in order to track potential changes over time. Figure 86 shows the resulting "battleship curve" seriation. In this method, bar-shaped representations of the relative frequencies of individual point types are arranged in such a manner as to yield a best fit to lenticular curves, type by type. The resulting "battleship curves" are thought to illustrate the introduction of a type, its gradual increase in popularity, and its eventual phasing out, thereby placing the assemblages in a chronological sequence (Ford 1962). Of projectile point types identified at 35WH14, only the ES/SN "type," created as a catchall for fragmentary side-notched or expanding-stemmed specimens (both broad- and narrow-necked) was excluded due to the internal variability of this catagory. Types represented by only

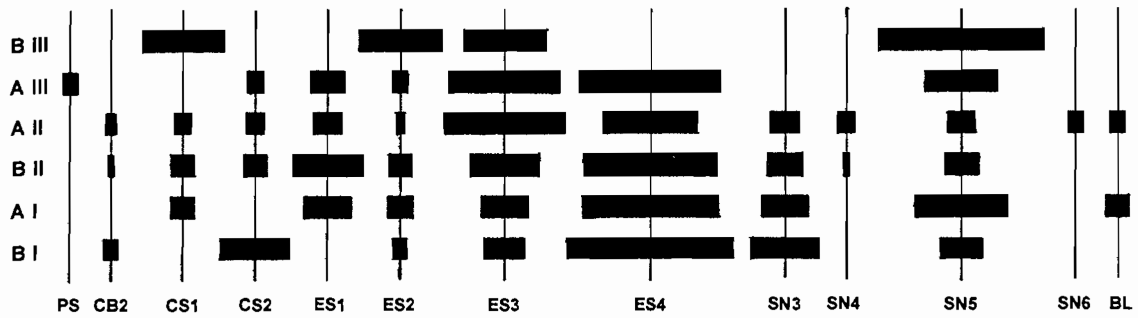


Figure 86. Battleship curves for relative proportions of major projectile point types, by component.

two or three members were included, though their interpretive potential is clearly limited.

The best fit achieved by the seriation supports the relationships proposed. Thus A-I and B-I have the same type/frequency pattern, suggesting that both are contemporaneous and occupy the early end of the sequence. Components A-II and B-II are similarly paired, and are chronologically intermediate. Components A-III and B-III, together, represent the latest portion of the sequence. B-III exhibits the worst fit, a circumstance which is at least in part related to its small sample size (N=5, or 3% of the entire collection). The somewhat anomalous nature of this assemblage has, however, also been suggested by the cumulative frequency graphs for which both A-I and B-III have approximately equal, albeit proportionately small, counts (N=128, and N=138, respectively, or each 6% of the provenienced artifact assemblage).

It is, in conclusion, suggested by artifact type/freqency analysis, that blocks A and B were both characterized by roughly contemporaneous upper, intermediate, and lower occupation zones, here identified as components. High artifact densities and thick cultural deposits suggest that the identified peaks in cultural materials may represent the trends shown by a larger number of discrete occupations. Reexcavation of houses is also reflected in the presence of disconnected rim segments which may represent previous structures (see Structural Features, Block A). Cumulative frequency graphs of respective artifact assemblages, and projectile point seriations generally suggest persistence in the kinds of activities conducted at the site, although a change in intensity of use is indicated over time. A summary of the components and functional inferences is presented in the following synopsis.

Summary and Comparisons

The following section presents a narrative account of the sequence of occupations identified at 35WH14. Observations on living floors and other features (Figures 87 to 92) are combined with distributional information on artifacts, faunal, and floral debris. Of particular concern are continuities and changes over time. The discussion is therefore organized in terms of the components defined in the preceding pages. This section is followed by a brief comparison of sites 35WH14 and 35WH7, before proceeding to a treatment of larger-scale local and regional relationships.

Summary

Two of nine housepits recorded at 35WH14 were excavated in part or completely during excavations conducted by the Oregon Museum of Science and Industry in the summer of 1981. Data resulting from these excavations have been synthesized for the present analysis. Cultural materials analyzed include 2,320 artifacts, 50,606 flakes, and 1,341 identifiable faunal specimens. The results of this study indicate a pattern of repeated occupation of 35WH14 between about 2600 B.P. and sometime after 900 B.P. (calibrated to between about 2750 and sometime after 800 cal B.P.), diminishing in intensity over time. While duration of use appears to have decreased at the sampled portion of the site, there is little evidence of concomitant change in the types of resources utilized and the types of activities conducted at 35WH14. Differences between early and late occupations appear to be quantitative, but not qualitative in scope. This also applies to differences between Blocks A and B, with B consistently showing higher densities of cultural remains, and, accordingly, a consistently higher diversity.

The earliest occupations in Blocks A and B (components A-I and B-I) are characterized by the highest artifact densities, with 22.1 artifacts per m^3 and 36.8 artifacts per m^3, respectively. High densities in formed and utilized artifacts are paralleled by high

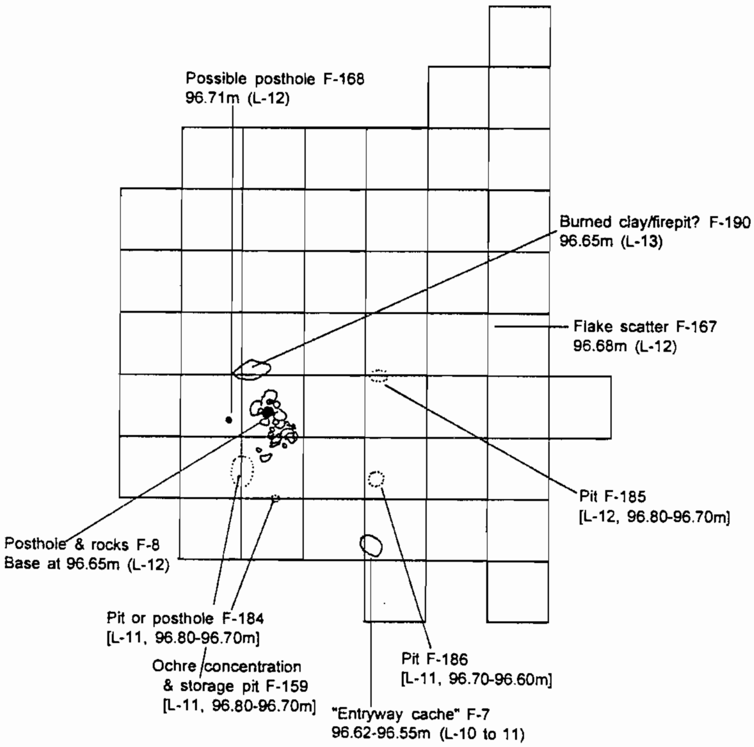


Figure 87. Generalized planview of Component A-I.

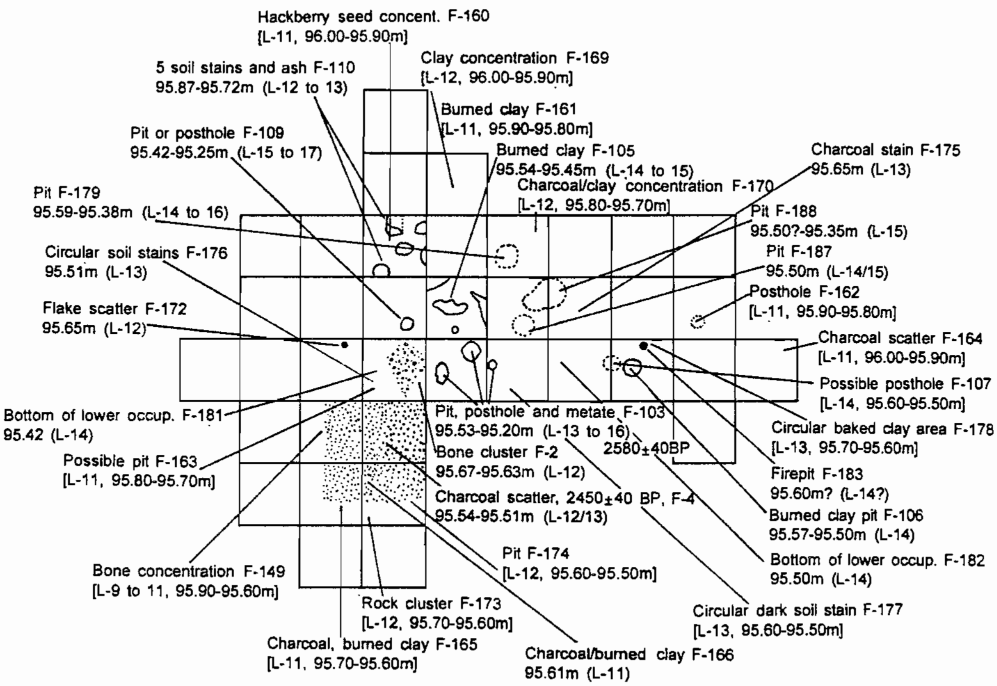


Figure 88. Generalized planview of Component B-I.

densities in lithic debitage (454.8 and 735.1 flakes per m^3). Exceptionally high densities of unmodified bone are found in B-I (38.7 identifiable specimens per m^3) but not paralleled in A-I, with only 11.4 identifiable specimens per m^3. The earliest occupations in both blocks are represented by pithouse floors excavated into the underlying clay.

Measuring between five and six meters in diameter, the floors exhibit evidence of multiple activities (Figures 87, 88, 53, 59), including lithic reduction and the processing of meat and (probably) plant foods. Storage is suggested by several pit features, including a cache in the entryway of House A. Patterning is evident in the spatial distribution of activities conducted on the lowest floors of both houses. In House A, pits and grinding stones are clustered south and east of a diagonal extending from northeast to southwest across the house, while flakes and many flaked stone tools (including large proportions of used flakes and bifaces) are concentrated in the northern half of the floor. This distribution suggests a deliberate separation of storage and food processing, on the one hand, and lithic reduction, on the other. The twelve grinding stones located on the floor appear, in addition, to be grouped in a roughly 1.5 meter-diameter circle in line with the doorway and may be associated with two adjacent pit features. Worked bone, with highest frequencies found in the lowest components, is concentrated in the southern third of the floor.

House B, while not completely excavated, shows a consistent pairing of grinding stones and pit features. Both pits and grinding stones are absent from the southwestern sixth of the floor, an area which exhibits a particularly high concentration of animal bone, charcoal and baked clay (including Feature 4, radiocarbon-dated to 2450 ± 40 B.P.). A central "ash-pit" is located in unit B24 (levels 14-16, radiocarbon-dated to 2580 ± 40 B.P.), and there are additional references to a "firepit" in Level 14 of B27 (Feature 183) and an "ash area" in levels 12-13 of B6 (Feature 110). An area of baked clay in the western portion of Level 13 (Feature 190; A25, A26, A32, and A33) constitutes the only possible evidence for a hearth in component A-I.

Bone awls and a partially finished pestle reflect energy-intensive and time-consuming activities such as basket-making, sewing of clothing, and manufacture of ground stone, while ornaments and other non-utilitarian objects, including stone and shell beads, a possible siltstone pipe fragment, and seven fossil bone gaming pieces, complement artifacts related to basic resource acquisition and processing. Direct information on seasonality of site use from faunal and macrobotanical remains is missing from component A-I and scarce for component B-I. However, evidence of substantial pithouses, together with storage features, and a rich and frequently non-portable assemblage representing diverse activities, suggest intensive and long-term habitation, and by analogy with ethnographic Plateau peoples, either winter or year-round occupation of the site.

At least two episodes or series of occupations characterize A-II (Figure 89), the intermediate component of Block A, and are reflected in stratigraphically consistent radiocarbon dates of 1500 ± 25 B.P. and 890 ± 20 B.P. In contrast to the lowest floors, intermediate occupation surfaces were not cleared as contiguous units during excavation and potential floors are mentioned only anecdotally in fieldnotes. The nature of habitations in A-II and B-II can therefore not be described in detail. It does appear, however, that large, dished house floors replaced the steeper-sided pithouses of the preceding period (see Occupation Floors, under Features). Artifact frequencies for A-II decrease with declining depth after a peak in Level 9, while B-II counts peak in Level 10, and subsequently decline. Multiple discrete floors are thus not identifiable on the basis of artifact fequencies. Stratigraphic evidence is similarly inconclusive. Component B-II (Figure 90) is generally undifferentiated with regard to cultural materials and may either represent a series of closely-spaced occupations, or a single long-term use of Block B. As for A-II, no resolution is possible on the basis of wall profiles.

Artifact density decreases slightly in Block A, declining from 22.1 artifacts per m^3 in A-I to 17.2 artifacts per m^3 in A-II. This trend is parelleled by flake density, which declines from 454.8 to 387.6 flakes per m^3. The relative density of faunal remains also declines, from 11.4 to 7.8 identifiable specimens to per m^3.

In Block B, densities of artifacts and lithic debitage remain almost identical. Component B-I is characterized by a density of 36.8 artifacts and 735.1 flakes per m^3, while B-II produced 36.2 artifacts and 702.2 flakes per m^3. Only faunal remains change significantly, decreasing from 38.7 identifiable specimens per m^3 in B-I to 17.5 in

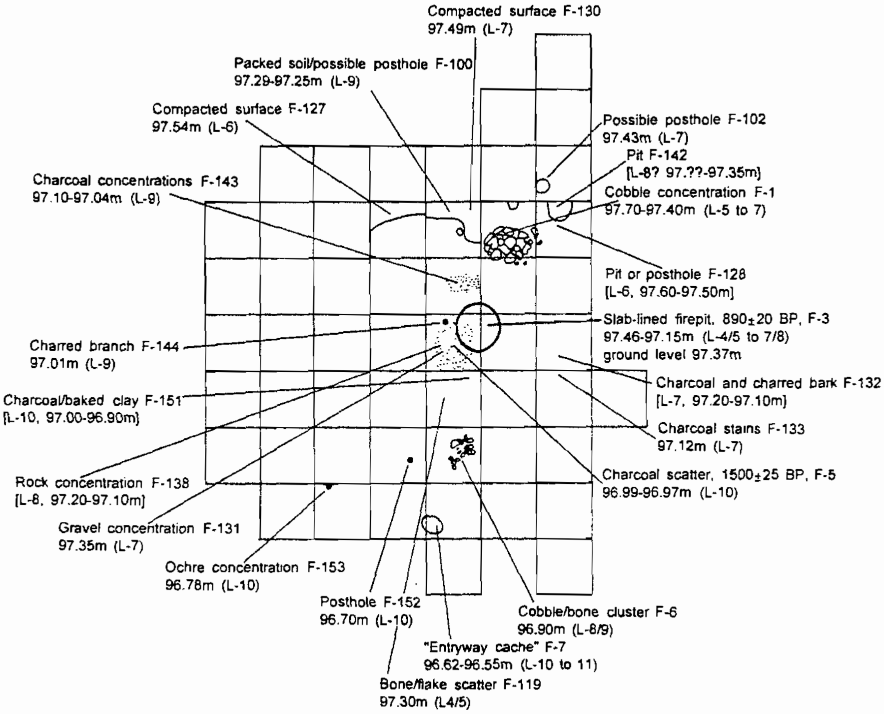


Figure 89. Generalized planview of Component A-II.

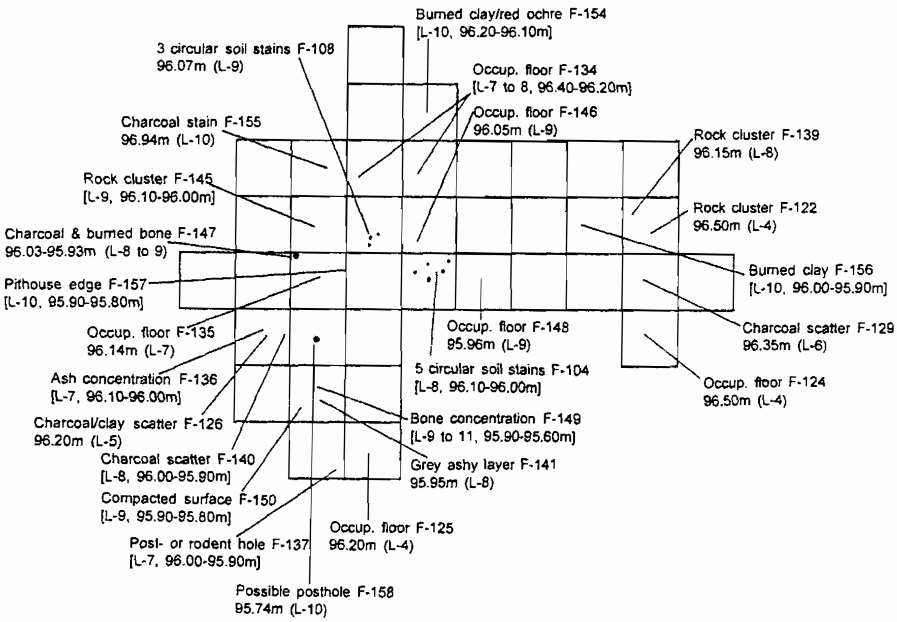


Figure 90. Generalized planview of Component B-II.

B-II. This is, however, still a higher density than that observed in House A.

In both houses, relative proportions of artifacts remain constant throughout this portion of the occupational sequence for most classes, with a few slight changes in emphasis. Small decreases in the relative share of worked bone, cobble tools, grinding stones, and classifiable projectile points correspond with slight increases in worked flakes, utilized flakes, and drills and gravers in both A-II and B-II. The percentage of obsidian in lithic debris, initially close to identical in both excavation blocks (5.9% of all flakes in component A-I and 6.9% of all flakes in component B-I) increases to 7.8% in A-II, while it decreases to 4.1% in Block B-II. Unique or unusual objects recovered from the middle components of the two blocks include an atlatl weight, a possible netsinker, and an edge-ground cobble. A flaked stone bipoint was recovered from Level 10 of A27 which is probably contemporaneous with the 1500 ± 25 B.P. date from Level 10 of the adjacent unit. Components A-II and B-II produced, in addition, four of the five abraders recovered from the site, four of the site's five manos, two of its five beads, and the two anvil stones examined during this analysis. The most prominent feature associated with component A-II is the slab-lined and juniper-stocked hearth which is probably best associated with Level 7.

Activities identified in the intermediate components include the processing of game (including pronghorn, which is missing from the upper and lower components of both blocks), food-grinding (probably including plant foods, though direct evidence is scarce), and lithic reduction and tool manufacture. Evidence for storage is scarce for A-II and absent for B-II, but the methodology employed in excavation and recording limits a final assessment regarding the presence or absence of such features.

Ochre processing is suggested by field observations of ochre in the southwest corner of House A (levels 10 and 11), but ochre is also concentrated along and beyond the northern margins of the house. A large proportion (by weight) of ochre from B-II was recovered from the eastern margin of Block B, which also produced high frequencies of seam quartz implements and the only two specimens of sun-dried clay from the site. This may indicate a distinct function for this area.

Evidence regarding seasonality of site occupation is, again, scant, with faunal and botanical indicators spanning late winter through summer. While extended residential use is reflected in the range and number of cultural materials, winter or year-round occupation remains probable, though not certain.

Component III marks a substantial change in the utilization of 35WH14 (Figures 91, 92). Cultural materials decrease in density relative to earlier periods in both excavation blocks, but particularly in Block B, which exhibits a decline from 36.2 artifacts per m^3 in B-II, to 12.1 artifacts per m^3 in B-III. Artifact density in Block A declines from 17.2 specimens per m^3 in A-II to 14 specimens per m^3 in A-III, placing this area roughly on a par with Block B. Faunal density shows a similar decline, from 7.8 identifiable specimens per m^3 in A-II, to 4.4

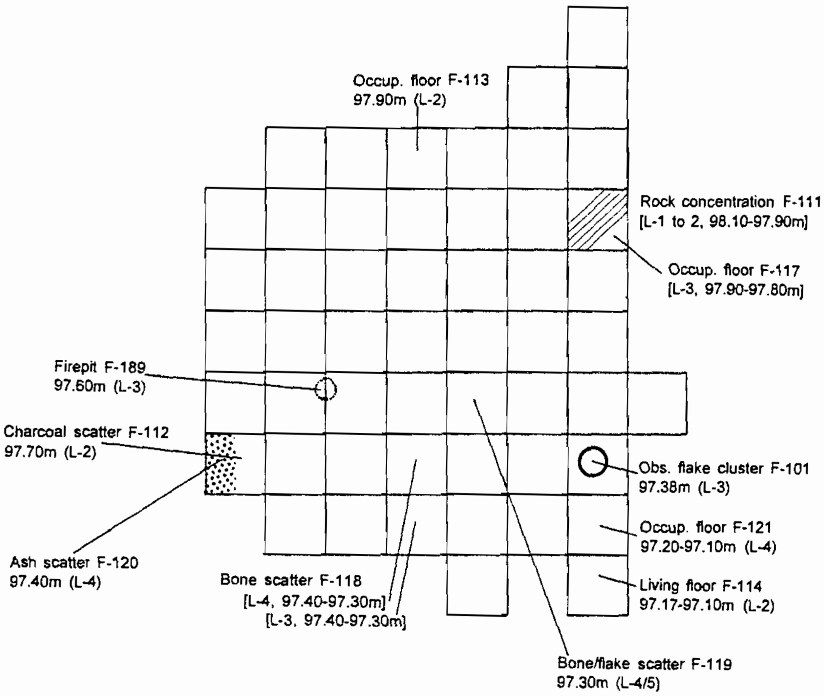


Figure 91. Generalized planview of Component A-III.

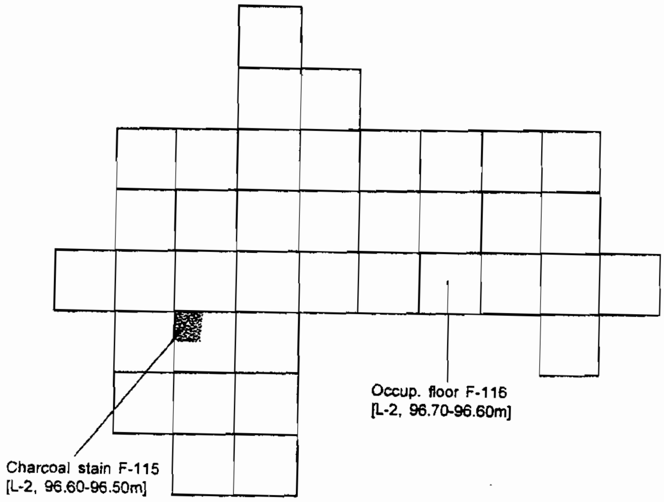


Figure 92. Generalized planview of Component B-III.

identifiable specimens per m^3 in A-III, and from 17.5 specimens per m^3 in B-II, to 0.7 specimens per m^3 in B-III. Lithic debris, while decreasing in density in B-III (from 702.2 flakes per m^3 in B-II, to 364.9 flakes per m^3), actually increases slightly in Block A, resulting in an average density of 404.7 flakes per m^3, in contrast to the earlier 387.6 flakes per m^3. A similar convergence between Block A and Block B is indicated in the percentages of obsidian among lithic debitage for both blocks. Obsidian decreases from 7.8% to 5.6% in Block A, and increases from 4.1% to 5.7% in Block B, resulting in essentially identical proportions for both areas.

Evidence of habitation structures is absent for components A-III and B-III, although a layer of very dark, "greasy" soil, coincident with a peak in cultural materials, was encountered in both blocks in the vicinity of Level 3, and appears to mark a discrete occupation surface. While people used the area of the old house depressions, there is no evidence for the presence of formal structures. Artifacts and flakes are deposited without obvious reference to the circular boundaries of the underlying house floors. A spatial focus of activities represented by a concentration of debris in the northwestern half of Block A is, however, evident. Features recorded in Block A include a firepit, charcoal, and ash scatters southwest of and adjacent to this area, a concentration of obsidian flakes in its southeastern corner, and a linear rock feature, possibly a wall of unknown extent and function, in the northeast. A bone scatter centered on Level 4 of A42 in the south of Block A produced a variety of artiodactyls, including mule deer, elk, and an approximately 2.5 year old bighorn sheep which was probably killed in late winter or early spring. A charcoal stain in Level 2 of B31 is the only feature reported for B-III.

Level 3 of Component A-III is marked by a distinct peak in projectile points, producing more than 13% of all identifiable points and almost 17% of all unidentifiable point fragments recovered from Block A. However, density per cubic meter actually decreases for classifiable specimens and remains constant for unclassifiable fragments. Bifaces, formed unifaces, worked flakes, and utilized flakes persist, as do small numbers of cores, drills and gravers, and cobble tools. Ground stone is rare, limited to two pestle/mauls, a slab metate fragment, and one block metate or hopper mortar from A53, on the southern margin of this excavation block. In addition to the familiar artifact complement, A-III produced four of the five small fragments of worked slate recovered from the site (along with one unmodified piece). All were recovered from the northwestern corner of Block A. Two other pieces of striated stone were found along the southern edge of the excavation block, contributing to the high representation in A-III of what has here been referred to as "Rocks and Minerals." Other unique or unusual items comparable to the pipe fragment, the beads, or the gaming pieces recovered from lower elevations are not represented in the latest assemblage.

Component B-III is set off somewhat from the rest of the site with regard to its relative artifact frequencies (see Discussion), primarily because of its small sample size (N=138 from Block B, vs. N=282 from

Block A). Absolute numbers are low, and many classes are absent, including grinding stones, cobble tools, and worked bone. Ground stone as a whole is represented by only two small and unidentifiable fragments.

The latest *radiocarbon-dated* occupation at 35WH14 is represented by Feature 3, the roughly 900 year-old, slab-lined hearth in component A-II. Clearly, use of the site persisted after this date, but appears to have ended before late projectile point styles, such as PS, SN6, and CS6 became common. Features and artifacts show a heavy emphasis on hunting and processing of large game, primarily artiodactyls, including mule deer, elk, and bighorn sheep. While scant evidence on seasonality suggests a continuation of the earlier pattern of late winter and early spring use, a shorter-term occupation of the site may be hypothesized based on the absence of house features. The strength of this inference is, however, limited by lack of information from the rest of the site. A shift in the spatial focus of activities including use of one or more of the other housepits would clearly produce the same outcome. No unequivocal evidence for post-contact Native American use of 35WH14 is evident. Euroamerican artifacts are limited to a porcelain button and a mushroomed bullet which may well be modern in age.

Comparisons

Two sites have been discussed in the preceding analyses, Cove Creek-2 (35WH7) and the Pine Creek Village Site (35WH14). The first of these was sub-divided horizontally into western, eastern, and central areas, comprised of excavation units associated with particular "test trenches." Only two housepits (comprising Block A and Block B) of the second of the two sites, 35WH14, were excavated. These have been sub-divided into vertical components, including three in Block A (A-I, A-II, and A-III), and three in Block B (B-I, B-II, B-III). The "components" in 35WH14, as well as the "areas" in 35WH7, have been shown to be distinguishable with regard to age and function. A comparison of the two sites in terms of these sub-divisions is presented below, highlighting temporal relationships between the two. The question of site function and implications for local settlement and subsistence is taken up in greater detail in Chapter 8.

The radiocarbon dates returned on the cached atlatl dart shafts from Cove Creek-2 (35WH7) indicate that the earliest use of this site was roughly contemporaneous with component B-I, and, by extension, component A-I of the Pine Creek Village Site (35WH14) (see Figure 93). Their greatest overlap occurs between roughly 2300 B.P. and 2400 B.P. Unlike the long-term (winter or year-round) occupation signified by the housepits at the Pine Creek Village Site, Cove Creek-2 appears to have been used primarily for the caching and refurbishing of hunting equipment at this time. Projectile points in TT2, the middle area and oldest excavated portion of 35WH7, are dominated by broad-necked varieties, particularly broken and reworked SN5 types. Projectile points in components A-I and B-I of 35WH14 are comprised, in large part, of ES4 specimens, with smaller numbers of other types, including SN5.

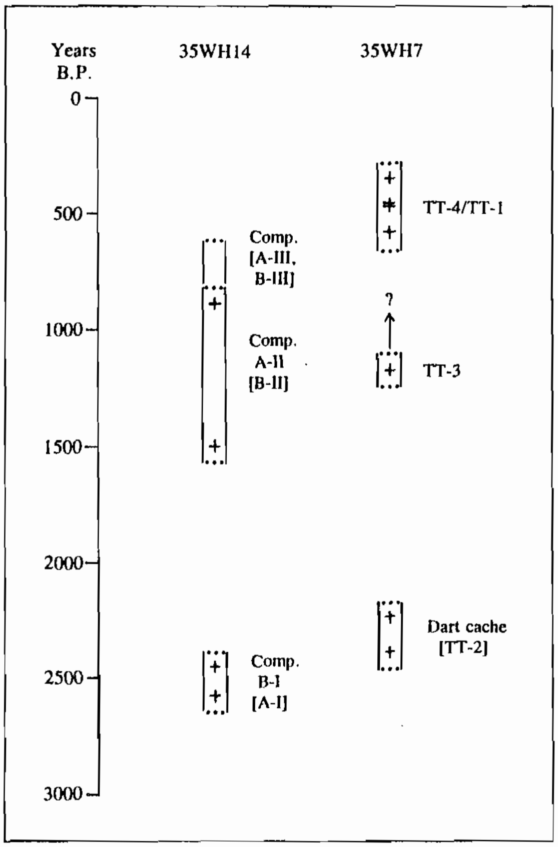


Figure 93. Generalized temporal sequence, 35WH7 and 35WH14. Square brackets indicate inferred age.

The difficulty in separating certain Expanding Stem series points from SN5 specimens (particularly in cases where they have been reworked) has been noted and may contribute to the differential representation of these types at the two sites.

The intermediate components at the Pine Creek Village Site (A-II and B-II) are represented by two radiocarbon dates from House A. These include an age of 1500 ± 25 B.P. for the charcoal scatter from Floor 3 and an age of 890 ± 20 B.P. for the slab-lined hearth assigned to Floor 2. Occupation at WH14 appears to have persisted into this period without major changes. An exception is the shift to shallow, saucer-shaped housepits from the earlier steep-sided variety. Component B-II is inferred to be roughly contemporary with A-II, based on similarities in the distribution of projectile points and other artifacts.

A radiocarbon date of 1160 ± 90 B.P. from a charcoal lens in the western portion of Cove Creek-2 (the area of TT3), appears to indicate occupation of this site during the interval of the two component A-II ages, although the temporal relationship of this date to the main cultural deposits remains problematic. An increase in SN5A projectile points, a concave-based, often slighty serrated variety of SN5, has been observed, as was an increase in ES1 and PS types. Types ES3 and ES4 are absent. Unlike the radiocarbon dates, the TT3 projectile point assemblage is not consistent with that recorded for components A-II and B-II of 35WH14, which retain relatively large proportions of ES3 or ES4, and include only small numbers of ES1 points and no Pinstem (PS) points.

The TT3 projectile point assemblage is generally comparable to that of TT4 at the same site, though TT4 is marked by fewer SN5A type points and a correspondingly higher proportion of narrow-necked specimens. The major feature in TT4, a small house floor, is radiocarbon-dated to 470 ± 90 B.P, consistent with a somewhat later emphasis. TT3 and TT4 have been combined analytically to represent the "western area" of the site.

TT3 has been interpreted as a work area. A large concentration of metates reflects a specialized focus of food grinding. Evidence for the production of large bifaces and various other manufacturing and processing activities has been presented. It has been suggested that the excavation of a house floor in TT3 could explain the relationship of the radiocarbon-dated charcoal lens to the underlying cultural deposits, but there is no unequivocal evidence for the former presence of such a structure.

No radiocarbon dates were obtained for A-III and B-III, the most recent components of 35WH14. Evidence of structures is absent at this time, although a discrete occupation surface is marked by dark, "greasy" soil, a firepit, a scatter of bone, and a peak in cultural materials. The small representation of ES1 points, the almost complete absence of PS points (only one specimen was recovered), and the absence of such late types as SN6 and CS6, all of which are well-represented at 35WH7, suggest that activity declined or ceased at 35WH14 during the time that 35WH7 was most intensively used, i.e. after about 600 years ago.

At 35WH7, this period is radiocarbon-dated by charcoal from the TT4 house mentioned above, and from superposed hearth features in the eastern area of the site, i.e. TT1 and its vicinity (580 ± 120 B.P., 468 ± 80 B., and 350 ± 90 B.P.). As indicated in Chapter 5, these dates are statistically comparable, and suggest repeated occupation of this site during the centuries immediately preceding Euroamerican contact. Major activities conducted at this time include lithic reduction and game processing, whereas fewer grinding stones appear to be present.

Historic Euroamerican materials and artifacts are absent from 35WH7 and 35WH14, suggesting that use of both sites was discontinued before major contacts had taken place.

CHAPTER 7

X-RAY FLUORESCENCE ANALYSIS OF PINE CREEK OBSIDIAN ARTIFACTS

Ninety obsidian artifacts (Tables 31, 32) were submitted for x-ray fluorescence analysis to Dr. Richard E. Hughes of Geochemical Research Laboratory, Rancho Cordova, California (Appendix E). In light of the non-local source of this raw material, it was hoped that

> identification of the sources of ... diagnostic artifacts will elucidate ... procurement patterns and their stability or variation through time, and may allow broader inferences regarding regional and extra-regional cultural ties (Endzweig 1990).

Specimens were selected to represent all sites in the Pine Creek drainage from which obsidian points had been collected, including both excavated and surficially recorded sites. Approximately half of all classifiable obsidian points were chosen, respectively, from 35WH7, 14, 21, and 2, along with 25% of classifiable obsidian points from 35WH13. Selections were made to encompass as many stylistic types as possible, and to maximize vertical and horizontal dispersion across excavated sites. In addition to excavated materials, all classifiable obsidian projectile points collected during the Pine Creek Archaeological Survey (see Chapter 4) were submitted for source analysis. A third category, finally, consisted of four non-projectile point tools including one early-stage biface, two utilized flakes and one retouched flake. It was

Table 31. Specimens Submitted for X-Ray Fluorescence, 35WH7 and 35WH14

Catalog Number	Type	Unit	Level	Source
35WH7				
CC2-109*	ES1	3B	3	WOLF CREEK
CC2-199	ESI2	2D	4	WHITE WATER RDG
CC2-274	ES1	1C	3	GLASS BUTTES
CC2-333	ES1	PH2	?	WHITE WATER RDG
CC2-406	SN5	2H	2	WHITE WATER RDG
CC2-494	PS	3E	4	WHITE WATER RDG
CC2-516	CS1	5A	6	LITTLE BEAR CRK
CC2-601	UFL	1A	4	WHITE WATER RDG
CC2-66	ESI4	3C	1	UNKNOWN
CC2-79	SN6	1P	7	WHITE WATER RDG
CC2-825	ESI1	4H	3	LITTLE BEAR CRK
CC2-900	SN6	1F	2	WHITE WATER RDG
CC2-927	ST	1F	3	WHITE WATER RDG
CC2-937	CS1	1F	3	WHITE WATER RDG
CC2-95	CS6	3A	4	WHITE WATER RDG
CC2-978	SN4	3G	3-4	WHITE WATER RDG
35WH14				
WH14-1086	SN3	A22	11	LITTLE BEAR CRK
WH14-1167	ST	A50	7	LITTLE BEAR CRK
WH14-1181	CS2	A43	9	WHITE WATER RDG
WH14-122	SN3	A13	8	LITTLE BEAR CRK
WH14-244	SN3	B06	10	OBSIDIAN CLIFFS
WH14-252	UFL	B22	10	WHITE WATER RDG
WH14-261	ES2	B23	12	WHITE WATER RDG
WH14-328	ES4	A13	12	WHITE WATER RDG
WH14-344	ES4	B25	13	LITTLE BEAR CRK
WH14-36	ES1	B24	5	OBSIDIAN CLIFFS
WH14-366	ES1	B32	6	HORSE MOUNTAIN
WH14-4	SN5	B22	1	WHITE WATER RDG
WH14-412	ES4	B02	6	LITTLE BEAR CRK
WH14-413	ESI4	B06	14	WHITE WATER RDG
WH14-442	ES1	A37	3	WOLF CREEK
WH14-461	ESI4	A53	1	WHITE WATER RDG
WH14-573	ESI1	B36	6	WHITE WATER RDG
WH14-594	CS2	B14	14	WHITE WATER RDG
WH14-606	ES4	A04	4	WHITE WATER RDG
WH14-713	ES4	B38	8	WHITE WATER RDG
WH14-715	BIF	B38	8	WHITE WATER RDG
WH14-723	CS2	B35	8	DELINTMENT CRK
WH14-788	ESI3	B38	10	QUARTZ MOUNTAIN
WH14-77	SN3	A16	6	GLASS BUTTES
WH14-779	ES2	B35	9	WOLF CREEK
WH14-785	ESI3	B35	9	LITTLE BEAR CRK
WH14-804	SN3	B19	8	LITTLE BEAR CRK
WH14-823	SN4	A32	6	LITTLE BEAR CRK
WH14-882	CS2	B34	7	BALD BUTTE
WH14-919	SN5	A46	3	GLASS BUTTES
WH14-937	SN5	A41	8	WHITE WATER RDG

Table 32. Pine Creek Basin Specimens Submitted for X-Ray Fluorescence, excluding 35WH7 and 35WH14

Site Number	Catalog Number	Type	Source
35WH2	WH2-1046	PS	WHITE WATER RDG
35WH2	WH2-112	ES2	NEWBERRY
35WH2	WH2-114	ES4	WHITE WATER RDG
35WH2	WH2-1570	CS1	WHITE WATER RDG
35WH2	WH2-16	SN6	LITTLE BEAR CRK
35WH2	WH2-381	ES1	UNKNOWN
35WH2	WH2-66	ES1	OBSIDIAN CLIFFS
35WH2	WH2-932	PS	LITTLE BEAR CRK
35WH13	IC2-1030	SN2	LITTLE BEAR CRK
35WH13	IC2-108	CS1	LITTLE BEAR CRK
35WH13	IC2-1274	ES1	LITTLE BEAR CRK
35WH13	IC2-197	SN6	LITTLE BEAR CRK
35WH13	IC2-283	ESPS	UNKNOWN
35WH13	IC2-366	ESI3	NEWBERRY
35WH13	IC2-453	ON	LITTLE BEAR CRK
35WH13	IC2-463	ST	LITTLE BEAR CRK
35WH13	IC2-484	PS	CHICKAHOMINY
35WH13	IC2-500	SN6	LITTLE BEAR CRK
35WH13	IC2-579	SN1	LITTLE BEAR CRK
35WH13	IC2-6991	SN1	WHITE WATER RDG
35WH13	IC2-7742	ES1	WHITE WATER RDG
35WH13	IC2-7885	ESSN	WHITE WATER RDG
35WH13	IC2-8088	ES4	NEWBERRY
35WH21	JC-113	SN1	NEWBERRY
35WH21	JC-119	RFL	WHITE WATER RDG
35WH21	JC2-1302	SN1	WHITE WATER RDG
35WH21	JC-159	ESPS	CHICKAHOMINY
35WH21	JC-186	ES1	WHITE WATER RDG
35WH21	JC2-228	ESI4	QUARTZ MOUNTAIN
35WH21	JC-281	CB2	GLASS BUTTES
35WH21	JC2-289	ES2?	OBSIDIAN CLIFFS
35WH21	JC2-54	ES1	BROOKS CANYON
35WH21	JC2-66	CB2	GLASS BUTTES
35WH42	WH42-76E	PS	GLASS BUTTES
35WH42	WH42-B	PS	LITTLE BEAR CRK
35WH42	WH42-C	ES1	CHICKAHOMINY
35WH46	WH46-A	PS	WOLF CREEK
35WH46	WH46-B	ESI1	WHITE WATER RDG
35WH164	C106-3A	CS1	WHITE WATER RDG
35WH166	C106-5C	CB2	OBSIDIAN CLIFFS
35WH166	C106-5WW	SN1	WHITE WATER RDG
35WH166	C106-5XX	SN1	WOLF CREEK
35WH168	C106-7A	SN1	WHITE WATER RDG

reasoned that these larger and more expedient tools might represent less distant sources of raw material than the more readily curated arrow and dart points.

Source analysis results are presented in Tables 33 and 34. As a result of recent fieldwork and source identification conducted by Hughes south of the Study Area, 87 of the ninety samples could be successfully matched to a known geochemical signature, a considerable improvement upon earlier analyses in the region (cf. Connolly et al. 1993:99ff). Twelve known sources are represented, including Bald Butte, Brooks Canyon, Chickahominy, Delintment Creek, Glass Buttes, Horse Mountain, Little Bear Creek, Newberry Volcano, Obsidian Cliffs, Quartz Mountain, White Water Ridge, and Wolf Creek. Three of these, Little Bear Creek, White Water Ridge, and Wolf Creek, are clustered about 30 km east of Seneca, Oregon (see Appendix E) and will for this discussion be referred as the "Seneca area sources."

All sources represented in the Pine Creek sample are located within 200 km south, southeast, and southwest of the Study Area, with most, including the Seneca area sources, situated along an arc centered on Pine Creek with a radius of approximately 150 to 160 km (Figure 94). Contrasting with this regular dispersion of utilized source areas, however, is the preferential representation of Seneca area obsidian, which comprises 70% of the sample (N=63). Each of the remaining sources is represented by between one and six specimens. Only one specimen each is assigned to Horse Mountain and Bald Butte, the most distant sources.

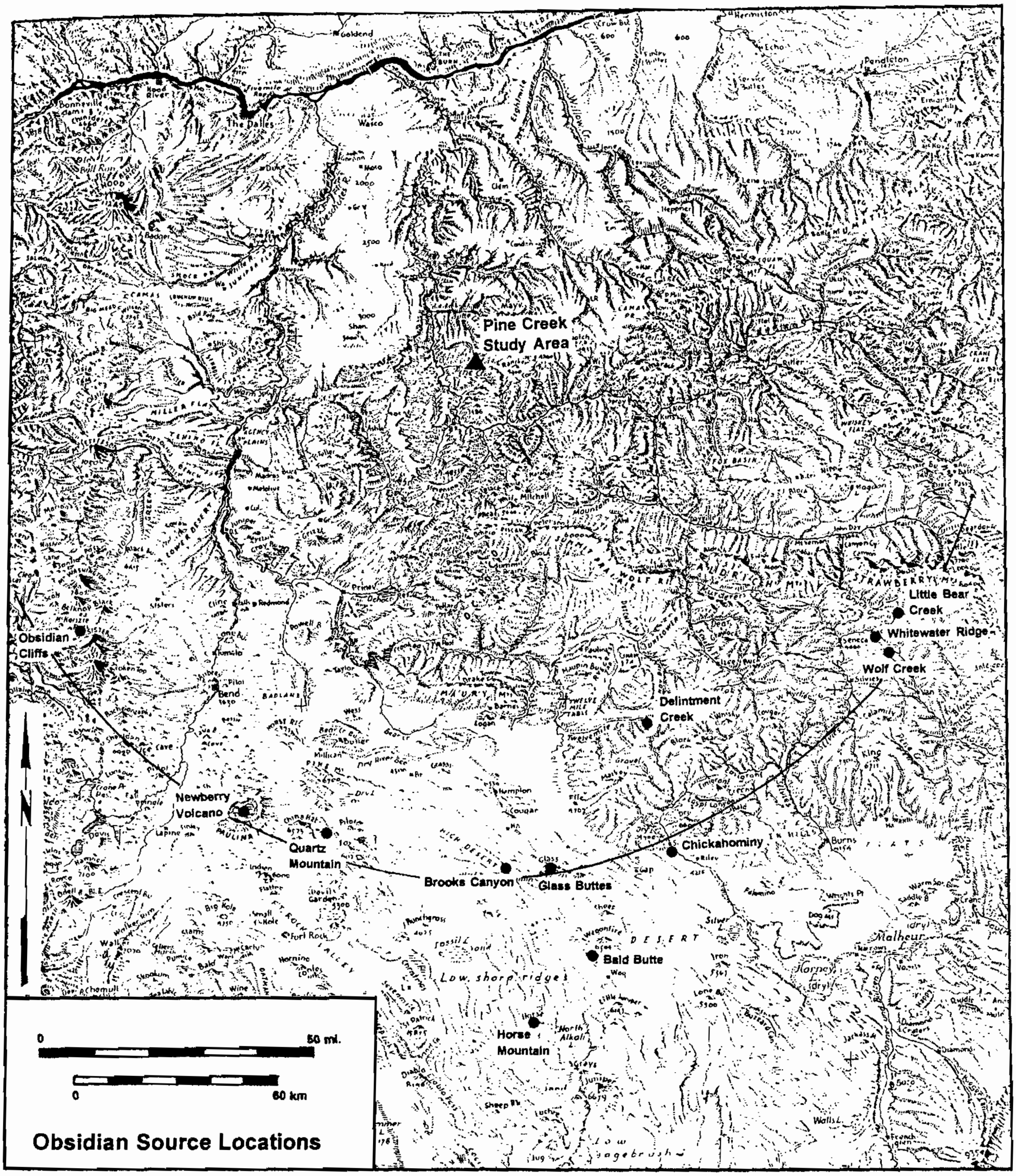


Figure 94. Source locations for Pine Creek basin obsidian artifacts. The Seneca area sources referred to in the text are Little Bear Creek, White Water Ridge, and Wolf Creek.

Table 33. Distribution of Obsidian Sources by Site

Source	13	14	164	166	168	2	21	42	46	7	Total
Bald Butte	-	1	-	-	-	-	-	-	-	-	1
Brooks Canyon	-	-	-	-	-	-	1	-	-	-	1
Chickahominy	1	-	-	-	-	-	1	1	-	-	3
Delintment Creek	-	1	-	-	-	-	-	-	-	-	1
Glass Buttes	-	2	-	-	-	-	2	1	-	1	6
Horse Mountain	-	1	-	-	-	-	-	-	-	-	1
Little Bear Creek	8	8	-	-	-	2	-	1	-	2	21
Newberry Volcano	2	-	-	-	-	1	1	-	-	-	4
Obsidian Cliffs	-	2	-	1	-	1	1	-	-	-	5
Quartz Mountain	-	1	-	-	-	-	1	-	-	-	2
White Water Ridge	3	13	1	1	1	3	3	-	1	11	37
Wolf Creek	-	2	-	1	-	-	-	-	1	1	5
Unknown	1	-	-	-	-	1	-	-	-	1	3
Total	15	31	1	3	1	8	10	3	2	16	90

Specimens assigned to the Seneca locality were found at all ten sampled sites (Table 33). In most cases, obsidian from this source area constitutes between 60% and 100% of the sample. Seneca obsidians, for example, represent 87.5% (N=14) and 73.3% (N=23) of material submitted from 35WH14 and 35WH7, the two excavated sites investigated in this dissertation (Figure 95). 35WH21 and 35WH42 represent two exceptions. While the strength of the relationship for 35WH42 is limited due to the small sample size of three specimens, only one of which is attributable to the Seneca sources, the highly diverse sample from 35WH21, with a sample of ten specimens drawn from a total of seven sources, is less easily dismissed. Only three specimens from this site are made of Seneca area material. An explanation for this deviation is not immediately apparent.

Projectile points made of obsidian from the Seneca locality encompass most of the temporally sensitive types in the analyzed sample, reflecting consistent use of the Seneca sources through time (Table 34).

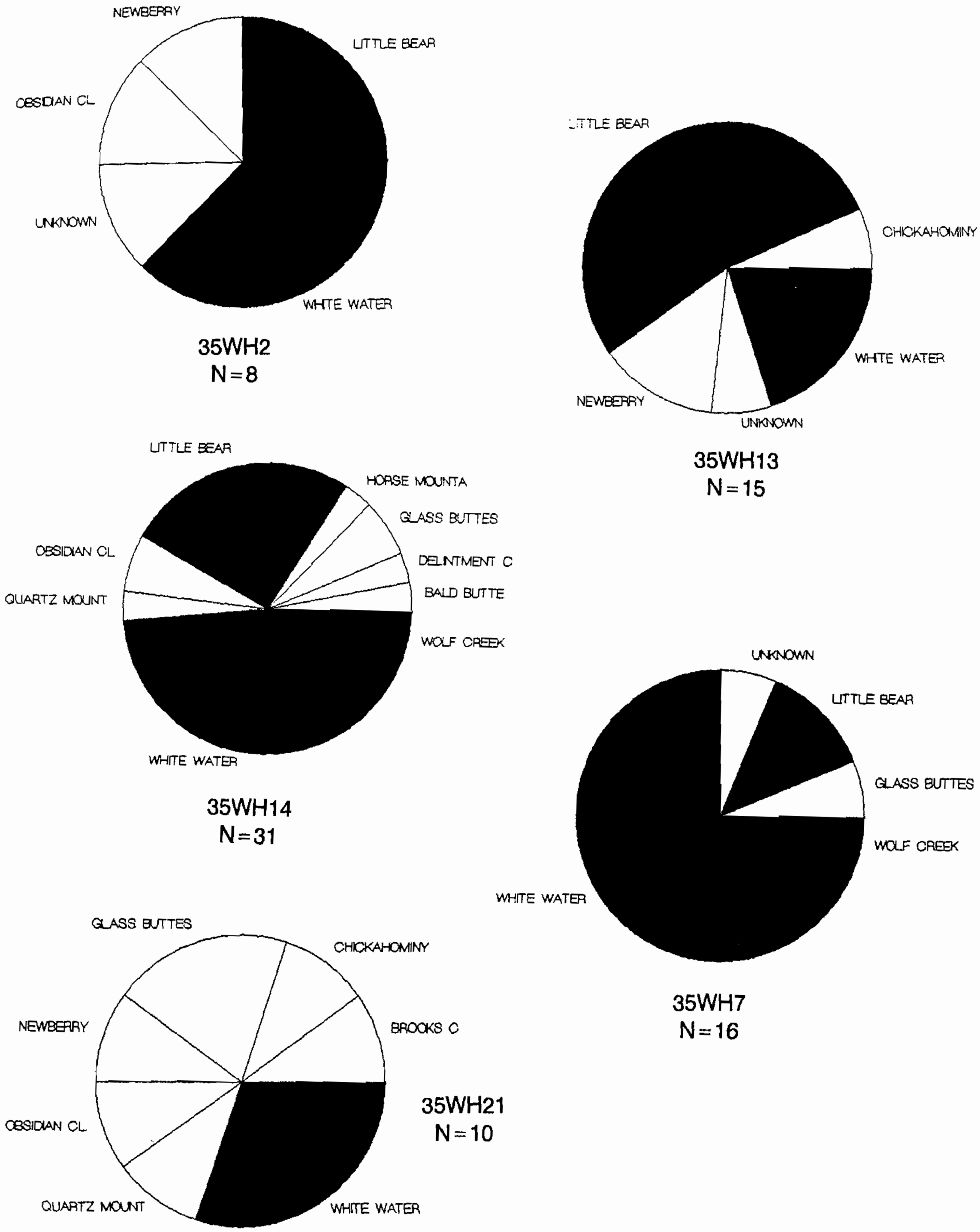


Figure 95. Relative contribution of obsidian sources by site, Pine Creek basin.

Table 34. Distribution of Obsidian Sources by Projectile Point Types and Other Tool Types[1]

Source	Diagnostic Projectile Point Types																					Other Tools					Total
	ST	SN6	CS6	PS	SN3	SN5	ES1	ESI1	ES2?	ES2	ESI2	ESI3	ESI4	ES4	ON	CS1	CS2	SN1	SN2	SN4	CB2	ESPS	ESSN	BIF	RFL	UFL	
Bald Butte	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
Brooks Canyon	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Chickahominy	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	3
Delintment Creek	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
Glass Buttes	-	-	-	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	6
Horse Mountain	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Little Bear Creek	2	3	-	2	3	-	1	1	-	-	-	1	-	2	1	2	-	1	1	1	-	-	-	-	-	-	21
Newberry Volcano	-	-	-	-	-	-	-	-	-	1	-	1	-	1	-	-	-	1	-	-	-	-	-	-	-	-	4
Obsidian Cliffs	-	-	-	-	1	-	2	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	5
Quartz Mountain	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2
White Water Ridge	1	2	1	2	-	3	3	2	-	1	1	-	2	4	-	3	2	4	-	1	-	-	1	1	1	2	37
Wolf Creek	-	-	-	1	-	-	2	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	5
Unknown	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	3
Total	3	5	1	7	5	4	13	3	1	3	1	3	4	7	1	5	4	7	1	2	3	2	1	1	1	2	90

1 Temporally diagnostic projectile points ordered chronologically based on Dumond and Minor (1983:Fig. 7.1) and present study. ST, SN6, and CS6 are not reported in Dumond and Minor (1983). Age increases from left to right.

The type identified as CB2 (Dumond and Minor 1983:172) is the sole exception. It includes one "typical" Cascade point from 35WH166 (the only specimen from the Pine Creek basin which can be labeled as Cascade with some degree of confidence) and two tiny, foliate points from 35WH21. The former is sourced to Obsidian Cliffs in the High Cascades, while the latter are of obsidian from Glass Buttes, in the High Desert country south of the Study Area. A number of types are only represented by Seneca area obsidian, including CS1 (N=5), CS6 (N=1), ESI1 (N=3), ESI2 (N=1), SN2 (N=1), SN4 (N=2), SN6 (N=5), ST (N=3), and an asymmetrically notched small triangular specimen which is classified as "ON" (one notch) in keeping with Dumond and Minor (1983:173) but which may represent an unfinished Pin Stem (PS). A somewhat greater emphasis on Seneca obsidians during the latest period of prehistoric occupation (as represented by SN6, ST, and possibly CS6) is supported by a relatively high proportion of PS points attributed to this source (five of a total of seven). The slightly earlier, albeit still late prehistoric ES1 type points, on the other hand, show a somewhat lower than expected representation of Seneca area obsidian (X^2=4.12; df=1; $p < 0.05$). A contraction in the obsidian procurement range is also suggested to have occurred at Mitchell Cave in the upper John Day River basin between Component III (1500-1300 or possibly as late as 800 B.P.) and Components I/II (after 300-400 B.P.), as defined for this site (Connolly et al. 1993:102-103). The Pine Creek data do not contradict this scenario, but the samples for the individual types are very small, and may be the true reason for these apparent patterns.

Temporal differences in source use are not apparent from the stratigraphic distribution of sampled specimens from 35WH7 and 35WH14 (this study). Seneca source material is present from the surface through the lowest levels of both excavation blocks at 35WH14 and it is found throughout the site at 35WH7, where only two of 16 analyzed specimens are not of Seneca area obsidian.

The results of the x-ray fluorescence analysis show a persistent pattern of obsidian procurement from the White Water Ridge, Little Bear Creek, and Wolf Creek sources east of present-day Seneca. Recent analyses extend the range of this material to sites in Umatilla County to the north and east of Pine Creek (Hughes, personal communication, 1993), and may explain the Nez Perce reference to the John Day as "obsidian river" (Spinden 1908:184). The worked flake, biface, and two used flakes submitted for identification match the Seneca source profile as well, indicating utilization of this source for both expedient and non-expedient varieties of tools.

Linear distance being roughly equal for most of the sources represented among the ninety obsidian specimens analyzed, the Seneca area focus suggests the importance of additional factors, such as facility of travel via the John Day River corridor, the inclusion of the upper John Day within the customary seasonal round of Pine Creek peoples, and/or social linkages allowing exchange between groups in the Study Area and their southern neighbors. The complete absence of obsidian from Dooley Mountain, located in the Baker area 200 km east of the Pine Creek sites (McDonald 1986), may also reflect physical as well as social barriers affecting toolstone procurement.

CHAPTER 8

COMPARISONS: THE ETHNOGRAPHIC AND THE ARCHAEOLOGICAL RECORDS

The Pine Creek Basin

Since the publication of Binford's seminal paper on hunter-gatherer settlement systems and archaeological site formation (Binford 1980), it has become commonplace to refer to the "logistical" resource procurement strategy of Columbia Plateau hunters and gatherers. This strategy is seen as characteristic of "collectors," who "supply themselves with specific resources through specially organized task groups" (Binford 1980:10). Relying heavily on storage, this adaptation resolves the problem of spatial and temporal incongruities in critical resources, moving goods to the consumer ("logistical mobility"), in contrast to the alternative "forager" strategy, by which a group "maps onto" resources ("residential mobility"). It is the development of a logistical strategy which is seen as pivotal in the evolution of sedentism on the Columbia Plateau, making possible the large, riverine communities observed by the the earliest Euroamerican explorers. Aside from the evolutionary implications of Binford's model, it provides a set of archaeological expectations for settlement patterns of logistically organized hunters and gatherers which are applicable to the southern Columbia Plateau (e.g. Chatters 1987, 1989).

According to Binford, a collector subsistence-settlement system is characterized by five site types, including residential base, field camp, location, station, and cache (Binford 1980:10). The "residential base" is considered to represent the "hub of subsistence activities ... where most processing, manufacturing, and maintenance activities take place" (Binford 1980:9). Field camps, on the other hand, are defined as

> ... a temporary operational center for a task group. It is where a task group sleeps, eats, and otherwise maintains itself while away from the residential base. Field camps may be expected to be further differentiated according to the nature of the target resources, so we may expect sheep-hunting field camps, caribou-hunting field camps, fishing field camps, etc. (Binford 1980:10).

"Locations" are characterized as places where extractive activities are carried out (Binford 1980:9), while "stations" are "sites where special-purpose task groups are localized when engaged in information gathering, for instance the observation of game movement" (Binford 1980:12). "Caches," finally, involve temporary storage of high bulk resources (Binford 1980:12), although this definition can be expanded to include equipment storage as well (Thomas 1983:81).

Moving beyond the model, Thomas attempts to "bridge the gap between the behavioral event and its archaeological consequences" to provide "concrete, observable, testable archaeological categories" (Thomas 1983:72). While specific material correlates given by Thomas are tailored to the Great Basin Shoshone, his more general definitions are applicable to the present case.

> The typical base camp may contain evidence of domestic dwellings and site furniture, specialized utilitarian structures and outdoor work areas, service centers, diversified tool fabrication and repair, child rearing, diversified food consumption (and perhaps storage), temporary storage of raw materials and tools, a relatively high degree of internal site structuring, luxury items, and debris from recreational and ceremonial activities. Variability in these remains is directly conditioned by the overall subsistence strategy in which that residential base functioned (Thomas 1983:73).

This straightforward definition of base camps stands in contrast to the more subjective characterization of the temporary field camp. Many of the distinctions between the two site types are primarily quantitative, with field camps exhibiting:

> ... limited artifact inventory, low diversity byproducts, restricted faunal (and floral) inventory, little investment in construction of dwellings or features, absence of child-rearing, more concern with logistic than domestic positioning (Thomas 1983:80).

More concrete differences include more specialized subsistence, which is said to be biased toward consumption of either plants or animals, but rarely both (Thomas 1983:79), and limited artifact inventory

> consisting primarily of highly curated personal "gear," specialized implements for extraction, and debris from limited artifact repair. Boredom reducers might be brought along, but since they are quite portable, only the byproducts--such as debitage or whittling debris--would enter the archaeological record. Primary manufacture would rarely occur in such a camp, although artifacts might be "staged" if adequate lithic resources were available nearby. Such field camps should contain few high-bulk artifacts, except those left as site furniture (Thomas 1983:80).

Interpretive difficulties are created by variability in the duration of field camp sojourns, as well as by the palimpsest effect of repeated occupations, particularly when different site types are superimposed (Thomas 1983:80). The problems involved in distinguishing field camps from residential base camps highlight the importance of sample size, necessitating large numbers of sites, as well as large artifact assemblages for comparison and classification.

Locations, or sites involving primary extractive activities, include hunting sites resulting from such actvities as kill and primary butchering, plant harvesting sites, and quarries. Hunting locations may be marked by relative permanent features or "facilities," such as blinds, rock walls, and cairns (Thomas 1983:84), while plant harvesting is characterized by relatively low visibility (Thomas 1983:85), with processing activities more likely to be observed at nearby field camps or residential bases. Quarries are recognizable where initial processing takes place on site. Locations are placed within 10 km (a daily foraging radius) from the residential camp (Thomas 1983:82).

While the identification of the "station" is of less importance to the present study, it should be noted that Binford and Thomas differ in their interpretation of this site type. Whereas Binford sees stations as including, for example, the hunting stands or ambush locations of specialized task groups (Binford 1980:12), Thomas subsumes under this category the sites of *fandangos*, large-scale ceremonial gatherings held in conjunction with communal rabbit or antelope drives and which may attract up to 300 people (Thomas 1983:85-87). While both Binford and Thomas emphasize the information exchange function of the respective "locations," it is difficult to conceive of both as the same manifestation, given such different scales of magnitude.

Caches, finally, discussed by Binford primarily in connection with resource storage (Binford 1980:12), can also consist of processing equipment, which is deposited near the projected location of use to reduce transport costs (Thomas 1983:81-82). While not the exclusive property of collectors, they do indicate the type of logistic strategy that is more characteristic of this adaptation.

Historic accounts of native John Day River peoples, as reported by Ray, Murdock, Suphan, and Hunn (see Chapter 3), allow the derivation of general expectations regarding the ethnographic use of Pine Creek. This information can, in turn, be compared to archaeological findings from excavations at 35WH7 and 35WH14. Based on the general ethnographic record, only four of Binford's five site types should be found in the Pine Creek basin. The "residential base," best equated with the winter village, is located well outside of the Study Area; for Tenino it is near the Columbia River, for Northern Paiute along the Upper John Day. Field camps used for varying amounts of time should serve as temporary residential bases. Members of expeditions traveling from Columbia River villages to interior field camps would be expected to live in mat-covered dwellings or "tipis" (Murdock 1958:300-301). Similarly, Northern Paiute are said to have lived in brush windbreaks or shades during the warmer months of the year (Fowler and Liljeblad 1986:443).

Limited ethnographic information on local site use and subsistence activities is contained in Verne Ray's unpublished Indian Claims Commission records (Ray n.d.) and in eyewitness accounts by local residents. The following activities can be extracted.

Plant collecting and processing: The springtime gathering of cous and "Indian root" by Columbia River peoples is mentioned by Conlee (Gannon 1975). It is possible that the plant involved here is bitterroot, which, like cous (also known as biscuitroot), grows in dry, rocky areas and is harvested in the spring. Ray (n.d.), indicates only that "roots" were dug. Ray also reports the gathering of chokecherries at the mouth of Pine Creek. Chokecherries ripen in summer (Hilty et al. 1980).

Conlee mentions that cous was ground into flour and (probably) pressed into cakes (Gannon 1975). "Indian root" was stewed with meat (Gannon 1975).

Hunting and processing of game: Pronghorn were hunted in the mountains east of "Sawi'tki," (Ray n.d.), a site located in the vicinity of 35WH14. According to the same source, deer were hunted near Cove Creek, and diversified hunting was conducted from the mouth of Pine Creek. Small mammals including rodents also appear to have been captured (Gannon 1975). There is no further information on processing other than the use of small game in stews.

Fishing: Fishing of non-salmonids is reported for the mouth of Pine Creek for Sahaptins (Ray in Suphan 1974), while a Deer-Eater Paiute reports the use of fishing sites upstream from Clarno (Suphan 1974:64). Conlee mentions encountering an Indian woman cooking eel, but the location of this actvity is not given (Project files, Oregon State Museum of Anthropology).

The information listed above and the ethnographic summary presented earlier do not contradict the regionally documented seasonal round, which would indicate spring, summer, and fall use of the Pine Creek drainage by Sahaptin-speakers, and a non-winter use (if at all) by Numic-speaking peoples from the south. It is difficult, however, to estimate the length of time spent in the area. Ray's unpublished description of Sawi'tki suggests that an extended sojourn was possible. The designations "village" and "permanent" suggest longterm and/or repeated occupation, although winter or year-round use is ruled out by other ethnographic accounts (see Chapter 3). Sawi'tki is probably best considered a long-term field camp, with activities related to at least two target resources (game, roots). Additional field camps may be represented by two or three other permanent sites in the hills to the east, which were "closer to the actual hunting operation," but other interpretations are possible.

Assignment of sites 35WH7 and 35WH14 to particular site types is possible, though with varying degrees of confidence. At 35WH14, components A-I and B-I clearly satisfy most of Thomas's requirements for a residential base (Thomas 1983:73). Semi-subterranean houses suggest long-term winter occupation, as do the variety of activities conducted within the houses (no information is, of course, available regarding potential outdoor activities), and their discrete spatial patterning. Evidence for the manufacture of both flaked stone and ground stone is represented by raw materials (e.g. cores), debris, and unfinished rejects. Additional technologies (such as fabrication of clothing and baskets) are indicated by the presence of a variety of stone drills, perforators, gravers, and bone implements. Diversified food consumption included a variety of game animals, and presumably plant foods, although this is primarily inferred from the presence of grinding stones. Both local and "exotic" raw materials are represented, the latter including dentalium from the Northwest Coast, obsidian and possibly serpentinite from the south. Recreational objects include gaming pieces and a pipe fragment, though a ceremonial function for the latter is conceivable. Only a portion of the milling stones were examined for the present study but several large specimens, one of which weighed 68 lbs, were recovered from the lowest components at 35WH14, and would seem to qualify as site furniture. Storage is represented by several pits and a cache in one of the entryways. Radiocarbon dates place the earliest occupation of B-I at roughly 2600 radiocarbon years before present.

The most recent components at 35WH14 (skipping for the moment the intermediate occupations designated as A-II and B-II) most likely represent a temporary field camp. No evidence of structures is present in the sampled portion of the site, although a discrete occupation floor is marked by change in sediment consistency and an, albeit minor, peak in cultural materials. A campsite of at least some duration is suggested by the presence of a firepit, and associated charcoal, ash, and bone scatters. Artifact density decreases overall, and a marked decline is particularly evident in the categories of worked bone and ground stone. Exotic raw material is limited to obsidian. Unique items, while always rare, are almost absent. Hunting and the processing of game, in particular artiodactyls, appear to represent the focal activities. The single recovered seasonal indicator points to a late winter or early spring kill. An age of sometime after 900 B.P. is postulated, with a likely termination before the most recent radiocarbon-dated occupation of 35WH7 (350 ± 90 B.P.), or at least before the common occurrence of such projectile point styles as PS, SN6, and CS6 at the latter site.

It is, due to the absence of information on individual floors in components A-II and B-II of 35WH14, more difficult to assign the intermediate occupations to a specific site type. The overall assemblage is, however, similar enough to A-I and B-I to suggest a long-term residential base. The only major change in artifacts is a decline in bone implements, but this may represent a culture historical development, rather than functional difference. Exotic raw materials include obsidian from the south and southwest and a small piece of muscovite which probably originated to the east in the Wallowa or the Elkhorn Mountains. Dwellings differ, and appear to have been built in large, saucer-shaped depressions, unlike the steep-sided housepits characteristic of the earlier occupations. Seasonal indicators, while scant, span late winter through summer. Winter or at least a non-summer occupation may also be indicated by the internal, slab-lined hearth in A-II (cf. Dumond and Minor 1983:113). A single storage pit containing a bone implement may be assigned to this set of occupations. Radiocarbon ages of roughly 1500 and 900 B.P. date A-II and may also apply to B-II, although this component was not directly dated.

Site function at 35WH7, as at 35WH14, appears to have varied through time. Its most ephemeral use is represented by the cache of atlatl darts recovered from the rock crevice which overlooks the site, and which is dated to approximately 2300 B.P. It has been suggested that the area of TT2, characterized predominantly by reworked projectile points, point fragments, and small bifaces, also reflects a limited and short-term use. This inference is supported by shallow depth of cultural deposits, an absence of such features as hearths, and a near-absence of faunal remains. Based on present evidence, TT2 may be interpreted as a station, or, if taphonomic processes are responsible for the absence of bone, perhaps as a location. The predominance of broad-necked projectile points in this part of the site and its presumed short-term use, may indicate contemporaneity with the dart cache.

A change in site function is indicated by the occupation of TT1 and TT4 (and, by extension, TT5 and 7), all calibrated radiocarbon dates of which overlap within one standard deviation. The most discrete feature is the floor in TT4, which has been interpreted as evidence for a small structure. The small size of this dwelling or shelter, much of the floor of which is taken up by a hearth, a grinding stone, and an associated scatter of bone, would not seem to suggest an extended stay. No evidence for storage is present. This stands in contrast, however, to the effort expended in clearing rocks from the surface and the accommodation of multiple activities within the its confines, including game processing and preparation, lithic reduction, and, possibly, the manufacture of bone beads. Since occupation during late winter and early spring is suggested, the structure may simply represent an attempt to avoid the rain or snow that would be likely for this time of year. This explanation may be supported by the persistent attraction of the sheltering overhang in TT1, the artifact assemblage of which complements that observed for TT4. The level of permanence represented here is clearly difficult to assess. It illustrates the difficulty of distinguishing between long-term "temporary" camps and residential sites, particularly for an overall more mobile adaptation, such as that characterized by the Great Basin peoples who may have used the Study Area intermittently during historic times. The most that can be said is that, at roughly 500 B.P., the site was used during late winter and early spring as either temporary fieldcamp or a small residential base.

An assessment of the role of TT3 is hampered by an uncertain relationship between the main cultural deposits and a charcoal lens radiocarbon dated to 1160 ± 90 B.P., as well as the absence of a clearly identifiable occupation floor. It has been suggested that activities are consistent with those represented in TT1 and TT4. As such, they include lithic reduction, particularly the manufacture of large bifaces, as well as specialized tasks utilizing large numbers of drills, perforators, gravers, notches, and formed unifaces. Bone is somewhat less abundant although this may be attributed to a higher degree of processing, and a resulting reduced retention of small fragments. A localized concentration of grinding stones may also suggest intensive processing of plant foods, while the presence of small amounts of freshwater mussel shell, recovered primarily from this area and TT1C, indicates that this resource was also utilized. The information at hand is consistent with either a residential base or a temporary camp. A final resolution, not possible at present, hinges on the functional and temporal relationship of this part of the site to TT1 and TT4.

Three major implications follow from the discussion presented above. First, the presence of pithouses at about 2600 B.P., with the associated correlates of a permanent residential base, suggests a type of occupation which is inconsistent with that documented by the ethnographic record, both with regard to the regional settlement system as well as locally observed site types. The absence of similar sites in the Pine Creek basin may be attributed to sampling error, but may, on the other hand, suggest a centralized focus that is complemented by the roughly contemporaneous dart cache. Second, shorter-term occupation at 35WH7 and 35WH14 coincides with an increase in numbers of sites dated to approximately 500 B.P. in the Study Area. Residential use persists to approximately 300-400 B.P. at 35WH21, situated in Jones Canyon along an intermittent stream which drains into Pine Creek (see Chapter 4). The degree of permanence of occupation at this site cannot be determined on the basis of present evidence. Third, occupation of the Study Area may have encompassed late winter and/or early spring from as early as 2600 B.P., or about 2800 calibrated years ago, until sometime after A.D. 1400.

The John Day and Deschutes Rivers

Regional changes in settlement patterns predating the ethnographic record can be also seen in the distribution of archaeological sites with surface evidence of housepits along the lower reaches of the John Day and Deschutes rivers, from Township 10S to the Columbia River. Site information has, for this purpose, been summarized from archaeological reconnaissance surveys (both published and unpublished), archaeological site records compiled by the Oregon State Historic Preservation Office, and a computerized site database prepared for the Prineville District Bureau of Land Management (Endzweig n.d.).

Published ethnographic accounts by Verne Ray and George Peter Murdock indicate a total of twelve camps and villages along the Deschutes River and nine along the John Day (Figure 96, based on Murdock 1980:132-136 and Suphan 1974:Petitioner's Exhibits 403, 404c). Archaeological surface evidence, in contrast, although without the benefit of temporal control, suggests a considerably more intensive use of the two lower river courses. Survey of BLM lands along the Deschutes River between Macks Canyon and Warm Springs Bridge in 1976 identified 135 archaeological sites, 27 of which exhibited definite housepits (Hibbs et al. 1976). Although not specified in the cited report, a tally of BLM lands by river length suggests that ca. 50% of land between Macks Canyon and Warm Springs Bridge was surveyed, or about 40% of the lower Deschutes as a whole. As of early 1992, the count for the 95 lower river miles stood at 160 sites, 40 or 25% of which exhibit

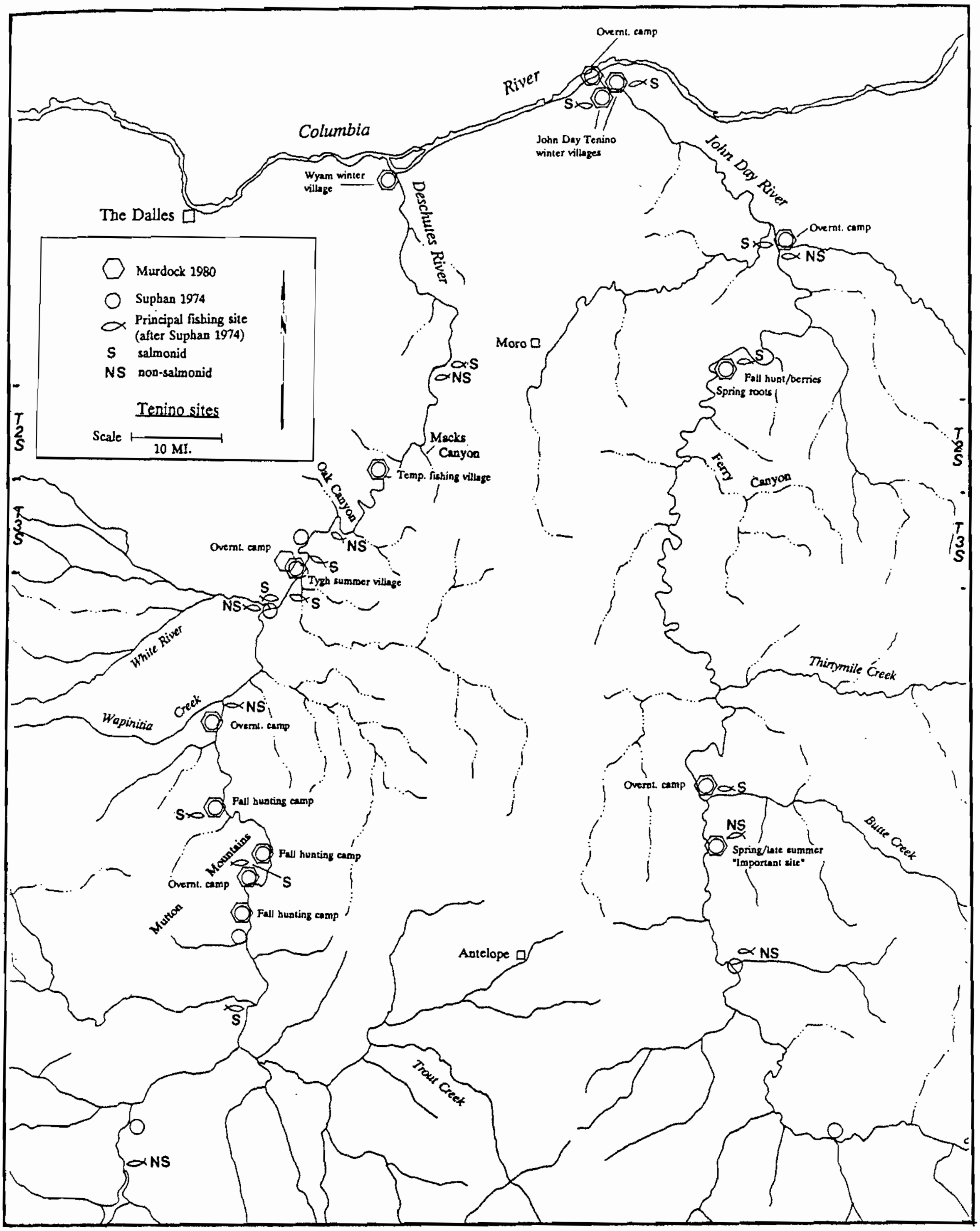


Figure 96. Tenino sites along the lower John Day and Deschutes rivers, according to published ethnographic sources (after Murdock 1980 and Suphan 1974).

depressions identified as housepits. Archaeological reconnaissance surveys along the lower John Day River (see Chapter 4) have recorded 113 sites (Jackson et al. 1990; Moratto et al. 1991; Polk 1976; Wilde et al. 1983). Housepits have been noted at forty-five of these, or 40% (Table 35).

Inferences on site distribution remain highly tentative because of disparate survey strategies and attendant gaps in the record. Some generalizations are, however, possible. On the lower Deschutes River, firm evidence of pithouses ends south of Trout Creek. No housepits were, for example, observed at 31 sites recorded during a survey in conjunction with the construction of Round Butte Dam, some 20 miles farther upstream (Ross 1963). The archaeological distribution of pithouse sites matches the general distribution of ethnographic sites recorded along this stretch of river. The large number of prehistoric *habitation sites* contrasts with the historic preponderance of "hunting camps" and "fishing sites," however, and may suggest changes in the way the area was used, e.g. a shift towards more specialized resource exploitation, with shorter, and seasonally more restricted stays. The absence of chronological controls, unfortunately, precludes an assessment of the potential contemporaneity of these sites. The northern limit of housepit sites along the Deschutes remains uncertain. As the unsurveyed portion of the river between Macks Canyon and the Columbia River is coextensive with what appears to be a gap in ethnographic sites, the question of prehistoric occupation remains open.

Table 35. Distribution of Pithouse Sites by Township and River

Township	1N	1S	2S	3S	4S	5S	6S	7S	8S	9S	Total
Deschutes R.	0	0	10	13	2	5	1	4	3	2	40
John Day R.	1	2	11	9	4	13	2	2	0	1	45
										Total	85

The absence of pithouse sites along the lower 33 miles of the John Day River, on the other hand, does appear to reflect a cultural reality in light of thirty-five other sites, primarily lithic scatters, which have been recorded along this stretch. Consistent with evidence from the Deschutes River, the currently held southern limit of pithouses along the mainstem of the John Day is at Township 9S, with the exception of three sites near Spray, 40 miles farther upstream and outside of the area of present concern.

The spatial distribution of prehistoric pithouse sites along the lower John Day River bears less resemblance to the ethnographic picture than that along the Deschutes. All lie within traditional Tenino big game-hunting territory (Suphan 1974:Petitioner's Exhibit No. 404A) (Figure 97). The high density of prehistoric habitation sites south of Thirtymile Creek and south of Ferry Canyon is particularly striking, in light of the historic void along this stretch. Equally impressive is the high density of archaeological pithouse sites in Townships 2S and 3S along both the Deschutes and John Day rivers.

A clue to this distributional parallel may be found in the ethnographic resource areas documented by Verne Ray for the Tenino. Not

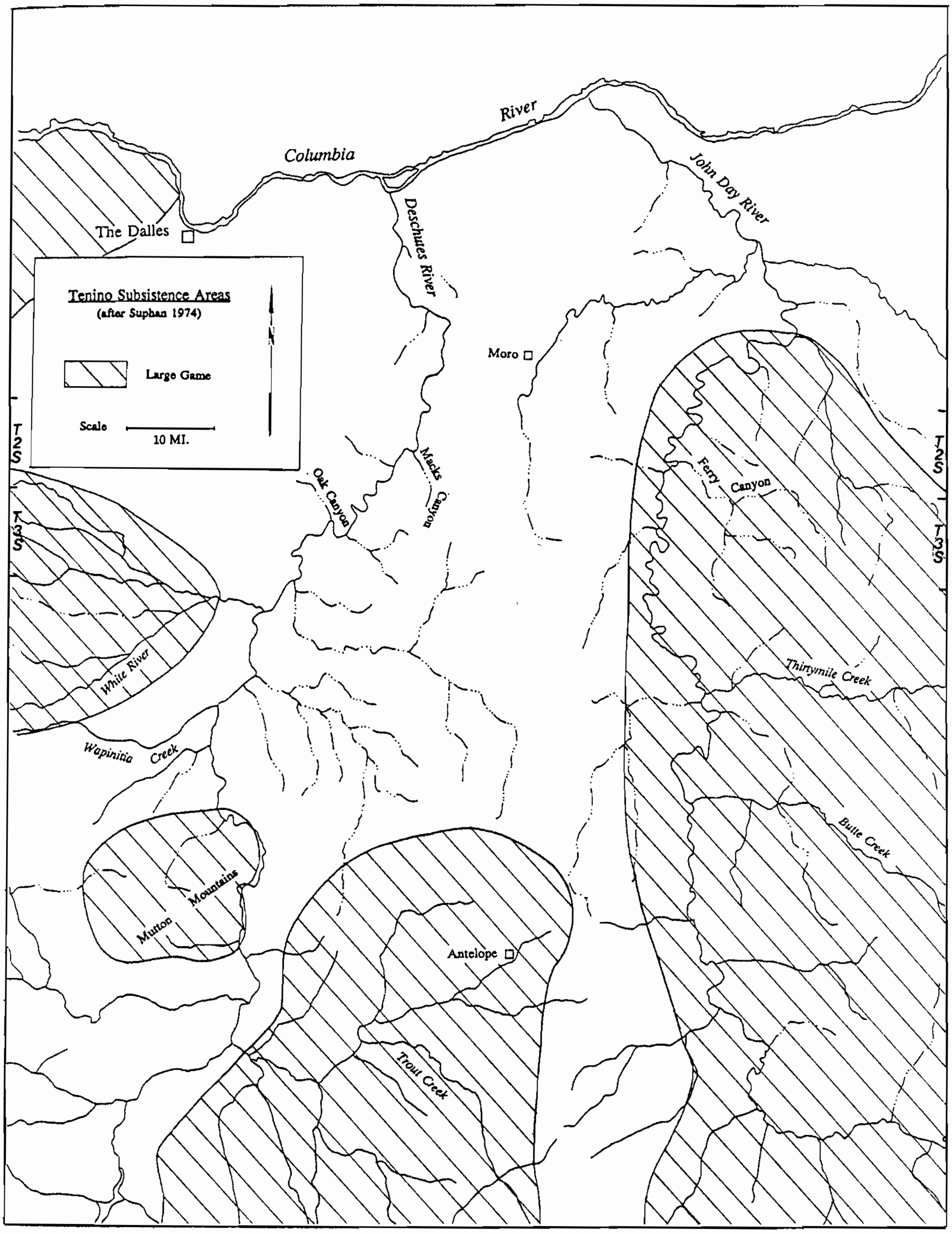


Figure 97. Tenino large game hunting areas (after Suphan 1974).

only are the two riverine site clusters located where the Deschutes and the John Day are closest to one another (separated by a mere 20 miles), but they also coincide with the indicated northern limits of the root and landfowl-hunting areas situated on the divide between the two drainages (Suphan 1974:Petitioner's Exhibits No. 404b,c) (Figure 98). Habitation sites placed along this stretch of river thus have access not only to fish (and game along the John Day), but also to the broader resource catchment of their "sustaining hinterland" (Burghardt 1959, cited in Flannery 1976:174), the nearby uplands. The proximity of John Day and Deschutes communities provided by this arrangement may have presented an additional, social, incentive.

The apparent importance of resource diversity is also reflected in the location of 35WS42, 35WS43, 35SH23, 35WS66, and 35WS91, the largest pithouse sites along the lower Deschutes. Sites 35WS42 and -43, with a minimum of 27 and 11 housepits each (or a maximum of 45 and 18, if all recorded depressions are counted, including those not definitively identified as house depressions in the field), are situated in Oak Canyon, within a half-mile of the Deschutes. Based on environmental setting and surface artifacts, Hibbs et al. (1976) suggest that 35WS42 and -43 functioned as specialized acorn processing sites. The Mack Canyon Site, 35SH23, with between 33 and 55 depressions, is one of only two pithouse sites along the lower Deschutes and John Day rivers at which some archaeological excavation has taken place. On the basis of artifacts and faunal remains, investigator David Cole concluded that mountain sheep and freshwater mussels were the most important food

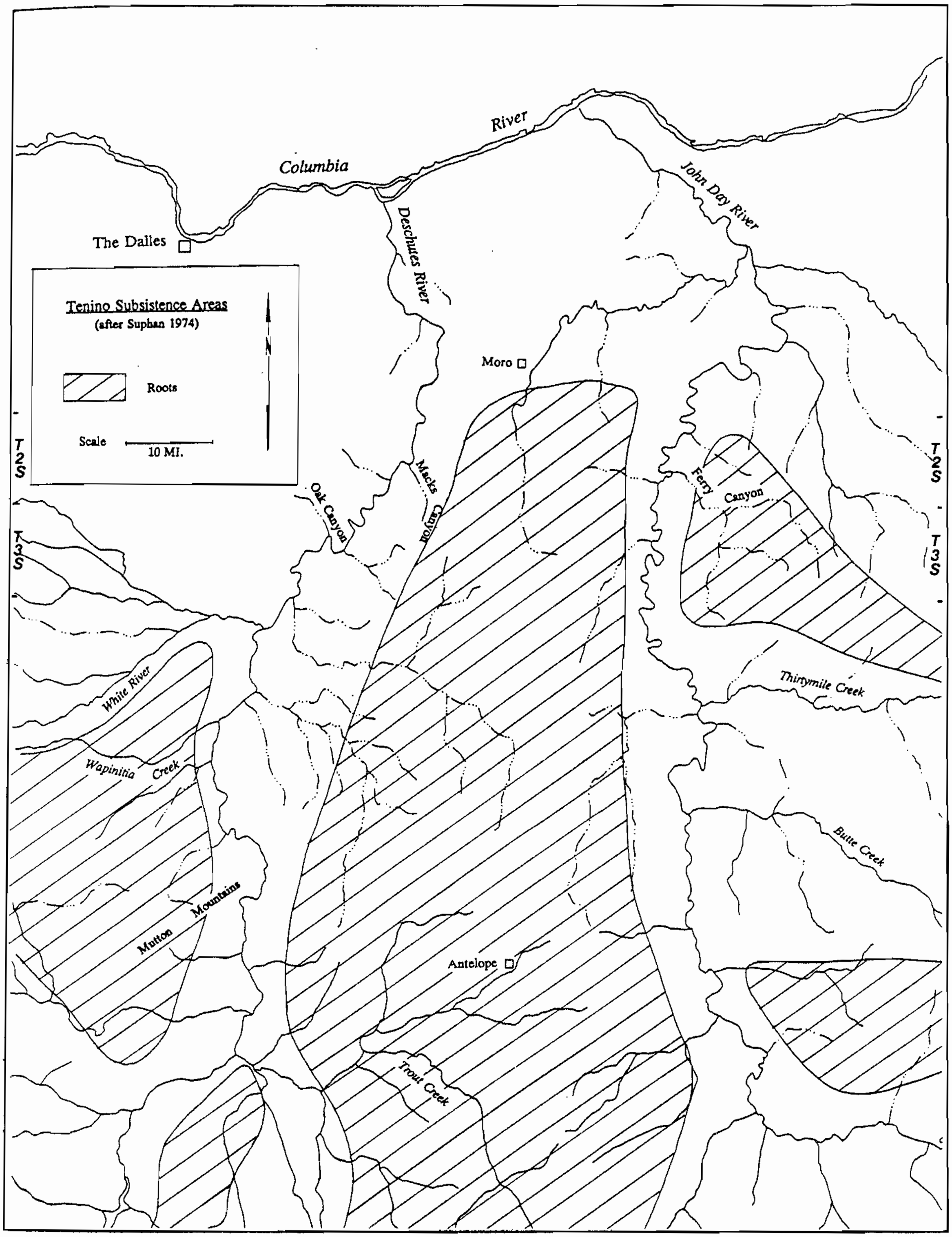


Figure 98. Tenino root-gathering areas (after Suphan 1974).

resources used. This site is, in addition, situated adjacent to a chert source from which much of the raw material recovered in the excavations was thought to have been derived (Cole 1967, 1969).

Site 35WS66, with 13 housepits, is situated at the mouth of Wapinitia Creek, in an area historically used for non-salmonid-fishing (Figure 96), at the northeastern edge of rootgrounds (Figure 98) and within 10 miles of major oak groves (Suphan 1974). 35WS91, the final larger habitation site, with between 6 and 13 depressions, is situated along the Deschutes in a known salmonid-fishing area, and at the edge of the Mutton Mountains, visited historically by Tenino for large game hunting, according to Verne Ray's informants (Suphan 1974:Petitioner's Exhibits No. 404a,c) (Figures 96 and 97). It has already been mentioned that all housepits sites along the lower John Day River fall within Tenino large game hunting territory (Suphan 1974:Petitioner's Exhibit No. 404A) (Figure 97). While these correlations may be purely coincidental, they also suggest that considerations of ecotone and catchment, successfully applied elsewhere in riverine settings (cf. Flannery 1976), may be of some utility in modeling fluvial settlement on the southern Columbia Plateau. They may also be of relevance in addressing the question of winter residential bases, or "villages" in areas like the Pine Creek basin and suggest that an assessment of all available resources may be more fruitful than a focus on one staple food source, be it anadromous fish or roots. The question of Plateau subsistence will be taken up further in the final chapter of this study.

Summary

The ethnographic record of John Day River peoples suggests the use of the Pine Creek basin by logistically organized collectors whose home bases were located elsewhere. The prehistoric house features described in this study, however, as well as the range and nature of activities inferred from their rich archaeological assemblages, indicate that long-term habitation characterized the Study Area, itself, in earlier times. Support for a change in the use of the larger region is also provided by an incongruity in the distribution of ethnographic and archaeological sites along the lower courses of the John Day and Deschutes rivers. Large pithouse sites, or "villages," in particular, appear to be more widespread and plentiful than the ethnographic record would predict.

The uncritical projection of the "ethnographic present" as an analog of the prehistoric past has been disparaged for decades in the archaeological literature (e.g. Ascher 1961; Binford 1967; Chang 1967; Freeman 1968; Yellen 1977; Wobst 1978; Gould and Watson 1982; Wylie 1985). Based on descriptions of native lifeways altered by encounters with Euroamerican newcomers, goods, and diseases, the "direct historical approach" assumes behavioral continuity over space and time, and frequently "prevents the discovery that the postulated similarities do not exist" (Freeman 1968:265). The subject of cultural variability in the Late Archaic of the southern Plateau is the focus of the concluding chapter.

CHAPTER 9

VARIABILITY IN THE LATE ARCHAIC OF THE SOUTHERN PLATEAU

Geographic Variability

Inspired by accounts of early explorers and drawing support from archaeological finds at sites like The Dalles, archaeologists have assigned a key role to salmonids in interpretations of Columbia Plateau prehistory. The intensive use of anadromous fish is seen by some as a hallmark, by others as a catalyst, in the development of the semi-sedentary lifeways which would, ultimately, lead to the great villages and elaborate material culture of the historic record. Both storage and the coordination of production-related activities, causes and/or correlates of large-scale salmonid utilization, are seen as necessary ingredients of this adaptation, referred to variously as the "winter village pattern," the "ethnographic pattern," or, merely, the "Plateau pattern." Only in the past one and a half decades has recognition of the importance of root crops tempered the explanatory emphasis on fishing.

A troubling aspect of claims for intensive salmon procurement is the common absence of archaeological evidence to support them. The variety of post hoc explanations, both cultural and taphonomic, which have been advanced to account for the dearth of appropriate faunal remains and artifactual associations, has been discussed in detail in several summaries (Butler 1987; Schalk 1987). These arguments are only briefly reviewed here, as they bear on the scarcity of fish bone at sites excavated in the Study Area. Butler (1987) examines three common explanations, which address bone fragility, screen mesh size, and butchery practices. She concludes that the first thesis, bone fragility, can be ruled out based on the abundance of fish bone that *has*, in fact, been recovered in some sites. Butler rejects the argument for off-site processing and disposal is rejected due to its reliance on negative evidence and its inherent resistance to falsification. While large screen mesh size may affect the representation of particular taxa and body parts, it does not appear to result in the absence of fish remains, per se, except where bone has been pulverized as a result of processing for consumption. Additional, taphonomic, factors conditioning the preservation and frequencies of fish bone include the scavenging activities of both domestic dogs and other wildlife (e.g. gulls, cf. Schalk 1987:10-10, 10-11).

As discussed in the previous chapter, ethnographic accounts would not anticipate the existence of residential base camps along Pine Creek. In addition, the present sites do not satisfy the expectations of Plateau-wide regional archaeological models which would predict their association, particularly in the case of residential site 35WH14, with greater numbers of anadromous fish remains. Eight fish bones were recovered at 35WH14, while four specimens were identified for 35WH7. It is at present unknown whether or not these represent salmonids. No fish bones were identified from soil samples floated for botanical remains, providing some support, albeit tenuous, for their scarcity. Artifacts typically used in fishing are, similarly, absent. A girdled stone from 35WH7, and a notched pebble from 35WH14, which may have served as a net weight, are the sole potentially fishing-related implements. Bone bipoints, harpoon pieces, and net weights other than the already mentioned specimens are lacking. As in the case of bone, reasons may be advanced to account for this deficiency, including the use of perishable fishing gear and/or its deposition at the procurement site or "location." For now, this cannot be resolved. Several lines of evidence may, however, be mustered in support of a broad-spectrum subsistence orientation by the prehistoric inhabitants of the Pine Creek basin. A discussion of the recovered artifact assemblages will not be repeated here, other than to note the abundance of projectile points and ground stone, reflecting hunting, and, probably, plant procurement. Additional arguments include the character of the available fish resources and the physical location of 35WH14, at present the most likely candidate for a winter residential site in the Study Area. These will now be addressed.

Modern distributional information indicates the presence of several anadromous fish populations in the John Day basin (Fulton 1968, 1970), while prehistoric conditions, before the impacts of hydroelectric dam construction along the Columbia River, and of agriculture, grazing, and mining farther upstream, would have probably been even more favorable. Salmonid populations include steelhead trout (Oncorhynchus mykiss), coho salmon (Oncorhynchus kisutch), chinook salmon (Oncorhynchus tshawytscha). Summer-run steelhead spawn in tributaries of the upper John Day River, as well as parts of Rock, Thirtymile, and Butte creeks (Fulton 1970:Table 3), entering the Columbia River between May and October and spawning during winter and spring (Fulton 1970:3). According to Hancock Field Station Director Joseph Jones (personal communication, 1994), steelhead were also found in Pine Creek before the recent drought (late 1980s and early 1990s) and are currently present in extremely low numbers. Coho salmon, as of 1970, only spawned in a small section of Middle Fork of the John Day (Fulton 1970:Table 5), generally entering the mouth of the Columbia between mid-September and mid-November, and spawning in the fall (Fulton 1970:12).

Chinook salmon found in the John Day include spring and summer runs, which pass through the lower Columbia River from February through May, reach The Dalles Dam between the end of March and early June, and spawn in the main stem, and large and medium-sized tributaries from mid-August to mid-November. As of 1968, the John Day was considered to be a major spawning area for this species, including its upper mainstem, upper North and Middle Forks, Granite Creek, and its tributary, Clear Creek. Past spawning areas are thought to have included many areas of the middle and upper main river and tributaries (Fulton 1968:Tables 1 and 2), including possibly Pine Creek (Joseph Jones, personal communication, 1993). The largest numbers, by far, however, are found in the mainstem of the Columbia and the Snake and Salmon rivers (Fulton 1968:Map 3).

The nature of the salmonid resource in the vicinity of Pine Creek, particularly the limited numbers of fall-run fish, may have diminished its suitability as a focal resource for winter storage (Schalk 1987:1-4). Schalk has observed that native peoples of the Northwest have traditionally favored fall runs for drying or smoking. He attributes this preference to the higher oil content of spring- and summer-run salmon and their arrival at the onset of the hottest months of the year, both of which would increase the likelihood of spoilage (Schalk 1986:13). Of note also is the weight differential listed by Fulton for the three runs of chinook salmon, with averages of 6.8 kg and 6.4 kg for spring- and summer-run individuals, respectively, in contrast to an average of 8.2 kg for fall runs (Fulton 1968:Table 1; cf. also Plew 1983 and Schalk 1986, regarding reduction in nutritional potential of salmonids with increasing distance of migration). It should, finally, be noted that the preparation of spring- and summer-run salmonids for storage would be more likely to conflict with other critical subsistence activities, in particular the procurement and processing of root foods. These considerations suggest that local salmon may have served a complementary, rather than focal role, in the subsistence of the prehistoric Pine Creek peoples. They also underline the importance of considering local conditions in order to assess the applicability of broad, regional generalizations.

The location of 35WH14 provides access to a broad variety of resources. Situated centrally within the Pine Creek drainage basin, this site is located within a comfortable day's walk (Lee 1968) to both the John Day River in the west (ca. seven miles) and the head of Pine Creek in the east (ca. eight miles). This distance spans an elevational range of 3600 feet (from approximately 1300 feet above sea level at Clarno to 4900 feet at Rancheria Rock, just beyond the eastern margin of the basin) and places the site within easy reach of the plant resources of three vegetation zones (shrub-steppe, steppe, and ponderosa pine, cf. Chapter 2), including root foods and firewood. A similar pattern has been observed for selection of winter villages by the Nez Perce, another native Plateau population (Ames and Marshall 1980:32):

> Winter villages ... were occupied during the season of food resource dearth. Economic behaviors focused on maintenance activties and tool-making. Public religious and political activities dominated people's thoughts. Village locations were chosen with an eye for springs, wood, good drainage, lack of spring flooding, easy access to uplands, and so forth, rather than for quick, direct access to a particular resource. Moreover, the deep canyons were simply warmer than upland areas during winter. Consequently, camps were found wherever resource locales were, at all elevations in Nez Perce territory, while villages were restricted to the deep canyons.

Multiple considerations also affected the placement of historic Tenino winter villages. These were "located at a protected interior site where water and wood for fuel were available" (Murdock 1980:129), although the paired winter villages of the John Day Tenino were, as already discussed, still within close proximity of the Columbia River (see Chapter 3).

The central location of 35WH14 is not highlighted to suggest that the Pine Creek basin formed a closed system isolated from surrounding groups. There is no doubt that the ecological variability of the Plateau fostered at an early date the extensive intergroup relations so characteristic of historic times (Anastasio 1975; Walker 1967). The prominent role of trade has been attributed in part to the varying quality of salmon with increasing distance from the Pacific (Griswold 1970, cited in Wood 1972:156). The Dalles fishery, in this context, provided an "... ideal combination of proximity to the ocean (meaning fish are more plentiful and in better condition) and dry, windy climatic conditions that made drying fish easy...." (Schalk 1986:9). As the hub of the "Pacific-Plateau System" (Wood 1972), the annual fall rendezvous in The Dalles-Celilo Falls area attracted visitors from across the Plateau and beyond, who obtained large quantities of dried and pounded salmon "pemmican" in return for local products (see Anastasio 1975:139 for sources).

Trade was probably also conducted on a lesser scale at many smaller localities. Of note is a report that Deer Eater Paiute traded regularly with Tenino residents of Sherar's Bridge on the Deschutes River, providing buckskin and roots in exchange for salmon and horses (Suphan 1974:52). It is likely that trade and exchange leveled local resource imbalances before the introduction of the horse allowed the transport of food stuffs over the extensive distances covered during historic times. In this manner, trade served as "a complement of food gathering" (Walters 1938, cited in Browman and Munsell 1969:262). The presence of dentalium more than 2500 years ago at 35WH14 confirms that the people of the Pine Creek drainage did not, indeed, live in isolation.

The scenario proposed here envisions for the southern Plateau a substantial, but dispersed prehistoric population which utilized the triad of salmon, roots, and game in varying proportions, depending upon local resource availability. It is not unlikely that models based on less riverine-oriented Plateau groups (cf. Anastasio 1975:139) will be more successful in explicating settlement and subsistence patterns in the present Study Area than those based on presumed "direct historical" analogs. As Earl Swanson (1962:84) observed more than thirty years ago, "much of prehistoric-life in the Plateau has been routinely regarded as riverine in character. Interpretation based on such a routine assumption does not lead to new sets of problems."

Temporal Variability

Assumptions of cultural homogeneity on the Columbia Plateau, sustained by the riverine focus of archaeological inquiry, have traditionally been coupled with presumptions of diachronic stability and conservatism (cf. a critical review of this tendency in Schalk 1983b:153 ff.). A consequence of this "normative" view (Schalk and Cleveland 1983) are concepts like the "Plateau pattern," and "the Ethnographic pattern," defined, in particular, by stable, riverine, winter villages of semi-subterranean pithouses, and the pursuit of a logistical adaptive strategy. Whether explicitly or implicitly, this stage or period has been identified with "a relatively static culture in equilibrium with the environment and free from any major external influence" (Browman and Munsell 1969:260-261).

As excavations during the past decade have pushed the age of the earliest pithouses back to beyond four and even five thousand years (Ames and Marshall 1980; Brauner 1976; Campbell 1985; Chatters 1984), their equation with winter villages has been called into question and it has been suggested that succeeding millennia were characterized by a sequence of distinctive adaptive strategies which varied in response to changes in the social and "natural" environment (e.g. Ames 1988b; Chatters 1989). Regional comparisons of radiocarbon dates have, in particular, served to identify discontinuities in occupational histories, which have been correlated with changes in demography (S. Campbell 1990) and residential patterning (Ames 1988b; Chatters 1989), and have been attributed to such causes as epidemic disease (S. Campbell 1990), climate (Reid 1991), and subsistence intensification (Ames 1988b; Chatters 1989). This chapter will conclude with a discussion of the patterning of radiocarbon dates from the vicinity of the Pine Creek Basin, and their correlation with climatic processes and cultural developments from adjacent regions. First, however, some comments on the relationship between environmental change and the archaeological record are in order.

It has become customary to cite the importance of the physical environment in shaping the lives of hunter-gatherers, particularly in the arid West. The extent to which aboriginal settlement in the semi-arid Pine Creek drainage was limited by water is not clear. Today, even given the deleterious effects of a century of intensive grazing, numerous springs supplement the few permanent creeks, and it is possible that, at some time in the past, drainages which are intermittent at present, held water year-round. Extended dry spells may, on the other hand, have served to tether aboriginal peoples to the basin's most permanent water sources.

Ethnographic sources place the Pine Creek drainage within a larger seasonal round that encompassed the entire John Day Basin. As noted above, the area probably never constituted a closed system, even before the introduction of the horse, although center of gravity, reach, and orientation may have shifted through time. Thus cultural developments in the Study Area may reflect environmental changes which were more strongly felt in adjacent areas. This assumption underlies a recent correlation of pulsations in frequencies of radiocarbon dates in the Northern Great Basin and the John Day/Upper Crooked River drainages with alternating wet and dry periods in the Harney Basin, the most immediate source for paleoenvironmental data (Connolly et al. 1993:135-136). Peaks and troughs in calibrated radiocarbon dates are interpreted as evidence for changes in occupation intensity and/or population density which are thought to vary in response to environmental change, although cultural factors are not ruled out. Farther upstream along the North Fork of the John Day River, Reid and Gallison also cite environmental correlates for the chronology of occupation in the Blue Mountains (Reid

1991; Reid and Gallison 1992). Here, both temperature and precipitation are controling factors, with upland occupation limited to the interstade between neoglacial advances.

While correlations between environmental change and cultural behavior are intuitively appealing, and may, in the long run, prove to be valid, the role of environmental processes in the preservation of archaeological sites cannot be ignored. This is of particular importance in canyon settings where sequences of deposition and degradation may expose or conceal archaeological sites by burial or erosion. Thus, prehistoric occupation along the Lower Snake River appears to be most intensive towards the end of periods of aggradation (Early Cascade and Harder phases), while reduced settlement densities (Windust and early Tucannon phases) are associated with early stages of fluvial cycles marked by frequent high-velocity inundation and periodic scouring and redeposition (Hammatt 1977). Hammatt concludes from his study that "Environmental change reflected in geological evidence has affected the cultural past as well as our perception of the past through the archaeological record" (Hammatt 1977:vii). Cautions of this sort must be kept in mind for the Pine Creek drainage, and the limitation of radiocarbon-dated sites to canyon settings in the Study Area is a disquieting reality.

In the following paragraphs, the patterning of radiocarbon dates from the vicinity of the Study Area (Figure 99; Table 36) is examined with reference to the broader, regional paleoenvironmental record and selected cultural developments in adjacent areas. Environmental

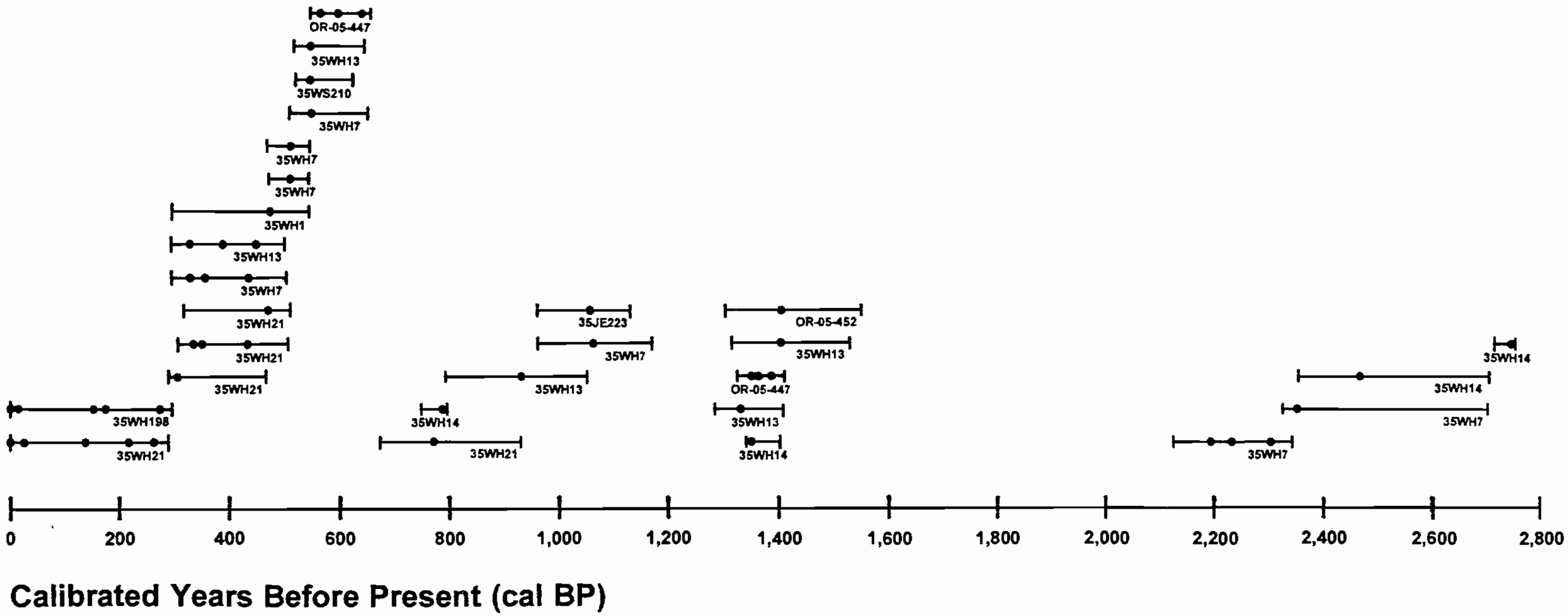


Figure 99. Calibrated radiocarbon dates, Pine Creek basin and vicinity.

Table 36. Radiocarbon Dates and Associated Calibrated Age Ranges, Middle John Day Region

Uncalibrated Date (RCYBP)	Calibrated Date(s)* (cal BP)	Summary Age Range max/min (cal BP) ± 1 sigma	Sample Number	Site Number
140 ± 75	261, 218, 137, 25, 0	282-0	QC-464	35WH21
190 ± 60	275, 173, 152, 7, 0	293-0	Beta-14338	35WH198
300 ± 75	309	465-286	QC-136	35WH21
335 ± 90	427, 386, 321	500-292	QC-465	35WH13
350 ± 90	434, 359, 329	504-296	GaK-2727	35WH7
360 ± 80	439, 350, 334	504-303	GaK-3867	35WH21
390 ± 65	472	508-317	QC-138	35WH21
400 ± 150	477	543-293	WSU-300	35WH1
468 ± 80	511	542-471	GaK-2176	35WH7
470 ± 90	512	545-467	GaK-3309	35WH7
550 ± 50	542	623-519	Beta-14335	35WS210
570 ± 80	547	645-517	GaK-3866	35WH13
580 ± 120	550	657-509	GaK-2726	35WH7
630 ± 60	640, 597, 565	655-547	Beta-14337	OR-05-447
875 ± 115	765	925-670	QC-134	35WH21
890 ± 20	782	789-742	A-2604	35WH14
1020 ± 100	933	1052-791	QC-791	35WH13
1140 ± 70	1057	1130-960	Beta-14336	35JE223
1160 ± 90	1062	1171-960	GaK-2728	35WH7
1460 ± 100	1331	1412-1285	QC-135	35WH13
1500 ± 25	1354	1402-1341	A-2602	35WH14
1510 ± 60	1387, 1364, 1359	1416-1321	Beta-14339	OR-05-447
1545 ± 100	1407	1533-1318	QC-137	35WH13
1550 ± 130	1409	1553-1303	Beta-14340	OR-05-452
2230 ± 90	2306, 2237, 2199	2342-2123	GaK-2725	35WH7
2380 ± 100	2352	2706-2326	GaK-2177	35WH7
2450 ± 40	2468	2708-2358	A-2603	35WH14
2580 ± 40	2742	2750-2719	A-2605	35WH14

* calibrated dates and age ranges calculated using the intercept method (Stuiver and Pearson 1993)

information is drawn from studies of local woodrat middens within the Pine Creek drainage (Croft 1989), Great Basin and Columbia Plateau pollen records (Barnosky 1985; Bartholomew 1982; Mehringer 1985; Wigand 1987; Reid et al. 1989), sequences of floodplain development reported from the upper Columbia and lower Snake rivers (Chatters and Hoover 1986, 1992; Cochran 1978; Cochran and Leonhardy 1981; Hammatt 1977), and glacial histories from the Wallowa Mountains (Kiver 1974). Inconsistencies between the pollen records of the southern Columbia Plateau and the northern Great Basin suggest the difficulty of correlating sequences from different regions and extrapolating to intervening areas, while elevational differences in vegetation histories reflect the differences in the autecology of plants and their reponses to climatic change (Davis et al. 1986). While Croft's woodrat midden analyses present data from the Pine Creek basin, itself, they represent isolated points in time and space which should be supplemented by more extensive, diachronic environmental studies.

The importance of changes in seasonality of precipitation and temperature, as well as changes in temperature and precipitation, per se, has been emphasized (Davis 1982). Identification of causal linkages between fluvial processes and climate is controversial and relationships may differ over the length of a river as well as between tributary and trunk channels, not to mention between major drainage systems, suggesting the prudence of identifying discontinuities rather than extrapolating to tendencies for aggradation or degradation (Knox 1983). The absence of long-term Holocene paleoenvironmental studies from the John Day Basin itself, as well as the lack of information on the depositional history of the sites discussed in this study constitutes an, at present, insurmountable obstacle to the testing of models such as that proposed by Connolly et al. (1993). The environmental information presented below is selective in its focus on changes observed at particular periods of interest and is not meant to represent a comprehensive treatment of climate and biogeography. Its intent is to suggest correlations which must be tested as part of continuing research in the region. No *causal* relations can be demonstrated without considerably better data, both cultural and environmental.

In spite of questions regarding the timing and synchronism of climatic transitions and the role of local latitudinal and physiographic conditions, Holocene climates of the Far West are frequently characterized in terms of the three-part sequence proposed by Antevs (Antevs 1948). In his model, Antevs envisions three broad stages, including a cool moist early Holocene Anathermal (9000-7000 B.P.), a warm and dry Altithermal (7000-4500 B.P.), and essentially modern conditions during the Medithermal (4500 B.P. to present). While this view masks considerable variation within the so-called stages, the general sequence has been supported by more recent studies (Mehringer 1985; however cf. Barnosky 1985).

Middle Archaic Occupations

The earliest occupation in the Study Area is represented by four sites and one isolate recorded during the Pine Creek Archaeological Survey (Endzweig 1990), none of which are radiocarbon dated. While the degree of confidence in their age assignment is therefore variable, the sites share commonalitites that set them apart from the later, excavated sites. All are situated at relatively high elevations (2840-3860 m) around the margins of the drainage basin, well away from Pine Creek. An apparent focus on mesic, springside settings has also been noted (see Chapter 4). While one of the recorded sites may incorporate Early

Archaic deposits (35WH168), the rest appear to be of Middle Archaic age. Accepting the existence of a mid-Holocene drought, it can be postulated that ephemeral streams dried up, leading to a focus of both humans and certain food resources on the most permanent sources of water. Sites along Pine Creek would most likely have either been buried or eroded, given riverine conditions observed elsewhere (Chatters and Hoover 1986; Hammatt 1977). Both cultural decisions and site formation processes should favor the preservation of early sites in settings comparable to 35WH166 and 168 on the tablelands of the basin margins.

Late Archaic Occupations: Before 1550 B.P.

Figure 99 shows all available radiocarbon dates from the vicinity of the Study Area, including 21 dates from the Pine Creek basin, six from the Muddy Creek drainage to the southwest (courtesy of Prineville Bureau of Land Management), and one from Butte Creek to the north (Chatters 1968). All have been calibrated, and multiple intercepts have been included as well as bars marking the limits of one standard deviation (Table 36). In spite of the larger sample and range of possibilities created in this manner, the clustering of dates, previously observed for uncorrected ages (Endzweig 1992:22), is retained. Radiocarbon dates are grouped between roughly 2800 and 2100 cal B.P. and between approximately 1550 cal B.P. and 300 cal B.P. The second concentration can be further subdivided into three groupings: from 1550-1300 cal B.P., from 1200-650 cal B.P., and from 650-300 cal

B.P. Two dates (one of which, QC-464, was rejected by researchers and not published as a result) fall after 300 cal B.P. and may be modern in age. It should be noted, as a caution, that the two earliest ages from 35WH7 were obtained on dart shafts from a single cache. The potential spread of these dates serves as a disconcerting reminder of the potential imprecision inherent is this kind of information.

The earliest radiocarbon-dated occupations in the Pine Creek Basin and its vicinity at present coincide with the inception of the Wildcat Phase at 35GM9 (Dumond and Minor 1983) and the Harder Phase on the lower Snake River (Leonhardy and Rice 1970). While not associated with the earliest pithouses on the Plateau, the period bracketed by about 3000 and 2500 B.P. does appear to coincide with the appearance of pithouses and pithouse villages in the lower mid-Columbia River region (Schalk and Cleveland 1983:33), as well as with a shift towards "longer-term and expanded habitation and use of non-riverine upland environments" (Galm 1990:n.p.). A shift from supra-annually mobile, broad-spectrum foraging (Pithouse I, ca. 4500-3770 B.P.) to a collector-type orientation (Pithouse II, after 3300 B.P.) is postulated for the southern Plateau based primarily on findings from the upper mid-Columbia drainage (Chief Joseph and Wells reservoirs) (Chatters 1989). Diverse, functionally differentiated site types are thought to reflect a highly logistical system or site complex (Nelson 1969), with mobility high at a subannual level, but reduced on a supra-annual scale, as reflected in repeated reuse of the same houses (Chatters 1989). This transition is thought to have taken place sometime between 2700 and 3300 B.P. (cf. Chatters 1984, 1989). Present evidence is insufficient for the firm identification of any one particular strategy (Pithouse I or II) at Pine Creek, and it remains to be seen if the developments observed elsewhere are paralleled in the John Day Basin.

Regional paleoenvironmental records, though by no means in complete agreement, suggest that the earliest radiocarbon-dated occupation of the Pine Creek basin coincides with the gradual transition from cooler and moister conditions succeeding the arid middle Holocene to a period of somewhat warmer and drier conditions. A "brief but significant" drought at about 2900 B.P. is indicated by pollen and sediments at Diamond Pond (Wigand 1987), and plant macrofossils from woodrat middens at Cove Creek reflect warm and dry conditions between 2970 ± 80 B.P. and 2740 ± 50 B.P. (Croft 1989), or between 3145 and 2797 cal B.P. Glaciers in the Wallowas may be in retreat after advancing between 4500 and 2600 B.P., though this advance is not always recognized (Kiver 1974). A period of relative quiescence between 3900 and 2400 B.P., is inferred from fluvial stratigraphy in the Wells Reservoir area and correlated with a period of cold winters, cool summers, and high, winter-dominant precipitation. Declining precipitation and warmer conditions after 2400 B.P. are associated with decreasing vegetation density, the erosion of sediments in mid-basins, and aggradation of the modern floodplain (Chatters and Hoover 1992). Along the lower Snake River, depositional conditions between 4000 and 2500 B.P. are succeeded by a period of alluvial quiescence, vegetational cover and soil formation between 2500 and 1500 years ago (Hammatt 1977:185). Finally, evidence for the appearance of bison in the archaeological record of the Columbia Plateau, beginning at 2500 B.P. (Schroedl 1973), may indicate the development of grassland conditions favoring this species.

A distinct gap in radiocarbon dates from the vicinity of the Study Area spans the 550 years from about 2100-1550 cal B.P. Occupation, as reflected in calibrated radiocarbon dates from the upper John Day drainage (Table 37) appears to continue in the Blue Mountains. This period corresponds to the middle subphase of the Wildcat Phase at the Wildcat Canyon Site, to which all houses at this site (both pithouses and other) have been assigned. Farther upstream along the Columbia River, occupation along the major rivers declines sharply between 2500 and 1600 B.P., while activity intensifies in the central Columbia Basin, where hunting, rootgathering, and lithic quarries and processing sites are common (Chatters 1984; Galm 1990). Radiocarbon dates from the Snake River drainage suggest that occupation of river canyons between 2600 and 1600 B.P. is less continuous than use of adjacent uplands (Reid 1991:29).

Environmental conditions at Diamond Pond show a drying trend between 2000 and 1400 B.P. in the northern Great Basin (Wigand 1987), while, as already mentioned, warmer winters and summers, with declining, winter-dominant precipitation between 2400 and 1800 B.P., are inferred from the sedimentary record of the Wells Reservoir area (Chatters and Hoover 1992). Aggradational conditions before 2000 B.P. in the Vantage region of central Washington are followed by erosion shortly before 1700 B.P. (Cochran 1978).

Table 37. Radiocarbon Dates and Associated Calibrated Age Ranges, Upper John Day Region*

Uncalibrated Date (RCYBP)	Calibrated Date(s)# (cal BP)	Summary Age Range max/min (cal BP) ± 1 sigma	Sample Number	Site Number
140 ± 70	261, 218, 137, 25, 0	281-0	Beta-26734	35WH122
210 ± 60	281, 164, 157, 1, 0	299-0	Beta-11218	35CR29
280 ± 90	303	463-0	Beta-26733	35WH122
880 ± 80	774	914-695	Beta-14866	35GR159
960 ± 60	913	934-785	Beta-61470	35GR572
1020 ± 100	933	1052-791	Beta-26731	35WH122
1030 ± 70	936	978-913	unknown	35GR1507
1430 ± 90	1309	1398-1278	Beta-36749	35WH122
1430 ± 120	1309	1409-1265	Beta-26732	35WH122
1480 ± 60	1345	1406-1303	Beta-61468	35GR572
1560 ± 60	1412	1523-1354	Beta-61469	35GR572
1690 ± 90	1561	1702-1511	Beta-14218	35GR162
1780 ± 50	1701	1729-1614	Beta-61472	35GR572
1870 ± 70	1815	1875-1710	Beta-14216	35GR148
1910 ± 80	1862, 1852, 1835	1931-1727	Beta-9709	35CR29
1950 ± 60	1878	1945-1825	Beta-10018	35CR29
2150 ± 80	2130	2307-1999	Beta-14215	35GR148
2210 ± 60	2296, 2265, 2154	2323-2130	Beta-14220	35GR148
2260 ± 90	2317	2347-2142	Beta-61471	35GR572
2360 ± 90	2348	2469-2322	Beta-48485	Crane Flats
2490 ± 70	2707, 2628, 2599, 2496	2735-2362	Beta-14219	35GR162
2490 ± 70	2707, 2628, 2599, 2496	2735-2362	Beta-10514	35CR29
3430 ± 200	3686, 3663, 3650	3923-3461	unknown	35CR616
4030 ± 190	4512, 4473, 4449	4827-4235	Beta-14865	35GR162
4370 ± 70	4873	5036-4855	unknown	35GR1507

* Middle and Late Archaic dates only
\# calibrated dates and age ranges calculated using the intercept method (Stuiver and Pearson 1993)

Late Archaic Occupations: After 1550 B.P.

Evidence for radiocarbon-dated occupations is once again present after 1550 cal B.P., from two sites in the Pine Creek drainage (35WH13 and 14) and two sites in the Muddy Creek basin. Occupations at 35WH13 have been interpreted as an intensive, communal, seed-processing location (Mazany 1980:10), while occupations at 35WH14 appear to have continued the early pattern of residential use, albeit with houses built in saucer-shaped depressions rather than steep-walled housepits. Both Muddy Creek radiocarbon ages date charcoal recovered from house depressions (project records, Prineville District BLM). Once again, there appears to be no break in the occupational history of the Blue Mountains. Reoccupation of the Middle John Day coincides with renewed occupation of the upper mid-Columbia (Chatters 1984). Changes observed after 1500 B.P. across the Columbia Plateau include a slight increase in average house size, an increase in number of dwellings per community, the presence of large, communal structures, and a larger number of features identified as attendant structures (Galm 1990:n.p.).

Utilization of the Study Area continues, with a brief hiatus between approximately 1200 and 1300 years ago. While this short gap in the radiocarbon record would appear to be of minimal import, it coincides with a 250-year interruption in the Blue Mountains record (ca. 1050 to 1300 years ago), and should therefore perhaps not be dismissed out of hand. The dispersion of radiocarbon ages in the Study Area between 1200 and 650 cal B.P. is greater than that of the preceding subphase and includes one date of uncertain association from 35WH7, as well as a date which is thought to be transitional between the two main occupational components at 35WH13 (Mazany 1980:10). The remaining dates are from a house floor at 35WH21 (project files, Oregon State Museum of Anthropology), from a house in the Muddy Creek drainage (project files, Prineville District BLM), and from the slab-lined hearth at 35WH14.

Re-expansion of grasses at Diamond Pond indicates moister conditions in this part of the Northern Great Basin from 1400-1000 B.P. (Wigand 1989), while 1000 B.P. marks the end of the Prospect Lake glacial stade in the Wallowa Mountains (1800-1000 B.P.) (Kiver 1974).

Erosional conditions mark the final phase of an alluvial cycle dating from after 4200 B.P. to sometime before 1550 B.P. in the vicinity of the Ladd Canyon sites in northeastern Oregon. A similar cycle is recognized for the Clearwater, Snake, and Columbia Rivers (Cochran and Leonhardy 1981).

Several dry spells characterize the most recent millennium of the environmental record. An extended dry interval is identified for Clear Lake in the channeled scablands of southeastern Washington between approximately 900 A.D. and the late 14th century (Bartholomew 1982). This finding is consistent with dramatically increased sedimentation rates observed between 1020 A.D. and 1390 A.D. along the upper Columbia River, which are attributed to atmospheric warming and resultant melting of snowpacks (Chatters and Hoover 1986). Major droughts are in evidence at 700 and 500 years ago at Diamond Pond (Wigand 1989).

Macrofossils from a packrat midden in Indian Canyon suggest that roughly modern conditions existed in the Pine Creek basin by about 300 B.P. (Croft 1989). Moister conditions in the Northern Great Basin after the preceding drought are, similarly, indicated by re-expansion of juniper and grasses at Diamond Pond (Wigand 1989). The establishment of modern depositional conditions may occur somewhat earlier along the upper Columbia, where reconstructed flood frequencies approximate those expected under current conditions by 1390 A.D. (Chatters and Hoover 1986). In the Wallowa Mountains, glaciers advance during the last 400 years in what is known as the Eagle Cap Stade (Kiver 1974), corresponding to the period known as the Little Ice Age (Bartholomew 1982).

The final major period of occupation in the Study Area extends from approximately A.D. 1300 to 1650 and is represented at 35WH7, 35WH13, and 35WH21 in the Pine Creek basin, two sites in the Muddy Creek drainage, and one site along Butte Creek (see Chapter 4). Radiocarbon-dated features include house depressions at 35WH7, 35WH21 and the two Muddy Creek sites, and a burial at Butte Creek Cave. The dated occupation at 35WH13 is interpreted as representing a generalized hunting and gathering economy, in contrast to the earlier focus on plant processing at this site (Mazany 1980:10). Only a single date from Mitchell Cave may fall within the second half of this period, suggesting a decline in occupation of the Upper John Day drainage. This time span falls within the Quinton Phase, which, as defined by Dumond and Minor at the Wildcat Canyon Site, begins at A.D. 1000 and terminates with the appearance of heavy Euroamerican influence (Dumond and Minor 1983:163). Calibration of radiocarbon dates used to define its inception may, in fact, place the beginning of the Quinton Phase between A.D. 1250 and A.D. 1300 (Oetting 1993a). The inception of the Piqúnin Phase along the lower Snake River at about A.D. 1300, in addition (Leonhardy and Rice 1970), suggests potentially more widespread cultural developments at this time.

The inception of the Quinton Phase is marked by several cultural changes (Dumond and Minor 1983:165). Use of the Wildcat Canyon Site as a winter village appears to have ceased, with habitation limited to the type of mat-covered temporary dwellings characteristic of summer occupation documented in the ethnographic record. A shift in the nature of the projectile point assemblage, represented in particular by the proliferation of Pin Stem points, is interpreted as a reorientation of cultural interactions downstream towards the Lower Columbia River, rather than upstream towards the Columbia Plateau, "... as a once homogeneous Plateau population developed smaller, divergent regional spheres of communication with the advent of stable village living and the inevitable passage of time" (Dumond and Minor 1983:165). The introduction of notched netsinkers during the most recent subdivision of the Wildcat Phase, and their continued use during the Quinton Phase (Dumond and Minor 1983:129-131) suggests a change in fishing technology and method of procurement.

Occupation of the Morris Site, a prominent John Day River spring and summer residential and fishing location linked to the Wildcat Canyon Site and the Columbia River by way of a two-mile long overland trail, all but ceases at roughly this time (A.D. 1200; Schalk 1987). Schalk (1987:10-24) relates these settlement changes to a regional trend towards aggregation of dispersed pithouse hamlets into larger villages, citing, as examples, Miller Island (Strong et al. 1930), 45BN53 in the McNary Reservoir (Osborne 1957), and Strawberry Island on the lower Snake River (Cleveland et al. 1976; Schalk 1983b). He postulates a "broader regional process of centralization of settlements and intensification of subsistence systems" (Schalk 1987:10-27). This conclusion is compatible with Dumond and Minor's interpretations of the projectile point assemblage.

The introduction to 35GM9 of a new fishing technology associated with well delineated, fast water channels (Gard 1991), and the abandonment of a traditional fishing site coincide roughly with two environmental "anomalies." The occurrence of drought conditions between approximately A.D. 900 and the late 14th or mid 15th centuries has been noted above. An additional event is represented by the Bonneville Landslide, which is now dated to about A.D. 1120 (Minor 1984). The role of the landslide in renewing salmon runs and its resulting contribution to the origins of the winter village pattern have been evaluated and rejected since the formulation of this model almost thirty years ago (Sanger 1967). Environmental factors, however, may nonetheless have some impact on Columbia River salmon runs, as discussed here by Schalk (1987:10-22):

> As originally proposed by Sanger, then, this model is no longer viable. Elements of the model, however, can be salvaged and incorporated into rather different scenarios that may still be of some scientific utility.
>
> One possibility is that although salmon may not have been entirely blocked from the Plateau at any time during the Holocene, climatically induced changes in runoff might have influenced the abundance and/or diversity of runs by making the passage of the falls more difficult. Fall runs coincide with the annual lows in runoff and it is not inconceivable that these runs might have been blocked to some degree prior to 850 B.P.... The absence of these runs undoubtedly would have had a profound effect on the aboriginal occupants of the Middle Columbia inasmuch as these were the primary runs exploited for the winter supply of stored fish. If the Cascade landslide at 850 B.P. or still earlier Holocene landslides in the Columbia Gorge permitted runs of fall chinook to become established in the Plateau, there can be little doubt that substantial reorganization of regional subsistence systems would follow.

Recent modeling of the anticipated impacts on Columbia Basin salmonids of a warmer, drier, Altithermal-type climate (Neitzel et al. 1991), does, in fact, indicate generally adverse impacts for chinook salmon in streams arising east of the Cascades (it should be noted, however, that these conditions may actually enhance steelhead populations, for which freshet timing is not critical).

Summary of Environmental Associations

The most obvious environmental associations to be noted for the first thousand years of the radiocarbon-dated record for the Middle John Day are its initial occupation at the transition from relatively moist to drier conditions, and the absence of dated components from the following drier period. The apparently continuous use of the Upper John Day drainage during this period has also been noted and parallels the pattern of radiocarbon dates from the Snake River and adjacent uplands, as indicated above. In discussing the observed decline in sites along the upper Columbia River (Priest Rapids to Grand Coulee), Chatters (1984:120), suggests three potential causes, including "selective erosion of sites due to renewed downcutting by the rivers; a population decline caused by abrupt, wholesale change in the environment, and a shift in foraging emphasis away from the river." Any or all of these explanations may explain the patterning of occupation observed in the Study Area.

Renewed evidence for occupation of the Pine Creek basin at approximately 1550 years ago coincides both with ameliorating moisture conditions and the end of an erosional episode which has been observed across the southern Plateau. Functional changes in site use near the mouth of the John Day River suggest that cultural, as opposed to merely taphonomic, processes may be operating, as does a roughly parallel increase in occupation of the northern Great Basin (Connolly et al. 1993). Almost continuous occupation of the Study Area (with a brief, possibly spurious interruption) correponds to a larger gap in the record from the upper John Day, and a population peak in the Northern Great Basin between 1250 and 1000 years ago. The latter has been attributed to an increase in effective moisture (Connolly et al. 1993). A redistribution of population may also be related to upland glaciation and its impact on local resources (cf. Reid and Gallison 1992).

An apparent increase in use of the Study Area and its vicinity has been observed between approximately 650 and 300 years ago. A concurrent decline in numbers of radiocarbon-dated sites in the Northern Great Basin has been related to drying conditions (Connolly 1993), though paucity of evidence for use of the Upper John Day region is curious, given this scenario. A tendency towards centralization of settlements and intensification of subsistence systems has been observed elsewhere on the southern Plateau. It is likely that both increased populations and deteriorating environmental conditions contributed to late prehistoric developments preceding the arrival of Euroamericans on the Plateau.

Proto-Historic Developments and the Question of Epidemic Disease

The abrupt decrease in radiocarbon dates from the Pine Creek basin after 300 years ago suggests reduced use or abandonment of the area. It is corroborated by the near-absence of Euroamerican artifacts at recorded sites. The single glass trade bead at 35WH13, which was probably part of a larger, more traditional bone necklace, and two rolled copper beads from the same site (Gannon 1978), constitute the only evidence of Euroamerican influence at present. Rather than direct contact, they probably represent rare trade goods which may have been acquired at considerable distance from the Study Area and passed along through "down-the-line" exchange with native intermediaries (Renfrew 1975), eventually making their way to Pine Creek peoples. Assemblages which show a more thorough integration of aboriginal and introduced material culture, reflecting intensive Euroamerican contacts (e.g. Endzweig 1985), are absent. While the paucity of late radiocarbon dates may be the result of sampling bias due to a change in the location of sites, this is felt to be unlikely, given the regional scope of the phenomenon, which extends south beyond the Study Area to the upper reaches of the John Day and the northwestern margins of the Great Basin (Connolly et al. 1993).

In a previous publication (Endzweig 1992), the author tentatively proposed a causal relationship between the introduction of European epidemic diseases and the apparent population decline in the Pine Creek basin. Direct evidence from burial populations in the region is rare and not likely to become available in the near future. Indirect evidence for the spread of introduced diseases has, however, recently also been presented for the Columbia River Gorge to the northwest, supporting this hypothesis. Minor and Walker (1993) document the replacement of circular, semi-subterranean habitations characteristic of Plateau peoples by Chinookan-style rectangular plank houses in the Bonneville area (the former Cascades of the Columbia) at about 1650 A.D., coinciding with a change in mortuary patterns. Challenging traditional views of a long time-depth for Chinookan speakers in this area, the authors (1993:12) postulate a late appearance of a Chinookan pattern (and a Northwest Coast pattern in general), and cite B. Rigsby's linguistic evidence for a spread, "in recent centuries," (Rigsby 1965:250) of Lower Chinookans upriver to the Dalles region. The authors suggest that "the hypothesized Chinookan expansion was made possible by a catastrophic decline in the native population living upstream along the Columbia River as a result of the introduction of epidemic diseases" (Minor and Walker 1993:13), a conclusion that is supported by mortality profiles from a late period cemetery near The Dalles, Oregon (Hemphill 1990).

Uncertainty exists regarding the timing and spread of post-Columbian introduced epidemic diseases throughout native North America. Recent studies, stimulated in particular by Dobyns' arguments for an early 16th century North American smallpox "pandemic" (Dobyns 1983), favor an earlier and more rapid spread of disease prior to actual face-to-face contact, associated with devastating impacts on native populations (cf. Verano and Ubelacker 1992 and sources). Views similarly differ on the spread of European infectious diseases on the Columbia Plateau. Based on an exhaustive and meticulous examination of documentary sources, Boyd (1985) assigns the earliest introduced epidemics in the Pacific Northwest to the 1770's. A Plains origin is considered to be most likely for the outbreak of smallpox on the Columbia Plateau (Boyd 1985:91-92), its spread facilitated by several factors, including the establishment of trading posts and the increased mobilty and intertribal contacts acquired through the introduction of the horse around 1730 (Haines 1938).

Campbell, alternatively, postulates severe depopulation as early as the 16th century for the northern Columbia Plateau. Based on archaeological data from the Chief Joseph Reservoir, Campbell compares temporal trends in several estimator variables thought to measure population change, including component number and area, numbers of structured features, and accumulation of shell and animal bone. Campbell identifies an abrupt decline in population between A.D. 1475 and 1525, which she attributes to the proposed North American smallpox pandemic of 1520. The strength of Campbell's conclusions is, however, compromised by the ambiguity of calibrated radiocarbon age ranges, the inclusion of riverine sites only (although Campbell does not consider this to be a problem, cf. S. Campbell 1990:108), changes in the proportions of site types which are correlated with changes in several of the estimator variables, and the inception of several of the observed trends well before A.D. 1500. Pending additional studies, the question of 16th century epidemics on the the Columbia Plateau must remain open.

The archaeological records of the Study Area and the Columbia Gorge may, however, reflect the impacts of epidemic disease sometime after A.D. 1650, later than Campbell proposes, but earlier than suggested by the historical accounts. In the absence of evidence for depopulation at the mouth of the Columbia River, the Great Plains represents the most likely origin. The appearance of infectious diseases on the Middle Missouri during the 17th century has been postulated on the basis of both archaeological (Ramenofsky 1987) and osteological evidence (Owsley 1992). Osteological data, in particular, suggest high mortality rates among Middle Missouri villagers in the first half of the century (Owsley 1992), providing a possible source for transmission to the Columbia Plateau. This would predate the introduction of horses to the Plateau. As trade connections have linked the Middle Missouri and the Pacific-Plateau systems for thousands of years (Erickson 1990; Swagerty 1988; Wood 1972), the claim that "In pre-horse times it is probable that the northern Rockies had served as an effective barrier to inter-tribal contact and cultural diffusion between the Plateau and the Plains" (Boyd 1985:93) seems difficult to support.

It has been suggested, with regard to native Plateau peoples, that

> the economic base of collecting, adapted to short-term fluctuations in resource abundance, and a flexible social organization and settlement pattern contributed to overall adaptability such that not only populations, but traits of cultural organization, survived (Campbell 1985:187).

But several aspects of Plateau life may have also made the population eminently vulnerable. The large riverine villages of the Columbia-Snake River system and its major tributaries satisfy Dobyns' predictions that denser, riverine-lacustrine horticultural peoples will be more severely affected than more mobile and scattered "backlanders," who rely more on hunting and gathering than on cultivated foods (Dobyns 1983:306-310). While not horticulturally based, it is likely that Plateau fishing villages would have provided a similar reservoir for the spread of new diseases, exacerbated by additional large gatherings at rootgrounds and trade centers such as The Dalles and Kettle Falls (cf. Dobyns 1992).

Drawing on historical documentation and studies from the Caribbean culture area, the Southeastern United States, the American Southwest, and the northern Great Plains, Dobyns postulates a widespread common pattern of response to depopulation by native peoples in North America. He envisions four major features, including abandonment of settlements located in marginally productive environmental niches, migration to environments that were more productive in terms of the basic subsistence technology of the peoples involved, amalgamation of survivors of abandoned settlements into a diminished number of continuing or new ones in an attempt to maintain a number of inhabitants culturally defined as proper by each group, and amalgamation of survivors of diverse lineage and even ethnic origins into a diminished number of polities (Dobyns 1983:11).

It has been suggested that widespread depopulation may explain the historic Native American population distribution on the southern Plateau, in particular its focus on the predictable salmon runs of the Columbia and Snake rivers (S. Campbell 1990). The appearance of Numic-speaking peoples (Dobyns' "backlanders?") may have reinforced changes set in motion by the processes already discussed. While the timing is uncertain, their arrival probably does not exceed the 300-year limit proposed for Lake Abert, ca. 250 km to the south, based on archaeological settlement patterns, material culture, and oral traditions (Oetting 1989). This is consistent with archaeological evidence from the Study Area, which appears to reflect a prehistoric Plateau affiliation of some time depth. The nature of protohistoric Numic expansion is clouded by difficulties in identifying the various players involved (including conflicting designations, such as Bannocks, Paiute, and Snakes), and disagreement over the role of the horse as well as the timing of its acquisition (Arkush 1990; Suphan 1974:206; Sutton 1986). Although threats by mounted predatory Shoshoneans may have been a common feature of the 19th century (Layton 1981; Sutton 1986), it is alternatively possible to envision the gradual expansion of pedestrian Paiute into lands vacated in the wake of preceding epidemics. The subject of introduced epidemic diseases among Great Basin peoples is, at present, not well understood (Beck and Jones 1992; Grayson 1993:271-272), and must be further explored in order to fully comprehend proto-historic developments at the Great Basin-Plateau interface.

Summary and Conclusions

The preceding chapters have been concerned with the Late Archaic of the drainage of Pine Creek, a small tributary of the John Day River. Two excavated sites, Cove Creek 2 (35WH7) and the Pine Creek Village Site (35WH14) have been discussed in detail. Evidence for the existence of substantial pithouses at 35WH14 more than two and a half millennia ago has been presented, and has been suggested to reflect winter, if not longer-term, occupation at this date. Concurrently, 35WH7, about five miles distant, seems to have experienced only ephemeral use for the caching and refinishing of hunting equipment. At some time during the intervening period, this pattern appears to have changed, although exactly when and why, is not clear. By 1500 B.P., semi-subterranean houses built in steep-sided pits at 35WH14 may have been replaced by structures built in large, dished depressions. A large and diverse assemblage suggests that long-term occupation persisted, and limited evidence for late winter through summer occupation has been presented.

The nature of occupations in the interval between 1500 B.P. and 600 or 650 B.P. is difficult to ascertain. The presence of the very substantial, slab-lined hearth at 35WH14 suggests some degree of permanence, though information on house features is not present. A date of 1160 B.P. also indicates some use of 35WH7 during this time. Evidence from other sites in the Pine Creek basin (see Chapter 4) documents a transitional occupation between two major periods of site use at Indian Canyon 2 (35WH13), and house construction at Jones Canyon

(35WH21). A compatible date was also returned from a housepit in the nearby Muddy Creek drainage.

A cluster of radiocarbon dates from the Study Area and its vicinity, beginning at approximately 600 or 650 B.P., coincides with the major radiocarbon-dated use of 35WH7, and less intensive occupation of the Pine Creek Village Site. Evidence for a small dwelling dated to 470 B.P. at 35WH7 has been discussed, and radiocarbon dates, features, and artifact assemblages suggest that a second such house or shelter may have been present. A terminal date of about 350 B.P. is correlated to an increase in point styles indicating increasing extra-regional ties, including Pin Stem points with affinities to the lower Columbia River and specimens which are identical to Desert Side-Notched type of the Great Basin. An abrupt decline in radiocarbon-dated occupation is observed at about 300 B.P., corresponding to an almost complete absence of Euroamerican trade goods at sites in the area.

The incongruities between archaeological evidence and the ethnographic record for the area have been discussed and a more broad-spectrum prehistoric adaptation has been proposed. It is likely, as S. Campbell has proposed (Campbell 1990), that the lifeway observed during historic times is a consequence of the upheaval caused by introduced epidemic diseases and the resulting reduction and reorganization of native populations in the region. However, clearly, the Late Archaic prehistory of the Columbia Plateau has not been without significant, internal change, precluding reference to an all-encompassing "Plateau pattern."

Situated at the transition between Deschutes-Columbia Plateau and Blue Mountains physiographic provinces, and at the historic cultural interface between Plateau and Great Basin peoples, the Study Area is perhaps particularly well-suited for the elucidation of cultural manifestations which are less "typical." Archaeological assemblages and chronological developments, however, indicate strong ties to the larger Columbia Plateau, and suggest that what is truly needed, is a greater effort to sample and understand the prehistoric variability of this region.

APPENDIX A

DESCRIPTIVE ATTRIBUTES AND PROVENIENCES FOR SELECTED ARTIFACT CLASSES, 35WH7

Table 38. Attributes and Dimensions of Classified Projectile Points, 35WH7[1]

Spec. Number (CC2-)	Type	Variety	Raw Mat.	Status	Unit	Level	Level Elevation	Spec. Elev.	Length	Width	Thick-ness	Base Width	Neck Width	Stem Length	Weight
29	CB2		CCS	C	3B	3	8.50-8.30	-	5.38	1.59	0.62	-	-	-	5.20
234	CB2		CCS	C	5C?	4	8.50-8.40	8.46	4.95	1.21	0.49	-	0.78	1.11	3.36
10	CS1		CCS	P3	2A	2	9.10-8.90	-	2.37*	1.58	0.61	-	0.72	0.35	2.17
139	CS1		CCS	P1	4C	5	8.20-8.00	-	1.35*	1.82	0.44	-	0.66	0.68	0.55
341	CS1		CCS	P3	2G	2	9.10-9.00	9.02	2.06*	1.55*	0.61	-	0.77	0.68	1.64
387	CS1		CCS	P2	1D	5	8.90-8.80	8.88	1.82*	1.52	0.36	-	0.57	0.40	0.62
516	CS1		OBS	P3	5A	6	8.00-7.90	7.96	2.53*	1.11	0.42	-	0.48	0.66	0.86
817	CS1		CCS	P2	3G	3	8.50-8.40	8.43	2.68*	1.82	0.57	0.33*	0.93	0.72	2.98
937	CS1		OBS	P3	1F	3	8.95-8.85	8.80	1.86*	1.49*	0.39	-	0.78	0.54	0.85
946	CS1		CCS	C	2Q	2	8.90-8.70	8.80	2.39	1.55	0.55	-	-	0.64	1.78
975	CS1		CCS	P2	7B	4	8.40-8.30	-	2.12*	1.76	0.54	-	0.87	0.72	1.68
129	CS2		CCS	P3	4A	2	8.70-8.60	-	2.65*	1.39*	0.40	0.57	0.54	0.72	0.95
146	CS2		CCS	P3	3C	3	8.20-8.30	8.31	3.19*	1.82	0.58	0.56	0.59	0.80	2.65
246	CS2		CCS	P2	5B	1	9.00-8.90	8.92	2.38*	1.78*	0.54	0.68	0.78	0.59	1.60
356	CS2		CCS	P3	5A	WS		-	2.54*	1.87	0.51	0.49	0.70	0.75	1.82
400	CS2		CCS	P2	2N	4	8.60-8.50	8.55	2.37*	1.90	0.48	0.58	0.68	0.64	2.21
95	CS6		OBS	C	3A	4	8.30-8.10	-	1.72	1.29	0.35	-	-	-	0.61
148	CS6		CCS	C	4D	4	8.40-8.20	-	3.15	2.41	0.83	-	-	-	5.03
231	CS6		CCS	P2	1C	2	9.20-9.10	-	1.19*	1.49	0.29	-	-	0.29	0.78
293	CS6		CCS	C	1C	4	8.80-8.60	-	2.09	1.41	0.32	-	-	0.12	0.75
350	CS6		CCS	C	2H	1	9.30-9.10	9.20	1.88	1.64	0.41	-	-	-	0.93
480	CS6		CCS	C	3E	3	8.50-8.40	8.43	2.32	1.78	0.49	-	-	-	1.58
659	CS6		CCS	P1	1A	5	8.90-8.70	-	0.97*	1.51	0.33	-	-	0.16	0.58
696	CS6		CCS	P1	2H	1	9.30-9.10	-	1.13*	1.63*	0.45	-	-	0.41	0.83
733	CS6		CCS	C	1D	3	9.30-9.10	-	1.67	1.24	0.27	-	-	0.27	0.52
1030	CS6		CCS	L	1P	10	7.90-7.70	7.80	1.96*	1.12*	0.30	-	-	-	0.52
1050	CS6		CCS	P1	1A	3	9.30-9.10	-	0.81*	1.80*	0.54	-	-	0.27	0.69
10001	CS6		CCS	P3	4B	4	8.40-8.20	-	2.73*	1.93	0.40	-	-	-	2.26
60	DR		CCS	P0	2D	2	9.00-8.90	-	1.53*	1.05*	0.39	0.44	0.70	1.19	0.56
93	ES1		CCS	P2	4A	2	8.80-8.60	-	1.26*	1.00*	0.19	0.39*	0.32	0.37	0.24
113	ES1		CCS	D1	4C	3	8.60-8.40	-	2.18*	1.86	0.47	*	0.46	*	1.47
128	ES1		CCS	C	4A	2	8.70-8.60	8.60	2.56	0.94*	0.28	0.47	0.31	0.46	0.55
196	ES1		CCS	P3	1A	4	9.10-8.90	8.90	2.57*	1.05*	0.30	0.61	0.41	0.48	0.72
267	ES1		CCS	P3	5B	3	8.70-8.60	8.68	2.50*	1.10*	0.29	*	0.46	*	0.55
333	ES1		OBS	P3	PH2	?		-	1.53*	1.31*	0.26	0.43*	0.47	0.40*	0.41
375	ES1		CCS	C	4G	2	8.80-8.70	8.76	1.87	1.42	0.24	0.48	0.46	0.25	0.61

Table 38. (Continued)

Spec. Number (CC2-)	Type	Variety	Raw Mat.	Status	Unit	Level	Level Elevation	Spec. Elev.	Length	Width	Thick-ness	Base Width	Neck Width	Stem Length	Weight
433	ES1		CCS	P2	6B	2	9.10-8.90	9.00	1.65*	1.15*	0.31	0.59	0.46	0.42	0.53
477	ES1		CCS	P2	3E	3	8.50-8.40	8.45	1.56*	1.44	0.36	0.60	0.49	0.35*	0.66
487	ES1		CCS	P3	4A	WS		-	3.25*	1.46	0.42	0.57	0.42	0.50	1.41
499	ES1		CCS	C	3D	5	8.00-7.90	7.95	2.04	1.29*	0.31	0.57	0.55	0.39	0.62
520	ES1	C	CCS	P2	TB1	3	9.20-9.10	-	1.94*	1.65	0.52	1.58	0.53	0.46	1.37
544	ES1	D	CCS	P2	3F	3	8.40-8.30	8.35	1.42*	0.95	0.22	0.36	0.23	0.37	0.20
545	ES1		CCS	C	3F	3	8.40-8.30	8.31	2.23	1.31	0.24	0.50	0.51	0.51	0.56
704	ES1		OBS	P2	4F	1	9.00-8.80	-	1.24*	0.92*	0.23	0.44*	0.39	0.44	0.22
801	ES1	D	CCS	P2	3G	2	8.70-8.50	-	0.91*	1.03	0.20	0.36	0.23	0.34	0.15
807	ES1		CCS	P3	3H	2	8.70-8.60	8.63	2.34*	1.09*	0.34	0.62	0.46	0.46	0.66
966	ES1		CCS	P2	7B	2	8.70-8.60	8.63	1.56*	1.41*	0.35	0.70	0.49	0.46	0.72
825	ESI1	A	OBS	P2	4H	3	8.40-8.30	8.35	2.13*	1.80*	0.38	0.63	0.54	0.51	1.09
942	ESI1	D	CCS	P3	1F	4	8.85-8.75	8.78	1.66*	1.18*	0.19	0.37*	0.32	0.28	0.25
199	ESI2		OBS	P3	2D	4	8.70-8.50	8.60	2.04*	1.55	0.37	0.76*	0.68	0.50	1.01
178	ES3		CCS	P2	2A	2	9.10-8.90	-	1.86*	1.67*	0.44	1.05*	0.89	0.58	1.61
236	ES3		CCS	P2	2F	2	9.10-9.00	-	2.05*	1.47*	0.43	0.50*	0.80*	0.38	1.57
822	ES3		CCS	P2	4H	3	8.50-8.40	8.48	2.53*	2.65*	0.69	0.89*	0.87	0.58	3.65
897	ES3		CCS	L	2Q	1	9.00-8.90	8.90	2.09*	1.38*	0.44	0.94*	0.79	0.51*	0.68
9992	ES3		CCS	P1	2Q	1	8.90-9.10	-	1.08*	1.60*	0.41	0.75*	0.82*	0.49	0.61
371	ESI3		CCS	P2	1D	4	9.00-8.90	8.90	1.95*	1.64*	0.39	1.03	0.93	0.48	1.38
420	ESI3		CCS	D1	6A	2	9.00-8.90	8.94	3.31*	1.51*	0.46	*	*	0.43*	2.18
438	ESI3		CCS	P2	6B	2	9.00-8.90	8.99	1.89*	1.71*	0.44	1.17	0.95	0.54	1.56
471	ESI3		CCS	P3	4B	6	8.00-7.90	7.96	2.44*	1.57*	0.43	0.62*	0.68*	0.50	1.71
873	ESI3		CCS	P2	2R	2	8.90-8.80	8.88	2.23*	1.86	0.48	1.23	0.92	0.55	1.76
189	ES4		CCS	P3	2A	2	9.00-8.90	8.92	2.76*	2.13*	0.59	*	1.23	0.73	2.84
428	ES4		CCS	P3	1D	7	8.50-8.40	8.47	2.69*	1.75*	0.52	1.13*	1.06	0.59	2.42
515	ES4		CCS	P2	1C	5-6	8.60-8.20	-	2.86*	1.92*	0.58	0.73*	0.95*	0.38*	3.14
849	ES4		CCS	P2	2T	1	9.00-8.90	8.98	1.86*	1.93*	0.43	1.12*	1.24*	0.49	1.50
66	ESI4		OBS	P2	3C	1	8.90-8.70	-	3.36*	2.09*	0.48	0.56	1.02	0.87	2.60
107	ESI4		CCS	P1	4C	3	8.60-8.40	-	1.23*	1.73*	0.37	1.37	1.13*	0.58	0.51
366	ESI4		CCS	P2	3D	1	8.90-8.80	8.90	2.27*	2.08*	0.46	1.43	1.17	0.59	2.15
917	ESI4		CCS	P3	2Q	1	9.00-8.90	8.96	2.96*	1.94*	0.55	1.23*	1.17	0.54	3.25
56	ES/SN		OBS	P0	2D	SUR		-	0.90*	*	0.28	1.40	0.94	0.89	0.32
847	ES/SN		CCS	P0	2T	1	9.00-8.90	8.98	0.78*	*	0.38	1.21	0.96	0.80	0.31

Table 38. (Continued)

Spec. Number (CC2-)	Type	Variety	Raw Mat.	Status	Unit	Level	Level Elevation	Spec. Elev.	Length	Width	Thick-ness	Base Width	Neck Width	Stem Length	Weight
870	ES/SN		CCS	P1	2R	1	9.00-8.90	8.90	0.82*	1.66*	0.38	0.89*	1.32*	0.50*	0.57
9991	ES/SN		CCS	P0	1P	6	8.70-8.50	-	0.78*	*	0.38	1.50	1.25	0.81	0.40
10005	ES/SN		CCS	P0	3G	2	8.70-8.50	-	0.75*	1.10*	0.35	1.10	0.84*	0.75*	0.22
1	PS	A	CCS	P3	1A	4	9.10-8.90	8.90	2.05*	1.38*	0.25	0.35	0.32	0.67	0.46
2	PS	B	CCS	C	1A	4	9.10-9.00	-	2.11	1.45*	0.30	0.35	0.36	0.42	0.61
6	PS	B	CCS	C	1A	5	8.90-8.70	-	1.73	1.02*	0.24	0.25	0.22	0.32	0.29
32	PS	A	CCS	P3	3A	2	8.70-8.60	8.61	1.91*	1.91	0.28	0.29	0.27	0.41	0.38
63	PS	A	CCS	C	4A	SUR		-	1.73	1.15	0.26	0.28	0.41	0.29	0.46
69	PS	A	CCS	C	3A	2	8.70-8.60	8.65	2.06	1.54	0.37	0.23	0.46	0.49	0.64
116	PS	B	CCS	C	4B	2	8.80-8.60	8.70	2.31	1.10	0.26	0.27	0.33	0.30	0.52
150	PS	A	CCS	C	4D	4	8.30-8.20	8.27	2.55	1.61*	0.29	0.37	0.43	0.50	0.74
154	PS	B	CCS	P2	1P	6	8.70-7.50	-	1.62*	1.07*	0.25	0.32*	0.32	0.31	0.39
159	PS	B	OBS	C	PH?	BDT		-	1.60	0.81*	0.22	0.19	0.240	0.20*	0.25
172	PS	B	CCS	C	1A	3	9.20-9.10	9.10	1.71	1.51	0.22	0.36	0.31	0.51	0.36
173	PS	A	CCS	C	1A	3	9.20-9.10	9.10	2.28	1.40	0.40	0.32	0.46	0.66	0.75
190	PS	A	OBS	P2	3A	1	8.90-8.80	8.83	1.35*	0.90*	0.23	0.44*	0.46	0.20*	0.26
268	PS	A	CCS	C	1C	3	9.00-8.80	8.90	2.23	1.32	0.32	0.32	0.33	0.58	0.50
357	PS	B	CCS	P3	1D	4	9.00-8.90	-	1.46*	1.08	0.29	0.32	0.27	0.41	0.29
494	PS	B	OBS	C	3E	4	8.30-8.20	8.27	2.41	0.90*	0.20	0.35	0.33	0.28	0.24
565	PS	A	CCS	P2	3G	1	8.90-8.70	-	1.40*	0.94*	0.31	0.28	0.30	0.39	0.35
802	PS	B	CCS	C	4H	2	8.60-8.50	8.54	1.93	0.92*	0.21	0.29	0.31	0.32	0.35
811	PS	A	CCS	C	1P	4-11	9.00-7.50	-	2.41	1.18*	0.25	0.25	0.34	0.52	0.42
823	PS	A	CCS	P3	4H	3	8.50-8.40	8.47	1.65*	1.32	0.30	-	0.32	0.36	0.46
895	PS	A	CCS	C	1F	2	9.25-9.15	9.25	2.64*	1.16	0.29	0.25	0.24	0.36*	0.53
898	PS	A	CCS	C	1F	3-6	8.97-8.25	-	2.49	1.27	0.35	-	0.35	0.43	0.89
906	PS	A	CCS	P3	2Q	1	9.10-9.00	9.10	2.23*	1.01	0.29	0.26	0.27	0.48	0.53
65	PS/ES		CCS	M	1P	6	8.60-8.50	8.55	1.42*	1.20*	0.20	*	0.38	*	0.36
126	PS/ES		CCS	L	4D	1	9.00-8.90	8.85	1.19*	0.91*	0.27	*	0.35	*	0.25
275	PS/ES		CCS	P1	5B	3	8.70-8.50	-	2.40*	1.55	0.34	*	0.48	*	0.79
361	PS/ES		CCS	D1	2H	1	9.30-9.10	9.20	1.65*	0.63*	0.21	0.35*	0.31	0.30*	0.22
519	PS/ES		CCS	D	TB1	3	9.20-9.10	-	1.99*	1.62	0.28	*	0.36	*	0.47
552	PS/ES		CCS	M1	3F	4	8.20-8.10	8.12	1.35*	1.18*	0.27	*	0.40	*	0.34
727	PS/ES		CCS	M1	5A	?		-	1.20*	1.16*	0.25	*	0.38	*	0.31
879	PS/ES		CCS	M1	7A	1-4	9.00-8.20	-	1.21*	0.99*	0.25	*	0.35	*	0.25
957	PS/ES		CCS	D1	7B	2	8.80-8.60	8.70	1.99*	1.11*	0.29	*	0.29	*	0.44
171	SN3		CCS	P3	EX	SUR		-	3.09*	2.21	0.44	1.57	1.26	0.70	3.39
506	SN3		OBS	P1	3E	WS		-	1.62*	1.71*	0.42	1.49	1.30*	0.83	0.95
944	SN3		CCS	P3	1F	4	8.75-8.65	8.70	2.12*	1.67	0.40	1.19*	1.15	1.17	1.50

Table 38. (Continued)

Spec. Number (CC2-)	Type	Variety	Raw Mat.	Status	Unit	Level	Level Elevation	Spec. Elev.	Length	Width	Thick-ness	Base Width	Neck Width	Stem Length	Weight
222	SN4		CCS	P3	2F	1	9.20-9.10	9.11	2.15*	1.47	0.46	1.15	0.89	0.73	1.29
307	SN4		CCS	P3	PH2	?		9.00	2.53*	1.73	0.40	0.75	0.66	0.74	1.29
872	SN4		CCS	P3	2R	2	8.90-8.80	8.88	3.72*	1.45*	0.46	1.00*	0.95	0.61	2.58
880	SN4		CCS	P2	2Q	1	9.10-9.00	9.09	1.95*	1.53*	0.50	0.77*	0.79	0.49	1.45
908	SN4		CCS	P2	2Q	1	9.10-9.00	9.07	1.67*	1.70*	0.48	1.00	0.78	0.58	1.49
978	SN4		OBS	P3	3G	3-4	8.50-8.10	-	2.24*	1.51*	0.36	1.04	0.69	0.65	0.91
16	SN5	C	CCS	P3	2A	2	9.10-8.90	-	2.51*	1.73*	0.44	1.16	1.02	0.52	1.69
46	SN5	D	CCS	P3	2C	3	8.70-8.70	8.80	2.39*	1.24	0.37	1.24*	1.00	0.59	1.28
57	SN5	A	CCS	C	4A	SUR		-	3.00*	1.85*	0.49	1.26*	1.08	0.53	2.36
58	SN5	C	CCS	P3	3C	1	8.90-8.70	-	2.73*	1.66*	0.42	1.08	1.01	0.41	2.16
99	SN5	A	CCS	P2	4C	2	8.70-8.60	8.62	2.34*	1.80	0.49	1.32	1.06	0.54	2.10
101	SN5	A	CCS	P2	1P	7	8.50-8.30	-	2.55*	1.96*	0.50	0.97*	1.21*	0.42*	2.50
108	SN5	C	CCS	P3	1P	7	8.50-8.30	-	2.49*	1.75*	0.46	0.70*	0.91*	0.44	2.03
122	SN5	B	CCS	P3	3A	5	8.10-8.00	8.02	2.72	1.74	0.42	1.59	1.22	0.58	1.42
141	SN5	A	CCS	P3	3A	6	7.80-7.70	7.76	2.95*	1.96	0.53	1.43*	1.10	0.52	2.25
156	SN5	D	CCS	P2	1P	6	8.70-8.50	-	1.87*	1.33	0.43	0.74*	0.81	0.60	1.13
208	SN5	A	CCS	P3	3B	5	8.10-8.00	8.10	2.82*	1.67	0.37	1.32*	1.00	0.57	1.56
217	SN5	C	CCS	P3	1C	1	9.30-9.20	-	2.28*	1.70*	0.49	0.83*	0.96	0.46	2.41
221	SN5	C	CCS	P2	2F	1	9.20-9.10	9.12	1.91*	1.56*	0.54	1.18*	1.16	0.42	1.72
229	SN5	A	CCS	C	3P	4	8.30-8.20	8.26	4.01	1.83*	0.47	1.56	1.12	0.61	2.60
237	SN5	D	CCS	P3	2F	2	9.10-9.00	-	2.58*	1.33	0.34	1.10	0.95	0.53	1.44
240	SN5	A	CCS	P2	3P	4	8.20-8.10	8.14	1.73*	1.54	0.40	1.13*	0.96	0.54	1.15
241	SN5	C	CCS	P2	2F	2	9.00-8.90	8.98	2.16*	1.57*	0.50	1.00*	1.09	0.52	1.81
245	SN5	C	CCS	C	2F	2	9.00-8.90	8.98	2.39	1.63	0.40	1.08*	1.05*	0.39*	1.61
249	SN5	C	CCS	P3	2F	2	9.10-9.00	9.01	2.89*	1.59	0.67	1.12	0.96	0.57	3.04
282	SN5	D	CCS	C	1C	4	8.80-8.60	-	2.30	1.24	0.41	0.90	0.73	0.55	1.01
288	SN5	C	CCS	P2	1C	4	8.80-8.60	-	1.16*	1.55*	0.42	0.32*	0.97	0.52	0.79
310	SN5	C	CCS	P3	1C	5	8.60-8.50	8.56	3.08*	1.49	0.56	1.11*	0.95	0.45	2.91
365	SN5	C	CCS	P3	2H	1	9.20-9.10	9.15	2.48*	1.68*	0.54	0.94	1.00	0.33	2.12
406	SN5	B	OBS	P2	2H	2	9.00-8.90	8.90	2.06*	2.12	0.48	2.00	1.45	0.75	2.08
408	SN5	D	CCS	P2	3D	1	8.80-8.70	-	1.75*	1.06*	0.46	0.70*	0.60*	1.11	0.91
446	SN5	A	CCS	P2	1D	WS		-	2.13*	1.85	0.54	1.64	1.32	0.61	1.97
512	SN5	A	CCS	C	3E	3-4	8.50-8.10	-	4.33	1.72	0.47	1.55	1.19	0.57	2.30
527	SN5	C	CCS	P3	TB1	6	8.60-8.50	8.54	3.17*	1.67*	0.40	*	0.90*	0.50*	2.08
528	SN5	C	CCS	C	TB1	6	8.60-8.50	8.50	2.79	1.64*	0.48	0.91*	0.86*	0.68*	2.11
546	SN5	A	CCS	P1	3F	4	8.30-8.20	8.25	0.84*	1.96*	0.41	1.85*	1.39	0.56	0.58
804	SN5	A	CCS	C	4I	1	8.90-8.70	8.80	3.17	1.58*	0.41	1.34*	1.01	0.51	1.94
835	SN5	D	CCS	P3	4I	2	8.70-8.60	8.68	2.43*	1.28	0.47	1.16	0.91	0.58	1.67
868	SN5	C	CCS	P3	2R	2	8.90-8.80	8.86	2.99*	1.55*	0.37	1.01*	1.00	0.63*	1.74
874	SN5	C	CCS	P2	2R	2	8.90-8.80	8.88	2.04*	1.87	0.52	1.30*	1.35	0.55	1.98

Table 38. (Continued)

Spec. Number (CC2-)	Type	Variety	Raw Mat.	Status	Unit	Level	Level Elevation	Spec. Elev.	Length	Width	Thick-ness	Base Width	Neck Width	Stem Length	Weight
881	SN5	A	CCS	P2	2Q	1	9.10-9.00	9.08	1.88*	1.71*	0.53	1.28*	1.17	0.44	1.94
887	SN5	D	CCS	P2	2Q	1	9.10-9.00	9.02	1.95*	1.30	0.48	0.98	0.82	0.46	1.38
891	SN5	A	CCS	P2	2Q	1	9.00-8.90	8.96	2.19*	1.87*	0.50	1.70*	1.31	0.69	2.34
907	SN5	C	CCS	C	2Q	1	9.10-9.00	9.09	2.25	1.46*	0.43	1.33*	1.06	0.55*	1.70
925	SN5	C	CCS	P3	2Q	2	8.80-8.70	8.77	2.82*	1.57*	0.43	0.89*	0.84*	0.51	1.81
965	SN5	B	CCS	C	7B	2	8.70-8.60	8.61	2.90	1.68*	0.54	1.21	1.04	0.44	2.43
985	SN5	A	CCS	P2	3P	2	8.70-8.50	-	1.59*	1.88*	0.47	1.28	1.19	0.54	1.52
1037	SN5		CCS	P2	7B	2	8.80-8.60	-	1.58*	1.51*	0.43	0.82*	0.80*	0.45	0.97
79	SN6		OBS	C	1P	7	8.50-8.40	8.50	2.21	1.19	0.31	1.19	0.96*	0.39	0.71
521	SN6		OBS	C	TB1	3	9.20-9.10	9.13	1.46	1.25	0.28	1.251	1.02*	0.47	0.45
566	SN6		CCS	L	4H	2	8.70-8.60	8.61	1.88*	0.93*	0.40	0.56*	0.36*	0.51	0.58
838	SN6		CCS	P1	3H	3	8.40-8.30	8.39	1.09*	1.45	0.32	1.37	1.11*	0.48	0.61
900	SN6		OBS	C	1F	2	9.25-9.05	9.15	2.14	1.41	0.29	1.41	0.87	0.53	0.64
23	ST		CCS	P1	3B	3	8.50-8.30	-	1.43*	1.87	0.31	1.87	-	-	0.56
376	ST		CCS	C	2H	1	9.20-9.10	9.10	2.05	1.41*	0.35	1.41*	-	-	0.83
379	ST		CCS	C	4G	2	8.80-8.70	8.75	2.20	1.44	0.33	1.44	-	-	0.87
824	ST		CCS	C	1A	3-9	9.30-7.90	-	1.74	1.51*	0.31	1.51*	-	-	0.63
927	ST		OBS	C	1F	3	8.95-8.85	8.93	2.65	1.22*	0.34	1.10*	-	-	0.81
1154	ST		CCS	L	1P	6	8.55-8.50	-	2.67	1.12*	0.29	1.06	-	-	1.03
9994	ST		OBS	P	3E	4	8.30-8.10	-	0.92*	1.26	0.23	1.25	-	-	0.25

1 Additional projectile points are listed under conjoined specimens, Table 39
Raw Material: CCS=cryptocrystalline silicates; OBS=obsidian; BAS=basalt
Status: P=proximal end, P0=base only, P1=base and at least one barb, P2=base and half of blade, P3=only tip missing; M=medial frag., M1=includes part of haft element, M2=blade frag. only, M3=most of blade except tip; D=distal frag., D1=only base missing, D2=only tip present, no diagnostic features; L=lateral frag.; C=complete specimen; UI=unidentifiable
Level: WS=wall scrapings; SUR=surface; BDT=backdirt
*=fragmentary specimen, measurement incomplete
All measurements in centimeters, weight in grams

Table 39. Attributes of Conjoined Projectile Points, 35WH7[1]

Specimen Number (CC2-)	Type	Variety	Raw Mat.	Status	Unit	Level	Level Elevation	Spec. Elev.	Length	Width	Thickness	Base Width	Neck Width	Stem Length	Weight
177/603	CS6		CCS	C					3.02	1.78	0.34	-	-	0.21	1.60
177	CS6		CCS	P2	1A	3	9.30-9.10	-							
603	PPT	FR	CCS	D	1A	4	9.10-8.90	-							
212/882	CS6		CCS	P3					3.37*	1.62	0.30	-	-	0.17	1.66
212	PPT	FR	CCS	M2	2F	1	9.20-9.10	-							
882	CS6		CCS	P2	2Q	1	9.10-9.00	9.08							
109/814	ES1		OBS	C					3.00	1.27	0.26	0.48	0.32	0.38	0.59
109	ES1		OBS	P2	3B	3	8.40-8.30	8.30							
814	PPT	FR	OBS	D	3A	4-6	8.30-7.70	-							
274/461	ES1	A	OBS	P3					2.20*	1.79	0.29	0.62	0.51	0.40	1.12
274	ES1	A	OBS	P2	1C	3	9.00-8.80	-							
461	PPT	FR	OBS	M2	1D	WS		-							
484/805	ESI1		CCS	P3					2.87*	1.57	0.35	0.71	0.56	0.43	1.26
484	PPT	FR	CCS	P3	3E	4	8.30-8.20	8.30							
805	ESI1		CCS	P2	3H	2	8.60-8.50	8.56							
529/945	PPT	FR	CCS	M1					3.33*	1.52*	0.41	*	1.19	*	1.83
529	PPT	FR	CCS	M1	2F	WS		-							
945	PPT	FR	CCS	M2	2Q	2	8.90-8.70	8.80							
175/553	PS/ES		CCS	D1					2.40*	1.59	0.27	*	0.35	*	0.58
175	PS/ES		CCS	M1	1P	3-5	9.30-8.70	-							
553	PPT	FR	CCS	D	1P	5	8.90-8.80	8.83							
3/176	SN6		OBS	P3					1.66*	1.35	0.24	1.35	-	-	0.55
3	SN6		OBS	LP	1A	4	9.10-8.90	-							
176	SN6		OBS	LP	1P	?		-							
291/757	ST		CCS	C					2.70	1.33*	0.45	1.33*	1.19	0.55*	1.63
291	PPT	FR	CCS	P	1C	4	8.80-8.60	-							
757	PPT	FR	CCS	D	PH1	SUR		-							

1 All measurements in centimeters, weight in grams, *=fragmentary specimen, measurement incomplete
Raw Material: CCS=cryptocrystalline silicates; OBS=obsidian; BAS=basalt
Status: P=proximal end, P0=base only, P1=base and at least one barb, P2=base and half of blade, P3=only tip missing; M=medial frag., M1=includes part of haft element, M2=blade frag. only, M3=most of blade except tip; D=distal frag., D1=only base missing, D2=only tip present, no diagnostic features; L=lateral frag.; C=complete specimen; UI=unidentifiable

Table 40. Attributes and Dimensions of Classified Large Bifaces, 35WH7[1]

Specimen Number (CC2-)	Unit	Level	Level Elevation	Spec. Elev.	Sta- tus	Frag. Type	Raw Mat.	Length	Width	Thick- ness	Weight	Stage Side A	Stage Side B
20	3A	2	8.70-8.50	8.60	C		CCS	3.86	2.49	0.73	6.09	3	3
27	3B	3	8.50-8.30	-	*	A	CCS	4.42*	4.82*	1.34	22.02	2	3
37	3A	2	8.60-8.50	8.52	*	R	CCS	3.06*	3.28*	1.11	10.82	2	3
43	2C	3	8.90-8.80	8.88	C		CCS	6.48	4.74	1.38	32.16	1	3
61	3A	3	8.50-8.40	8.41	*	R	CCS	4.52*	2.44	0.88	11.22	3	3
70	3A	3	8.40-8.30	8.30	*	A	CCS	2.82*	2.30*	0.63	2.93	2	2
77	3C	2	8.70-8.60	8.70	*	S	CCS	3.16*	2.02	0.53	4.04	5	5
80	4A	1	9.00-8.80	8.90	C		CCS	6.03*	2.78	0.73	12.47	3	4
83	3C	2	8.70-8.50	-	*	A	CCS	3.08*	2.33*	0.64	4.48	2	3
84	1A	SUR		-	*	A	CCS	3.81*	2.34	1.10	7.40	2	2
97	4A	2	8.80-8.60	-	*	R	CCS	1.90*	2.65*	0.51	2.27	2	3
98	1P	6	8.60-8.50	8.52	C		CCS	3.73	2.37	1.22	9.05	2	2
100	4C	3	8.60-8.50	8.57	*	A	CCS	2.38*	1.49*	0.67	1.59	3	4
112	4C	3	8.60-8.40	-	*	S	CCS	3.27*	3.16	0.71	9.43	3	4
115	3C?	3?		8.90	*	S	CCS	1.90*	1.96	0.52	1.77	2	3
123	3A	5	8.10-7.90	-	*	R	CCS	2.93*	3.19*	0.97	9.12	3	3
124	1P	7	8.40-8.30	8.32	*	A	CCS	4.22*	3.08*	0.72	8.47	3	3
131	4A	3	8.60-8.40	-	*	R	CCS	2.78*	3.29*	0.72	5.45	3	3
132	4D	2	8.70-8.60	8.65	*	R	CCS	3.46*	4.33*	1.07	15.87	2	2
134	4D	3	8.60-8.50	8.55	C		CCS	7.17	3.03	1.30	25.32	2	3
147	4A	1	9.00-8.80	-	*	S	CCS	3.63*	3.24	1.01	13.75	2	2
167	5C	2	8.90-8.70	-	*	A	CCS	3.15*	3.56*	1.06	11.14	2	3
174	2D	4	8.70-8.50	-	C		CCS	4.05	2.95	0.83	10.41	2	3
201	?	BDT		-	C		CCS	4.66*	3.46	1.48	23.56	2	2
235	3P	4	8.20-8.10	8.16	*	S	CCS	4.14*	3.19*	0.81	11.76	2	3
247	2E	3	8.90-8.80	-	*	A	CCS	2.88*	1.93*	0.45	1.84	4	4
305	4A	?		-	*	R	CCS	3.59*	3.16*	1.17	14.26	2	2
330	3C	1	8.90-8.70	-	*	S	CCS	3.95*	3.16*	0.91	13.24	3	4
345	1P	6	8.70-8.60	8.65	*	A	CCS	3.43*	2.46*	0.62	5.37	3	4
355	2G	2	9.00-8.90	8.90	*	A	CCS	3.06*	2.31*	0.62	3.87	3	3
364	3D	1	8.90-8.80	8.84	*	S	CCS	1.80*	2.16	0.61	2.93	4	4
368	4B	3	8.60-8.50	8.57	C		CCS	5.61	3.89	1.24	28.33	2	2
380	2H	1	9.20-9.10	9.10	*	U	CCS	4.62*	3.85*	1.40	22.77	2	2
381	1C	5	8.60-8.50	8.60	*	A	CCS	3.18*	2.72*	0.80	5.22	3	3
384	4F	2	8.70-8.60	8.65	C		CCS	5.22	2.36	0.74	10.26	3	3
390	3B	4	8.30-8.20	8.26	*	A	CCS	4.46*	3.24*	0.87	13.83	3	3
395	4B	4	8.40-8.30	8.34	*	A	CCS	4.39*	3.41	1.28	16.08	2	3
407	4G	2	8.70-8.60	8.64	*	S	CCS	2.60*	2.70	1.03	8.66	2	3
421	5C	3	8.70-8.50	-	*	L	CCS	5.30	3.73	1.40	24.26	2	3
422	6A	2	9.00-8.90	8.93	*	U	CCS	2.15*	2.48*	0.60	2.77	2	2
431	1D	7	8.50-8.40	8.44	*	A	CCS	3.87*	2.53*	0.77	7.40	3	3
434	2K	4	8.70-8.60	8.65	*	A	CCS	3.56*	2.66*	0.63	5.75	3	3
435	4F	3	8.50-8.40	8.49	*	L	CCS	4.69*	2.95*	0.88	12.54	2	3
456	6A	3	8.80-8.70	8.77	*	A	CCS	3.07*	2.50*	0.54	4.44	2	3
457	2K	5	8.50-8.40	8.46	*	R	CCS	3.84*	3.04	1.02	13.32	3	3
467	3E	2	8.70-8.50	8.60	*	S	CCS	2.05*	1.94*	0.67	2.50	2	2
469	3E	2	8.60-8.50	8.50	*	A	CCS	2.94*	3.28*	1.05	9.46	2	3
474	3D	4	8.30-8.20	8.25	*	A	CCS	4.58*	3.11*	0.95	10.13	2	3
493	3E	4	8.30-8.20	8.25	*	M	CCS	3.84*	3.26	0.97	15.11	2	3
504	3E	3	8.50-8.40	8.47	*	A	CCS	4.85*	4.65*	1.32	22.98	2	4
549	3F	4	8.20-8.10	8.14	*	A	CCS	3.85*	2.50	1.00	7.41	2	3
560	4A	4	8.40-8.30	8.38	*	A	CCS	2.85*	2.51*	0.62	4.62	2	2
610	4A	3	8.60-8.40	-	*	R	CCS	5.02*	2.44*	1.14	11.29	2	2
660	3B	3	8.50-8.30	-	*	U	CCS	3.18*	2.18*	0.61	4.17	2	2
691	3A	4	8.30-8.10	-	*	R	CCS	3.72*	2.88	1.32	12.42	2	3
740	3E	1	8.97-8.70	-	*	U	CCS	3.40*	2.04*	1.10	6.76	2	2
752	5B	3	8.70-8.50	-	*	R	CCS	2.10*	3.54*	0.63	3.78	3	3
777	1C	4	8.80-8.60	-	*	U	CCS	3.33*	3.05*	1.26	13.54	2	3

Table 40. (Continued)

Specimen Number (CC2-)	Unit	Level	Level Elevation	Spec. Elev.	Sta-tus	Frag. Type	Raw Mat.	Length	Width	Thick-ness	Weight	Stage Side A	Stage Side B
841	1C	?		-	*	S	CCS	2.67*	3.48	0.53	5.01	4	4
843	1P	?		-	*	M	CCS	2.16*	2.16*	0.64	2.69	3	3
857	3H	3	8.50-8.30	8.37	C		CCS	6.78	4.00	1.97	39.54	2	2
920	2Q	1	9.00-8.90	8.93	*	R	CCS	2.20*	3.52*	1.07	7.13	2	3
961	7B	2	8.80-8.70	8.77	C		CCS	7.44	4.64	1.55	48.87	2	2
968	7B	2	8.70-8.60	8.60	*	R	CCS	3.77*	2.78	0.75	9.85	3	3
971	7B	2	8.70-8.60	8.60	*	M	CCS	1.91*	2.29*	0.65	3.06	2	3
972	7B	3	8.50-8.40	8.47	*	S	CCS	3.07*	2.51	0.96	7.26	2	4
1014	3C	2	8.70-8.50	-	*	A	CCS	2.94*	4.86*	1.14	14.13	3	3
1069	1B	WS	?	-	C		CCS	4.56	2.77	0.34	14.80	2	2
1120	1F	2	9.25-9.05	-	*	A	CCS	2.03*	2.23*	0.75	2.19	3	3
1207	2H	1	9.30-9.10	-	*	A	CCS	4.40*	2.90	1.18	13.96	2	2
1257	3A	5	8.10-7.90	-	*	M	CCS	1.20*	2.53*	0.92	2.46	2	2
1258	3A	5	8.10-7.90	-	*	M	CCS	2.97*	3.04	1.40	14.38	2	2
1276	3B	4	8.50-8.30	-	*	R	CCS	2.16*	2.02*	1.19	4.76	2	2
1290	3C	1	8.90-8.70	-	*	R	CCS	1.95*	2.75	0.57	4.10	2	3
1291	3C	1	8.90-8.70	-	*	R	CCS	2.14*	3.25*	1.36	2.27	2	3
1311	3C	2	8.70-8.50	-	*	R	CCS	2.04*	4.05*	1.10	7.41	2	2
1313	3C	WS	?	-	*	A	CCS	3.01*	4.07*	1.00	9.58	3	3
1323	3D	3	8.50-8.30	-	*	L	CCS	3.04*	2.76*	1.25	8.46	2	2
1343	?	?		-	*	R	CCS	3.33*	4.45*	1.27	17.60	1	3
1351	3AE	1-2	8.95-8.50	-	*	A	CCS	1.40*	2.43*	1.81	2.31	2	2
1403	3G	3	8.45-8.30	-	*	A	CCS	3.23*	2.55*	0.63	3.88	2	3
1408	3G	3	8.45-8.30	-	*	L	CCS	2.96*	1.56*	1.72	2.82	3	3
1497	4B	3	8.60-8.40	-	*	R	CCS	1.40*	3.10*	0.80	3.21	1	3
1509	4C	2	8.80-8.60	-	*	A	CCS	2.91*	1.94*	1.09	4.77	2	3
1513	4C	3	8.60-8.40	-	*	A	CCS	2.64*	3.08*	1.06	6.86	2	3
1522	4C	4	8.40-8.20	-	*	R	CCS	4.53*	4.06*	1.63	30.12	2	2
1554	4F	2	8.80-8.60	-	*	A	CCS	2.30*	3.62	1.00	6.32	3	3
1610	5B	3	8.70-8.50	-	*	R	CCS	3.52*	3.49	1.37	17.59	2	2

1 Status: *=fragmentary specimen, incomplete dimension; C=complete
Fragment Type: A=acute, R=round, S=square, M=medial, L=lateral, U=unidentifiable
Raw Material: CCS=cryptocrystalline silicates, OBS=obsidian, BAS=basalt
Level: WS=wall scrapings, SUR=surface, BDT=backdirt
Stage A and Stage B refer to opposite faces of a single specimen
All measurements given in centimeters, weight in grams

Table 41. Attributes and Dimensions of Conjoined Large Bifaces, 35WH7[1]

Specimen Number (CC2-)	Unit	Level	Level Elevation	Spec. Elev.	Status	Frag. Type	Raw Mat.	Length	Width	Thickness	Weight	Stage Side A	Stage Side B
195/278					C		CCS	6.58	2.53	0.69	10.96	3	3
195	4B	1	9.00-8.80										
278	5B	3	8.60-8.50	8.50									
25/114					*	S	CCS	6.36*	2.86	0.75	17.11	3	4
25	3C	1	8.90-8.80	8.90									
114	4C	3	8.60-8.40										
292/1175/1606					C		CCS	4.19	2.56	1.17	9.37	2	2
292	1C	4	8.80-8.60	8.68									
1175	1P	10	7.90-7.70										
1606	5B	2	8.90-8.70										
304/969					C		CCS	5.79	2.37	0.54	7.76	4	4
304	4A	2	8.70-8.60	8.70									
969	4J	2	8.70-8.60	8.64									
374/NO#					*	S	CCS	4.55*	2.26	0.64	4.78	3	4
374	2H	1	9.20-9.10	9.10									
424/656					C		CCS	6.35	2.84	1.05	15.17	3	3
424	1D	6	8.60-8.50	8.50									
656	1F	4	8.75-8.65										
624/767					*	S	CCS	4.06*	2.95	0.66	9.68	2	3
624	4I	1	8.90-8.70										
767	3C	2	8.70-8.50										
827/1017					*	R	CCS	4.95*	4.95	1.26	33.62	2	2
827	3G	3	8.40-8.30	8.32									
1017	3A	3	8.50-8.30										
837/958					*	S	CCS	4.38*	2.29	0.57	6.75	3	4
837	5C	4	8.50-8.40	8.48									
958	7B	1	8.90-8.80	8.85									
85/770					C		CCS	7.83	4.06	1.44	45.89	3	3
85	4A	2	8.80-8.60										
770	3C	2	8.70-8.50										

1 Status: *=fragmentary specimen, incomplete dimension; C=complete
Fragment Type: A=acute, R=round, S=square, M=medial; L=lateral
Raw Material: CCS=cryptocrystalline silicates, OBS=obsidian, BAS=basalt
Stage A and Stage B refer to opposite faces of a single specimen
All measurements given in centimeters, weight in grams

Table 42. Attributes of Drills, Microdrills, Perforators, and Gravers, 35WH7[1]

Specimen Number (CC2-)	Class	Type	Raw Mat.	Status	Unit	Level	Level Elevation	Spec. Elev.	Length	Width	Thickness	Weight
Drills												
94	DRL	T-SHAPED	CCS	C	3A	4	8.30-8.10	-	3.62	1.59	0.53	2.18
448	DRL	BIT FRAGMENT	CCS	D	4E	1	8.90-8.80	8.85	2.10	0.84	0.43	0.74
889	DRL	BIT FRAGMENT	CCS	D	2Q	1	9.00-8.90	8.98	2.63	1.00	0.45	1.02
903	DRL	BIT FRAGMENT	CCS	D	1F	2	9.25-9.15	9.16	1.96	0.58	0.38	0.48
970	DRL	EDGED FLAKE	CCS	D	4J	2	8.70-8.60	8.64	3.35	1.43	0.37	1.43
1031	DRL	FORMED	CCS	M	4D	2	8.80-8.60	-	2.84	3.53	0.75	7.51
1260	DRL	EDGED FLAKE	CCS	C	3A	7	7.70-7.50	-	2.51	0.69	0.28	0.55
Gravers												
153	GRV	REWORKED PP	CCS	C	1P	6	8.70-8.50	-	1.17	1.42	0.24	0.33
386	GRV	REWORKED PP	CCS	D	2K	3	8.80-8.70	8.72	1.51	1.64	0.42	0.84
432	GRV	EDGED FLAKE	CCS	C	6B	2	9.10-8.90	9.00	2.63	2.37	0.63	2.83
605	GRV	RD UNIF CHNKSPUR	CCS	C	3C	1	8.90-8.70	-	2.35	3.02	1.04	7.06
629	GRV	EDGED FLAKE	CCS	C	1B	3	9.30-9.10	-	3.40	3.83	0.76	6.58
720	GRV	RD UNIF FLKSPUR	CCS	C	4A	2	8.70-8.50	-	4.46	3.74	1.32	16.34
956	GRV	EDGED FLAKE	CCS	D	7B	1	9.00-8.90	-	2.36	1.70	0.35	1.36
1016	GRV	EDGED FLAKE	CCS	C	3A	3	8.50-8.30	-	3.75	1.73	1.42	9.83
1042	GRV	FLAKE SPUR PERF	CCS	P	1A	1		-	2.39	1.78	0.81	2.89
1054	GRV	RD UNIF FLKSPUR	CCS	C	1A	5	8.90-8.70	-	2.38	2.98	0.85	6.38
1056	GRV	RD UNIF CHNKSPR	CCS	C	1A	5-6	8.82-8.62	-	2.86	2.13	1.77	9.45
1098	GRV	RD UNIF FLKSPUR	CCS	C	1D	4-6	9.10-8.60	-	1.70	2.50	0.81	2.32
1110	GRV	RD UNIF CHNKSPR	CCS	C	1F	1	9.45-9.25	-	2.60	2.01	1.38	3.52
1148	GRV	RD UNIF CHNKSPR	CCS	C	1P	6	8.70-8.50	-	3.91	2.36	1.69	10.46
1153	GRV	RD UNIF CHNKSPR	CCS	C	1P	6	8.55-8.50	-	3.50	3.30	2.13	18.46
1293	GRV	FLAKE SPUR	CCS	C	3C	1	8.90-8.70	-	2.73	1.88	0.66	2.33
1294	GRV	FLAKE SPUR	CCS	C	3C	1	8.90-8.70	-	2.41	1.80	0.53	1.78
1315	GRV	PRF OR GRAVER?	CCS	C	3D	1?	9.01-8.70	-	2.72	1.39	0.56	2.32
1333	GRV	RD UNIF FLKSPUR	CCS	C	3E	1	8.95-8.70	-	4.06	3.02	1.20	11.33
1337	GRV	RD UNIF CHNKSPR	CCS	C	3E	1	8.95-8.70	-	1.84	2.61	1.48	6.03
1342	GRV	RD UNIF FLKSPUR	CCS	C	3AE	1-3	8.95-8.30	-	3.51	2.53	0.87	4.93
1389	GRV	BROKEN FLk EDGE	CCS	C	3G	1	8.90-8.70	-	2.35	1.93	0.48	2.18
1390	GRV	FLAKE SPUR	BAS	C	3G	1	8.90-8.70	-	2.49	2.01	0.66	2.86
1391	GRV	RD UNIF CHNKSPR	CCS	C	3G	1	8.90-8.70	-	3.10	2.80	1.12	7.85
1405	GRV	RD UNIF FLKSPUR	CCS	C	3G	3	8.45-8.30	-	4.65	3.27	0.73	8.70
1479	GRV	RD UNIF FLKSPUR	CCS	C	4B	2	8.80-8.60	-	4.22	3.06	0.82	9.75
1527	GRV	RD UNIF FLKSPUR	CCS	C	4D	1	9.00-8.80	-	1.91	1.68	0.50	1.45
1665	GRV	RD UNIF FLKSPUR	CCS	C	7B	3	8.60-8.40	-	2.30	1.43	0.52	1.56
1703	GRV	RD UNIF FLKSPUR	CCS	C	3P	3	8.50-8.30	-	1.92	1.58	0.32	1.07
Microdrills												
417	MDR	REWORKED PP	CCS	D	6A	2	9.00-8.90	8.95	1.52	1.14	0.38	0.48
429	MDR	BI-POINTED	CCS	F	4G	3	8.60-8.50	8.52	2.07	1.46	0.34	0.99
731	MDR	REWORKED PP?	CCS	D	1D	3	9.30-9.10	-	1.45	0.90	0.32	0.36
788	MDR	BI-POINTED	CCS	C	1A	4	9.10-8.90	-	2.07	0.74	0.38	0.43
1151	MDR	EDGED FLAKE	CCS	C	1P	6	8.70-8.50	-	1.60	1.03	0.35	0.42
1164	MDR	REWORKED P-BARB	CCS	C	1P	7	8.50-8.30	-	1.23	1.72	0.30	0.19
Perforators												
170	PRF	FORMED	CCS	D	1?	1-2		-	2.34	2.03	0.63	2.14
316	PRF	FORMED	CCS	L	2G	1	9.30-9.20	-	2.76	1.62	0.49	1.71
340	PRF	EDGED FLAKE	CCS	C	5C	1-2	9.10-8.70	-	2.80	1.24	0.75	1.27
444	PRF	REWORKED PP	OBS	D	6A	3	8.90-8.80	8.85	1.72	1.27	0.38	0.59

Table 42. (Continued)

Specimen Number (CC2-)	Class	Type	Raw Mat.	Status	Unit	Level	Level Elevation	Spec. Elev.	Length	Width	Thickness	Weight
517	PRF	FORMED	CCS	P	5A	6	8.00-7.90	7.96	2.36	1.58	0.30	0.93
595	PRF	EDGED FLAKE	CCS	C	3P	1-2	8.90-8.50	-	2.30	2.39	0.54	2.62
651	PRF	EDGD CHUNK PNCH	CCS	C	2AB	3	8.90-8.70	-	7.30	2.88	2.54	47.35
738	PRF	USED FLAKE	CCS	C	3E	1	8.97-8.70	-	4.64	2.72	0.71	5.67
785	PRF	EDGED FLAKE	CCS	C	3E	3	8.50-8.30	-	2.48	0.83	0.50	0.72
815	PRF	EDGED FLAKE	CCS	C	5C	2	8.90-8.80	8.81	2.68	1.15	0.28	0.89
816	PRF	EDGED FLAKE	CCS	C	5C	2	8.80-8.70	8.78	3.25	1.25	0.21	0.82
1127	PRF	BIF;STEMMED	CCS	C	1F	3	9.05-8.80	-	5.01	2.55	1.01	11.14
1198	PRF	EDGED FLAKE	CCS	C	2F	1	9.23-9.10	-	2.00	1.10	0.54	0.75
1331	PRF	EDGED FLAKE	CCS	P	3E	1	8.95-8.70	-	3.39	1.90	0.42	2.57
1598	PRF	EDGED FLAKE	CCS	C	5A	6	8.10-7.90	-	3.32	1.17	0.63	1.71

1 All measurements in centimeters, weight in grams
<u>Raw Material</u>: CCS=cryptocrystalline silicates, OBS=obsidian, BAS=basalt
<u>Status</u>: C=complete, D=distal, P=proximal, M=medial, L=lateral, F=fragment
For discussion of types, see text

Table 43. Attributes and Dimensions of Notches, 35WH7[1]

Specimen Number (CC2-)	No. of Notches	Additional Features	Raw Mat.	Unit	Level	Level Elevation	Spec. Elev.	Length	Width	Thickness	Weight
255	1	1 UNIF EDGE	CCS	1C	2	9.10-9.00	-	2.70	2.14	0.67	3.41
717	1	2 UNIF EDGES	CCS	3B	3	8.50-8.30	-	5.97	4.67	2.11	36.40
735	2	1 UNIF EDGE	CCS	3E	1	8.97-8.80	8.97	3.75	2.65	0.87	5.19
959	1		CCS	7B	1	8.90-8.80	8.83	5.77	3.92	4.26	80.01
1125	1	2 UNIF EDGES	CCS	1F	3	9.05-8.80	-	3.66	2.66	0.86	3.85
1349	1	STEEP ENDSCRAPER	FWD	3AE	1-2	8.95-8.50	-	6.26	4.03	1.31	49.00
1386	3	1 UNIF EDGE	CCS	3F	5	8.10-7.90	-	3.46	2.60	0.50	5.63
1395	1		CCS	3G	1	8.90-8.70	-	4.18	3.72	0.90	10.37
1397	1		CCS	3G	2	8.70-8.50	-	2.08	2.00	0.71	2.42
1498	1		CCS	4B	4	8.40-8.20	-	5.93	3.75	1.16	17.42
1519	1	1 UNIF EDGE	CCS	4C	4	8.40-8.20	-	5.52	4.28	1.75	32.25
1535	2	1 UNIF EDGE	CCS	4D	2	8.80-8.60	-	1.94	1.22	0.24	0.50
1546	1		BAS	4E	1	8.90-8.70	-	3.47	2.97	0.93	7.78
1563	1		BAS	4G	2	8.80-8.60	-	5.96	5.85	1.86	66.31
1566	1		CCS	4H	2	8.70-8.50	-	3.29	2.93	1.29	9.88
1597	1		CCS	5A	6	8.10-7.90	-	1.87	0.95	0.61	1.08
1611	1		CCS	5B	3	8.70-8.50	-	3.18	3.01	0.98	7.87
1618	4		CCS	5B	3	8.70-8.50	-	6.31	2.96	0.61	8.26

1 All measurements in centimeters, weight in grams
<u>Raw Material</u>: CCS=cryptocrystalline silicates, BAS=basalt, FWD=fossil wood

Table 44. Attributes and Dimensions of Formed Unifaces, 35WH7[1]

Spec. Num. (CC2-)	Edge Type	Variety	Raw Mat.	Unit	Level	Level Elevation	Spec. Elev.	Length	Width	Thick-ness	Weight
809	C	DSC	CCS	1P	4-11	9.00-7.50	-	3.15	2.91	0.76	7.59
256	C	E	CCS	1C	2	9.10-9.00	-	3.56	3.45	1.20	15.18
257	C	E	CCS	1C	2	9.10-9.00	-	3.33	4.31	1.03	10.49
580	C	E	CCS	1C	WS		-	3.16	2.75	1.59	13.75
1086	C	E	CCS	1C	4	8.80-8.60	-	2.95	3.66	1.58	15.83
1221	C	E	CCS	2L	5	8.50-8.40	8.42	4.46	2.22	1.64	13.53
1296	C	E	CCS	3C	1	8.90-8.70	-	3.22	3.49	1.86	24.86
88	C	ES	CCS	4A	1	8.90-8.80	8.80	3.29	3.26	1.01	8.10
213	C	ES	CCS	5B	1	9.00-8.90	8.96	4.23	2.61	1.32	12.42
377	C	EE	CCS	2H	1	9.20-9.10	9.10	6.28	4.77	3.01	88.47
26	C	IND	CCS	3C	1	8.90-8.80	8.90	0.86	2.47	0.24	0.47
230	C	IND	CCS	1C	2	9.20-9.10	-	1.49	1.70	0.20	0.71
359	C	IND	CCS	1F	4	8.85-8.65	-	3.18	1.90	0.95	4.81
764	C	IND	CCS	1A	4	9.10-8.90	-	2.49	2.07	0.32	1.42
1212	C	IND	CCS	2H	1	9.30-9.10	-	2.87	1.54	1.05	3.16
1425	C	IND	CCS	3H	3	8.50-8.45	-	2.23	1.79	0.45	1.49
1551	C	IND	CCS	4E	2	8.70-8.50	-	1.86	1.98	0.77	1.90
1590	C	IND	CCS	5A	1	9.10-8.90	-	1.94	1.65	0.77	2.31
30	C	S	CCS	3B	3	8.50-8.30	-	4.28	3.21	1.13	15.35
570	C	S	CCS	3G	1	8.80-8.70	8.75	4.33	3.41	1.48	17.78
962	C	S	CCS	7B	1	8.90-8.80	8.85	3.71	2.83	0.85	9.61
1345	C	S	CCS	3AD	3-4	8.50-8.10	-	3.37	4.64	0.90	18.08
91	C	TD	CCS	1A	6	8.70-8.60	8.67	3.79	2.40	0.63	5.58
204	C	TD	CCS	3B	5	8.10-8.00	8.10	4.48	3.76	1.08	16.44
269	C	TD	CCS	1C	3	9.00-8.80	-	3.52	2.89	1.12	9.32
397	C	TD	CCS	2L	3	8.80-8.70	8.73	2.71	2.51	0.90	5.73
459	C	TD	CCS	3D	3	8.40-8.30	8.38	3.34	1.81	0.49	3.32
476	C	TD	CCS	3E	2	8.60-8.50	8.50	4.96	3.54	1.24	20.92
509	C	TD	OBS	1C	5	8.60-8.40	8.50	3.53	2.27	0.41	3.27
550	C	TD	CCS	3F	4	8.20-8.10	8.12	4.87	4.60	1.64	41.41
561	C	TD	CCS	3G	1	8.90-8.80	8.83	2.77	3.52	1.10	9.19
563	C	TD	CCS	2H	1	9.20-9.10	9.19	1.78	1.78	0.45	1.33
620	C	TD	CCS	3C	2	8.70-8.50	-	3.21	2.83	1.03	8.38
635	C	TD	CCS	3B	3	8.50-8.30	-	3.66	2.76	0.73	4.46
683	C	TD	CCS	1AB	2	9.50-9.30	-	4.26	2.84	0.89	11.68
699	C	TD	CCS	4D	3	8.60-8.50	-	3.03	1.93	0.91	4.52
742	C	TD	CCS	4D	2	8.80-8.60	-	5.03	3.17	0.58	8.31
839	C	TD	CCS	3H	3-4	8.50-8.10	8.30	2.32	2.32	0.61	3.24
846	C	TD	CCS	5C	4	8.50-8.40	8.41	3.71	2.53	0.37	3.38
1095	C	TD	CCS	1D	4	9.10-8.90	-	3.69	4.27	1.60	28.47
10012	C	TD	CCS		SURF		-	4.22	2.69	0.67	7.78
296	CDNT	E	CCS	1C	4	8.80-8.60	8.65	1.67	2.52	0.71	2.61
1552	CDNT	E	CCS	4F	2	8.80-8.60	-	2.34	2.52	0.97	7.34
642	S	CVT	CCS	1P	WS		-	2.48	2.29	0.92	4.14
750	S	CVT	CCS	1AB	3	9.30-9.10	-	3.46	1.92	0.71	5.22
769	S	CVT	CCS	4C	1	9.00-8.80	-	3.21	2.48	0.47	4.00
1171	S	E	CCS	1P	8	8.30-8.10	-	5.15	3.31	0.52	16.79
1271	S	S	CCS	3B	3	8.50-8.30	-	3.05	1.44	0.46	1.99
248	S	PL	CCS	3P	4	9.30-8.10	-	3.60	2.71	1.45	13.13
562	S	PL	CCS	3G	1	8.90-8.80	8.83	3.15	2.30	0.88	8.36
12	S	TRL	CCS	2B	2	9.10-8.90	-	4.42	2.72	0.99	10.93
464	S	TRL	CCS	4H	3	8.40-8.30	-	2.92	1.75	0.62	3.41
254	S	S	CCS	1C	2	9.10-9.00	-	3.31	2.57	0.77	6.42
646	S	S	CCS	1D	4	9.10-8.90	-	3.76	1.87	1.59	7.50
658	S	S	CCS	1A	5	8.90-8.70	-	2.82	1.87	0.50	1.98

1 All measurements in centimeters, weight in grams; Type: C=convex, S=straight, CDNT=convex denticulate Variety: DSC=discoidal, S=side, E=end, TD=teardrop, PL=parallel, TRL=trilateral, CVT=convergent, IND=indeterminate

APPENDIX B

DESCRIPTIVE ATTRIBUTES AND PROVENIENCES FOR SELECTED ARTIFACT CLASSES, 35WH14

Table 45. Attributes and Dimensions of Classified Projectile Points, 35WH14[1]

Spec. Number	Type	Variety	Raw Mat.	Status	Unit	Level	Level Elevation	Spec. Elev.	Length	Width	Thick-ness	Base Width	Neck Width	Stem Length	Weight
505	BL		OBS	C	A53	8	96.60-96.50	96.50	2.32	0.85	0.35	0.51	0.57	0.39	0.57
1000	BL		CCS	C	A35	9	96.90-96.80	-	2.64	0.73	0.30	0.46	0.50	0.39	0.56
1234	BL		CCS	P3	A20	11	96.90-96.80	96.80	2.00*	0.85	0.29	0.48	0.44	0.46	0.43
287	CB2		CCS	P2	B22	12	95.70-95.60	95.60	2.83*	1.58	0.47	-	1.35	1.35	2.32
1157	CB2		CCS	C	B09	10	96.00-95.90	95.95	3.07	1.50	0.48	-	1.30	1.48	2.11
1303	CB2		CCS	C	A52	7	96.90-96.80	96.85	4.18	1.84	0.63	-	1.57	1.42	3.68
826	CS1	A	CCS	C	B30	6	96.20-96.10	96.11	3.78	1.37	0.41	-	0.92	0.92	1.75
936	CS1	A	CCS	P2	B04	6	96.60-96.50	96.50	2.04*	1.64	0.44	-	1.25	0.90	1.59
960	CS1	A	CCS	C	A47	6	97.20-97.10	97.17	4.72	1.74	0.61	-	1.19	0.88	3.64
1073	CS1	A	CCS	C	A44	6	97.10-97.00	97.03	4.70	1.63	0.42	-	1.19	1.06	2.87
2676	CS1	A	CCS	P2	B03	3	96.90-96.80	-	2.59*	1.38*	0.50	-	0.79	0.63	1.33
2829	CS1	A	CCS	P1	B26	10	95.90-95.80	-	1.87*	1.75	0.40	-	1.11	0.68*	0.90
127	CS1	B	CCS	C	B20	4	96.60-96.50	-	2.55	1.23	0.31	-	0.86	0.86	0.72
1103	CS1	B	CCS	C	A29	11	96.80-96.70	96.73	2.03	1.17	0.31	-	0.69	0.57	0.48
222	CS2		CCS	M1	B06	8	96.30-96.20	96.25	2.18*	2.17	0.54	*	0.80	0.51	1.65
267	CS2		CCS	C	B22	11	95.80-95.70	-	3.97	1.56*	0.47	0.60	0.72	0.88	1.63
278	CS2		CCS	P0	B06	11	96.00-95.90	95.90	1.01*	0.77*	0.40	0.56	9.99*	0.95	0.34
594	CS2		OBS	C	B15	14	95.60-95.50	95.51	2.84	1.45*	0.35	0.35*	0.89	0.67*	0.97
723	CS2		OBS	P3	B35	8	96.00-95.90	95.93	2.00*	1.63	0.44	0.80	0.75	0.64	0.91
797	CS2		CCS	C	A32	3	97.70-97.60	97.64	2.67	2.83	0.43	0.75	0.72*	7.90	1.14
835	CS2		CCS	P3	B33	11	95.80-95.70	95.74	3.53*	0.44*	0.47	0.60	0.67	0.64	1.91
876	CS2		CCS	C	B12	5	96.60-96.50	96.52	4.12	1.70	0.37	0.59	0.88	0.88	1.67
882	CS2		OBS	P3	B34	7	96.10-96.00	96.03	2.90*	1.43	0.36	0.61*	0.75	0.53*	0.91
1181	CS2		OBS	P3	A43	9	96.90-96.80	96.81	3.29*	2.07*	0.36	0.83	0.91	0.86	1.63
1283	CS2		CCS	P3	B18	13	95.70-95.60	95.69	2.24*	1.50	0.42	0.53	0.72	0.75	0.92
1317	CS2		CCS	P2	A48	6	97.10-97.00	-	2.05*	1.22*	0.46	0.48	0.68	0.66	1.14
27	ES1		CCS	P2	B14	4	96.60-96.50	-	1.33*	1.49	0.37	0.60	0.44	0.50	0.53
35	ES1		OBS	C	B24	5	96.40-96.30	-	1.51	1.20*	0.25	0.48	0.43	0.43	0.29
36	ES1		OBS	C	B24	5	96.40-96.30	96.32	1.50	0.97*	0.21	0.50	0.41	0.42	0.24
115	ES1		OBS	P1	B27	6	96.40-96.30	-	0.93*	1.37*	0.27	0.49	0.46	0.39	0.32
118	ES1		CCS	C	B25	9	96.00-95.90	95.96	2.39	0.63*	0.31	0.64	0.53	0.38	0.79
203	ES1		CCS	P3	B23	5	96.40-96.30	96.38	1.82*	1.23	0.27	0.53	0.49	0.56	0.40
366	ES1		OBS	C	B32	6	96.30-96.20	96.23	1.33	1.27	0.22	0.42	0.32	0.37	0.24
442	ES1		OBS	P1	A37	3	97.60-97.50	-	1.05*	2.26	0.25	0.66	0.58	0.53	0.46
573	ES1		OBS	C	B36	6	96.20-96.15	-	2.41	1.25	0.27	0.72	0.60	0.41	0.56
661	ES1		CCS	P3	A25	8	97.30-97.20	97.26	1.87*	1.20	0.39	0.89	0.55	0.60	0.71
816	ES1		OBS	C	B30	4	96.40-96.30	96.30	2.41	1.17*	0.29	0.52	0.49	0.42	0.49

Table 45. (Continued)

Spec. Number	Type	Variety	Raw Mat.	Status	Unit	Level	Level Elevation	Spec. Elev.	Length	Width	Thick-ness	Base Width	Neck Width	Stem Length	Weight
828	ES1		CCS	C	B37	4	96.25-96.20	-	3.52	1.52	0.31	0.74	0.58	0.35	0.98
924	ES1		CCS	C	B04	4	96.79-96.70	-	1.98	1.07	0.20	0.42	0.44	0.30	0.33
1004	ES1		CCS	D1	A42	4	97.40-97.30	97.31	2.85*	1.50	0.27	9.99*	0.40	0.18*	0.58
1108	ES1		CCS	C	B09	8	96.20-96.10	96.15	2.73	1.73*	0.36	0.76	0.67	0.41	1.11
*1237	ES1		CCS	C	A19	12	96.90-96.70	96.81	2.51	1.75	0.30	0.52	0.47	0.41	0.73
1251	ES1		OBS	F	A27	7	97.30-97.20	97.20	2.07*	1.26*	0.23	0.49	0.46	0.53	0.43
1253	ES1		OBS	P2	A34	8	97.20-97.10	97.18	1.23*	1.14*	0.29	0.53	0.48	0.56	0.34
214	ES2		CCS	C	B23	10	95.90-95.80	95.84	2.75	1.90	0.50	0.95*	0.77	0.54	2.26
261	ES2		OBS	C	B23	12	95.70-95.60	95.65	2.79	1.33	0.47	0.86	0.77	0.55	1.27
682	ES2		CCS	P2	B38	3	96.40-96.30	96.40	2.39*	1.63*	0.48	0.84	0.74	0.42	1.90
779	ES2		OBS	P2	B35	9	95.90-95.80	95.82	1.88*	2.15	0.42	0.64	0.74	0.66	1.14
789	ES2		CCS	P2	A32	2	97.80-97.70	97.75	1.47*	1.63*	0.53	0.75	0.69	0.62	1.11
965	ES2		CCS	P2	A47	6	97.20-97.10	96.16	2.05*	1.63	0.51	1.00	0.75	0.60	1.22
1299	ES2		CCS	P3	B10	9	96.10-96.00	96.00	2.68*	1.46*	0.49	1.01	0.71	0.61	1.60
208	ES3		CCS	C	B23	6	96.30-96.20	96.20	5.24	1.89*	0.47	1.00	0.80	0.66	3.70
239	ES3		CCS	P3	B23	12	95.70-95.60	95.70	4.27*	1.88*	0.59	1.02	0.93	0.63	3.73
1118	ES3		CCS	C	A21	12	96.80-96.70	96.73	3.65	1.95	0.54	0.65*	0.93	0.55	2.80
32	ES3	A	CCS	L	B14	5	96.50-96.40	-	3.19*	2.00*	0.52	1.31	1.02	0.76	2.12
70	ES3	A	CCS	P1	B24	9	96.00-95.90	95.96	1.74*	2.19	0.47	1.26	0.91	0.68	1.51
666	ES3	A	CCS	P3	A02	6	97.80-97.70	97.75	2.77*	1.78*	0.53	1.19	0.96	0.65	2.37
710	ES3	A	CCS	C	B35	7	96.10-96.00	96.08	3.32	2.04	0.47	0.98	0.79	0.73	2.44
850	ES3	A	CCS	C	A21	9	97.10-97.00	97.02	2.86	2.16	0.46	1.23	0.92	0.55	2.45
241	ES3	B	CCS	P3	B21	9	95.95-95.90	-	2.77*	1.86*	0.42	1.18	0.89	0.58	1.68
864	ES3	B	CCS	P1	A21	11	96.85-96.80	-	1.83*	1.58*	0.31	1.02	0.83	0.70	0.57
1209	ES3	B	CCS	C	A20	10	97.00-96.90	96.94	3.20	1.91	0.43	1.05	0.97	0.48	2.19
618	ES3	C	CCS	P3	A24	6	97.60-97.50	-	2.19*	1.42	0.53	1.43	0.98	0.57	1.33
814	ES3	C	OBS	C	A21	7	97.30-97.20	97.21	2.96	1.66	0.51	1.10	0.80	0.58	1.38
975	ES3	C	OBS	C	A47	8	97.00-96.90	96.92	2.51	1.52	0.48	1.05	0.79	0.60	1.13
209	ES4		CCS	P3	B23	8	96.10-96.00	96.04	3.93*	1.98*	0.51	0.39	1.09	1.71	3.34
604	ES4		CCS	C	B13	9	96.10-96.00	96.10	3.32	1.89*	0.52	1.29	1.00	0.62	2.62
631	ES4		CCS	P2	B31	8	96.00-95.90	95.98	2.98*	2.26*	0.56	1.36	1.14	0.81	3.60
675	ES4		CCS	P2	B07	12	95.90-95.80	95.82	2.41*	1.80*	0.55	1.39	1.05	0.63	2.50
713	ES4		OBS	C	B38	8	95.90-95.80	95.89	3.02	2.07*	0.46	1.47	1.18	0.69	2.12
867	ES4		BAS	P3	A40	8	97.10-97.00	97.05	3.71*	1.75*	0.52	1.19	1.02	0.68	3.68
1248	ES4		CCS	C	A19	13	97.80-96.70	96.75	5.15	2.08*	0.61	1.46	1.16	0.70	4.92
43	ES4	A	CCS	P1	B22	6	96.30-96.20	-	1.97*	2.40*	0.44	1.45	1.22	6.20	2.01
68	ES4	A	CCS	C	B14	10	96.00-95.90	95.90	2.83	2.01*	0.53	1.24	1.00	0.58	2.40
256	ES4	A	CCS	C	B22	10	95.85-95.80	-	3.71	2.73	0.48	1.40	1.02	0.77	3.09

Table 45. (Continued)

Spec. Number	Type	Variety	Raw Mat.	Status	Unit	Level	Level Elevation	Spec. Elev.	Length	Width	Thick-ness	Base Width	Neck Width	Stem Length	Weight
284	ES4	A	OBS	P1	B22	12	95.70-95.65	-	1.40*	2.32*	4.40	1.59*	1.30	0.64	1.43
*328	ES4	A	OBS	P2	A13	12		96.89	2.80*	2.73*	0.58	1.81	1.28	0.79	4.35
344	ES4	A	OBS	P2	B25	13	95.60-95.50	95.57	2.53*	2.30*	0.56	1.50	1.24	0.71	2.19
409	ES4	A	CCS	P1	B32	10	95.90-95.80	95.88	1.59*	2.36	0.47	1.24	1.08	0.58	1.83
606	ES4	A	OBS	D1	A04	4	98.00-97.90	97.98	2.64*	2.47*	0.58	*	1.15	0.69*	2.50
645	ES4	A	CCS	C	B07	8	96.30-96.20	-	2.75	2.12*	0.47	1.23	1.04	0.63	2.23
654	ES4	A	CCS	P3	A25	7	97.40-97.30	97.32	3.42*	2.01*	0.52	0.85*	1.17	0.59	2.60
758	ES4	A	CCS	P2	B26	13	95.60-95.50	-	2.24*	1.75*	0.45	0.78*	0.73*	0.39	1.39
860	ES4	A	CCS	P2	A21	11	96.90-96.80	96.87	1.99*	2.43*	0.54	0.81*	1.10	0.70	2.46
978	ES4	A	CCS	D1	A35	5	97.30-97.20	97.26	4.88*	2.37*	0.54	9.99*	1.00	0.49*	4.49
1020	ES4	A	CCS	P3	B16	9	96.10-96.00	96.15	3.74*	2.32*	0.61	1.45	1.27	0.75	4.18
1027	ES4	A	CCS	F	A42	7	97.10-97.00	97.07	3.32	2.47*	0.57	1.58	1.41	0.75	3.93
1113	ES4	A	CCS	C	A22	12	96.80-96.70	96.73	2.87	2.17*	0.51	1.55	1.23	0.64	2.62
1127	ES4	A	CCS	C	A19	2	97.90-97.80	97.87	2.61	2.28	0.50	1.34	1.09	0.66	2.24
1183	ES4	A	CCS	P1	A19	11	97.00-96.90	96.90	1.74*	1.93*	0.45	1.47	1.17	0.62	1.45
2859	ES4	A	CCS	P1	B14	10	96.00-95.90	-	1.55*	2.07*	0.41	0.84*	1.19*	0.66	1.00
211	ES4	B	CCS	P2	B21	5	96.40-96.30	96.38	2.85*	2.53	0.58	1.72	1.37	0.84	3.81
389	ES4	C	CCS	P3	A11	4	97.80-97.70	97.79	3.87*	2.13	0.61	0.91*	1.09	0.62	3.98
428	ES4	C	CCS	P3	B02	7	96.50-96.40	96.43	2.84*	1.73	0.35	1.04	1.01	0.38	1.56
851	ES4	C	CCS	L	A21	9	97.10-97.00	97.00	3.43*	1.98*	0.49	1.40	1.15	0.72	2.75
948	ES4	C	CCS	P2	A47	4	97.40-97.30	97.32	2.04*	1.72*	0.51	1.37	1.01	0.57	1.93
412	ES4	D	OBS	P3	B02	6	96.60-96.50	96.50	3.80*	2.99*	0.69	1.50*	1.39	0.87	7.17
616	ES4	D	CCS	C	B13	11	95.90-95.80	95.86	4.50	2.47	0.64	0.36	1.16	0.85	6.42
674	ES4	D	CCS	L	B31	10	95.80-95.70	95.73	3.75*	2.28*	0.47	1.80	1.34	1.02	3.31
854	ES4	D	OBS	M1	A21	10	96.95-96.90	-	3.86*	2.57*	0.62	9.99*	1.12	*	5.39
1140	ESI1		CCS	C	A28	12	96.80-96.70	96.78	2.94	2.05	0.34	0.67	0.56	0.46	0.94
783	ESI2		CCS	C	B05	8	96.30-96.20	96.23	2.96	1.59*	0.50	0.99	0.72	0.60	1.32
1236	ESI2		CCS	P2	A20	11	96.90-96.80	96.81	1.95*	1.21*	0.38	0.73*	0.76*	0.65	0.89
447	ESI3		CCS	C	B32	12	95.70-95.60	95.69	4.09	1.85	0.65	1.19	0.98	0.52	3.83
785	ESI3	A	OBS	P3	B35	9	95.90-95.80	95.80	2.63*	2.40*	0.47	1.63	1.16	0.71	2.19
1178	ESI3	A	CCS	P2	A20	2	97.80-97.70	97.75	2.10*	2.06*	0.47	0.16	0.96	0.58	1.94
1185	ESI3	A	CCS	C	A43	10	96.80-96.70	96.78	2.69	2.04*	0.55	1.16	0.87	0.62	2.27
1216	ESI3	A	CCS	P2	A20	10	97.00-96.90	96.90	2.72*	2.18	0.46	1.10	0.83	0.62	2.67
301	ESI3	B	CCS	C	B28	6	96.40-96.30	96.34	2.57	1.78	0.41	1.24	1.02	0.45	1.34
362	ESI3	B	CCS	P3	B01	8	96.50-96.40	96.41	4.07*	1.84*	0.45	1.14	0.92	0.64	2.75
456	ESI3	B	CCS	P3	B32	12	95.70-95.60	95.68	3.21*	1.95*	0.39	1.40	0.95	0.57	2.18
518	ESI3	B	CCS	P2	A18	10	97.10-97.00	97.08	2.63*	1.94	0.54	1.21	0.87	0.51	2.88
561	ESI3	B	CCS	P3	A51	9	96.70-96.60	96.65	2.96*	1.62*	0.51	1.09*	0.79	0.65	1.28

Table 45. (Continued)

Spec. Number	Type	Variety	Raw Mat.	Status	Unit	Level	Level Elevation	Spec. Elev.	Length	Width	Thick-ness	Base Width	Neck Width	Stem Length	Weight
595	ESI3	B	CCS	P3	B36	8	96.00-95.90	-	3.40*	2.14	0.50	1.14	0.89	0.50	2.78
838	ESI3	B	CCS	P2	B37	6	96.10-96.00	96.01	2.15*	1.71*	0.40	0.87*	0.87	0.62	1.33
990	ESI3	B	OBS	P2	A48	2	97.50-97.40	97.42	1.64*	1.79*	0.45	1.26*	0.96	0.77	0.97
1024	ESI3	B	CCS	C	A35	10	96.80-96.70	96.71	2.48	1.71	0.43	1.32	0.91	0.52	1.14
1039	ESI3	B	CCS	C	A42	8	97.00-96.90	-	3.28	1.91	0.37	1.27	0.98	0.41	1.75
109	ESI3	C	CCS	P2	A13	4	97.80-97.70	97.76	1.81*	1.55*	0.44	1.11	0.88	0.66	1.01
334	ESI3	C	CCS	P3	B01	2	97.10-97.00	97.04	2.66*	1.74	0.42	1.08	0.93	0.58	1.96
757	ESI3	C	CCS	P3	A12	4	97.80-97.60	-	2.21*	1.48	0.52	1.00	0.89	0.72	1.64
760	ESI3	C	CCS	P2	A18	3	97.80-97.70	-	1.84*	1.59	0.49	1.07	0.86	0.56	0.94
788	ESI3	C	OBS	P3	B38	10	95.70-95.60	-	2.30*	1.58*	0.34	1.21	0.90	0.59	1.04
937	ESI3	C	OBS	P3	A41	8	97.10-97.00	97.06	3.70*	1.54*	0.50	1.24	0.83	0.66	1.61
945	ESI3	C	CCS	P3	B04	7	96.50-96.40	96.40	2.11*	1.72	0.51	1.03	0.82	0.73	0.94
1093	ESI3	C	CCS	C	A49	3	97.40-97.30	97.30	4.02	1.27	0.42	1.01	0.79	0.59	1.43
217	ESI4		OBS	P2	B20	7	96.20-96.10	96.10	2.39*	1.84*	0.45	1.46	1.04	0.67	1.97
461	ESI4		OBS	P2	A53	1	97.30-97.20	-	2.66*	2.48*	0.56	1.93	1.40	0.88	3.41
99	ESI4	A	CCS	P2	A14	3	97.90-94.80	97.84	3.00*	2.36*	0.55	1.31	1.11	0.60	3.44
455	ESI4	A	CCS	C	B02	9	96.30-96.20	96.28	2.72	2.60	0.54	1.36	1.12	0.64	3.08
462	ESI4	A	CCS	P3	B32	12	95.70-95.60	95.67	3.59*	2.43*	0.47	1.45	1.13	0.62	3.41
516	ESI4	A	CCS	P2	B15	11	95.90-95.80	95.89	2.31*	2.32*	0.51	1.36	1.10	0.58	2.52
815	ESI4	A	CCS	C	B30	4	96.40-96.30	96.30	4.74	2.34	0.55	1.80	1.05	0.56	4.13
15	ESI4	B	CCS	P2	A12	3	97.90-97.80	-	1.82*	1.69	0.46	1.20	1.00	0.43	1.07
293	ESI4	B	CCS	P1	A45	5	97.20-97.10	97.10	1.04*	2.07	0.37	0.35	1.07	0.45	0.75
295	ESI4	B	OBS	P2	B28	7	96.30-96.20	96.26	1.63*	1.95*	0.41	1.00*	1.12	0.57	1.13
413	ESI4	B	OBS	P2	B06	14	96.70-96.60	-	2.80*	2.57	0.44	1.52	1.20	0.62	2.58
524	ESI4	B	CCS	C	B15	11	95.90-95.80	95.80	3.52	2.19	0.48	1.40	1.10	0.54	2.04
560	ESI4	B	CCS	C	B15	13	95.70-95.60	95.65	3.67	1.99	0.59	1.29	1.07	0.65	3.34
805	ESI4	B	CCS	P3	B28	10		95.81	2.50*	2.19	0.45	1.29	1.09	0.50	2.16
1089	ESI4	B	CCS	C	B18	8	96.20-96.10	96.10	3.49	2.34*	0.60	0.36	1.25	0.72	3.65
1095	ESI4	B	CCS	P2	B09	6	96.40-96.30	96.35	2.24*	1.88*	0.40	0.96*	1.10	0.63	1.66
26	ESI4	C	CCS	C	A12	4	97.80-97.60	97.61	4.29	1.98	0.68	1.47	1.22	0.69	4.37
40	ESI4	C	CCS	C	A14	7	97.50-97.40	97.41	4.13	1.85	0.57	1.30	1.01	0.63	3.21
105	ESI4	C	CCS	P1	B24	12	95.70-95.60	-	1.15*	1.96	0.43	1.20	1.09	0.51	1.01
116	ESI4	C	CCS	C	A13	7	97.50-97.40	97.43	3.15	1.86	0.37	1.37	1.10	0.57	1.83
143	ESI4	C	CCS	P2	B27	12	95.80-95.70	95.72	2.28*	1.80	0.45	1.36	1.17	0.60	1.81
609	ESI4	C	CCS	P3	A24	5	97.70-97.60	-	3.20*	1.95*	0.67	1.52	1.08	0.73	3.40
880	ESI4	C	CCS	P2	B12	6	96.50-96.40	96.47	2.46*	1.92	0.58	1.32	1.19	0.60	2.16
1017	ESI4	C	CCS	P2	B16	8	96.20-96.10	96.19	2.34*	2.02	0.44	1.53	1.25	0.55	2.34
1120	ESI4	C	CCS	P2	A21	12	96.80-96.70	96.73	2.49*	2.15*	0.43	1.44	1.09	0.68	2.01

Table 45. (Continued)

Spec. Number	Type	Variety	Raw Mat.	Status	Unit	Level	Level Elevation	Spec. Elev.	Length	Width	Thick-ness	Base Width	Neck Width	Stem Length	Weight
3	ESSN		CCS	P0	A16	2	98.00-97.90	-	0.60*	0.92*	0.32	0.92*	*	*	0.17
100	ESSN		OBS	P0	B24	12	95.70-95.60	-	1.06*	1.99*	0.43	1.99	*	1.06*	0.72
364	ESSN		CCS	P2	B24	13	95.60-95.50	95.60	2.20*	2.11*	0.52	1.38	1.14	0.70	2.26
468	ESSN		OBS	P0	B02	10	96.20-96.10	-	0.77*	1.16*	0.34	0.34*	*	*	0.21
478	ESSN		OBS	P0	A53	3	97.10-97.00	-	1.06*	1.53*	0.36	1.53	*	*	0.53
486	ESSN		OBS	P0	B26	12	95.70-95.60	-	0.82*	1.83*	0.41	1.83	*	0.82*	0.65
589	ESSN		OBS	P0	B36	8	96.00-95.90	95.90	0.96*	1.69	0.40	1.69	1.28*	0.71	0.68
729	ESSN		OBS	P0	B22	3	96.60-96.50	-	0.99*	1.78	0.46	1.78	1.17*	0.72*	0.65
736	ESSN		OBS	P0	B22	2	96.70-96.60	-	0.51*	0.54*	0.32	0.54	*	2.00	0.15
762	ESSN		OBS	P0		3	97.80-97.70	-	0.84*	1.57*	0.41	1.57	*	0.84*	0.52
781	ESSN		OBS	P0	B35	9	95.90-95.80	95.83	1.26*	1.77*	0.48	1.77	1.20	0.77	0.73
849	ESSN		OBS	P0	A32	9	97.10-97.00	97.00	0.69*	1.53*	0.33	1.53	*	0.69*	0.26
906	ESSN		OBS	P0	A51	3	97.30-97.20	-	1.04*	1.21*	0.38	1.21*	*	1.04*	0.33
907	ESSN		OBS	P0	A51	3	97.30-97.20	97.20	1.22*	1.59*	0.41	1.59	1.29*	0.92	0.73
981	ESSN		CCS	P0	B08	1	96.92-96.80	96.86	0.73*	1.65*	0.37	1.65	*	0.73*	0.33
1193	ESSN		OBS	P0	A26	1	97.90-97.80	-	0.96*	1.76*	0.50	1.76	1.25	0.96*	0.75
1208	ESSN		OBS	P0	A23	3	97.70-97.60	-	0.80*	1.19*	0.32	1.19	0.87	0.67	0.31
1324	ESSN		CCS	P0	B06	7	96.40-96.30	-	0.80*	1.38*	0.39	1.38	1.05	0.45	0.42
2523	ESSN		CCS	P0	A36	8	97.00-96.90	-	1.17*	1.47*	0.46	1.47	1.10	0.98	0.74
2554	ESSN		OBS	P0	A40	9	97.00-96.90	-	0.74*	1.82*	0.40	1.82	*	0.74*	0.43
2597	ESSN		OBS	P0	A12	4	97.70-97.60	-	1.68*	1.39*	0.27	1.39	*	1.68*	0.16
2664	ESSN		CCS	P0	A21	7	97.30-97.20	-	0.75*	1.31*	0.42	1.31	0.96	0.47	0.42
2711	ESSN		CCS	P0	A04	3	98.10-98.00	-	0.77*	1.86*	0.36	1.86	*	0.77*	0.53
2916	ESSN		CCS	P0	B14	7	96.30-96.20	-	1.37*	1.71*	0.32	1.37	*	1.37*	0.83
2932	ESSN		CCS	P0	B23	12	95.70-95.60	-	1.20*	1.61*	0.43	1.61	1.24*	1.20*	0.76
2951	ESSN		CCS	P0	B23	10	95.90-95.80	-	0.91*	1.52*	0.41	1.52	1.21*	1.70*	0.52
2983	ESSN		OBS	P0	B24	12	95.70-95.60	-	0.83*	1.80*	0.42	1.80	*	0.83*	0.41
3057	ESSN		OBS	P0	B32	12	95.70-95.60	-	0.94*	1.05*	0.37	1.05*	0.70*	0.65	0.30
1122	PS		CCS	C	A43	4	97.40-97.30	97.30	2.68	1.56	0.44	0.33	0.46	0.61	0.95
77	SN3		OBS	C	A16	6	97.60-97.50	97.50	3.08	1.60*	0.49	1.20	1.00	0.69	1.84
96	SN3		CCS	C	B24	11	95.80-95.70	-	3.14	2.41*	0.47	1.64	1.27	0.81	3.29
122	SN3		OBS	C	A13	8	97.40-97.30	97.37	3.36	2.28*	0.49	1.83	1.59	0.80	2.86
218	SN3		OBS	P2	B06	7	96.40-96.30	96.30	3.08*	2.47*	0.53	2.14	1.57	0.98*	3.71
244	SN3		OBS	C	B06	10	96.10-96.00	96.05	2.77	1.79	0.50	1.79	1.43	0.74	2.04
246	SN3		OBS	P3	B07	10	96.10-96.00	96.02	2.77*	2.14	0.45	1.87	1.44	0.79	2.76
268	SN3		CCS	C	B22	11	95.80-95.75	-	3.05	1.60	0.60	1.51	1.18	0.87	2.33
420	SN3		CCS	C	B02	6	96.60-96.50	96.52	2.58	1.88	0.57	1.18	1.14	0.69	2.17
484	SN3		CCS	C	A18	5	97.60-97.50	97.51	3.06	1.88	0.58	1.23	1.10	0.70	2.95
620	SN3		OBS	C	B36	11	95.70-95.60	95.63	3.02	2.26*	0.50	1.59	1.35	0.87	2.67

Table 45. (Continued)

Spec. Number	Type	Variety	Raw Mat.	Status	Unit	Level	Level Elevation	Spec. Elev.	Length	Width	Thick-ness	Base Width	Neck Width	Stem Length	Weight
626	SN3		OBS	P2	B13	13	95.70-95.60	95.61	2.20*	2.17	0.51	1.52	1.15	0.80	2.57
694	SN3		CCS	P3	B38	5	96.20-96.10	96.10	2.61*	2.07	0.58	1.76	1.35	0.96	3.20
974	SN3		CCS	C	B03	11	96.10-96.00	96.01	2.45	2.00	0.52	1.41	1.18	0.64	2.16
1086	SN3		OBS	C	A22	11	96.90-96.80	96.88	3.08	2.02*	0.46	1.80	1.17	0.93	2.39
1146	SN3		CCS	C	B17	9	96.10-96.00	96.03	3.09	2.23*	0.51	1.61	1.25	0.85	3.44
554	SN4		CCS	C	A51	8	96.80-96.70	96.79	3.48	2.02	0.52	0.90	0.85	0.61	2.87
823	SN4		OBS	P3	A32	6	97.40-97.30	97.31	3.34*	1.65*	0.55	0.74	0.81	0.54	2.66
967	SN4		CCS	C	B03	10	96.20-96.10	96.16	3.51	1.66*	0.57	0.96	0.81	0.75	2.55
84	SN5		CCS	M1	B24	10	95.90-95.80	-	2.00*	1.44*	0.41	0.96*	1.00	0.38*	1.20
919	SN5		OBS	C	A46	3	97.50-97.40	97.40	3.81	1.53*	0.38	1.24*	1.01	0.58	1.55
1075	SN5		CCS	P3	A22	9	97.10-97.00	97.02	3.11*	1.73	0.50	1.02*	0.90	0.51	2.23
1	SN5	B	CCS	P2	A14	1/2	97.92-98.02	-	2.30*	1.76*	0.48	1.27	1.06	0.58	2.01
4	SN5	B	OBS	P3	B22	1	96.80-96.70	96.70	3.25*	1.73*	0.43	1.46*	1.31	0.60	2.41
*317	SN5	B	CCS	P2	A16	10		97.03	2.09*	1.53	0.42	1.53	1.16	0.53	1.46
532	SN5	B	CCS	C	A51	2	97.40-97.30	97.33	3.13	1.92	0.57	1.84	1.25	0.66	2.25
541	SN5	B	CCS	P2	A18	13	96.80-96.70	96.77	3.03*	1.96	0.58	0.40*	1.13	0.70	3.89
587	SN5	B	CCS	P2	B13	8	96.20-96.10	96.18	2.44*	1.81*	0.37	1.42	1.05	0.60	1.63
629	SN5	B	CCS	P3	B31	7	96.10-96.00	96.07	2.07*	1.27	0.46	1.28	0.94	0.63	1.17
927	SN5	B	CCS	P2	B03	5	96.70-96.60	96.65	1.70*	1.45	0.42	1.29	0.98	0.54	0.94
1043	SN5	B	CCS	P3	A42	9	96.90-96.80	96.88	2.97*	1.60*	0.56	1.59	1.12	0.68	2.43
1055	SN5	B	CCS	C	B08	10	96.00-95.90	95.90	3.44	1.57	0.54	1.33	1.02	0.61	2.17
1078	SN5	B	CCS	P1	B09	2	96.80-96.70	96.73	1.64*	1.70	0.42	1.26*	0.97	0.75	1.11
1094	SN5	B	CCS	P3	A49	3	97.40-97.30	97.30	2.36*	1.78*	0.45	1.34	1.09	0.57	1.57
1104	SN5	B	CCS	P2	A29	11	96.80-96.70	96.72	2.21*	1.77	0.37	1.53	1.04	0.55	1.38
1111	SN5	B	CCS	P2	B09	8	96.20-96.10	96.10	2.24*	1.59	0.36	1.27	0.86	0.55	1.36
1114	SN5	B	CCS	P3	A22	13	96.70-96.60	96.67	4.17*	2.19*	0.56	1.52	1.09	0.62	4.19
1212	SN5	B	CCS	P2	B17	11	96.85-96.80	-	2.57*	1.87	0.44	1.50*	1.30	0.50	2.46
1221	SN5	B	CCS	P2	B17	12	95.80-95.70	95.80	2.48*	2.00*	0.41	1.21*	*	0.58	2.10
1254	SN5	B	CCS	P3	B09	11	95.90-95.80	95.80	2.62*	1.63	0.47	1.44	1.05	0.64	1.66
1320	SN5	B	CCS	P2	A52	4	97.20-97.10	-	2.02*	1.71	0.43	0.98*	1.02	0.58	1.33
856	SN6		OBS	L	A28	7	97.30-97.20	97.23	1.75	1.10	0.32	0.46*	0.49	0.47	0.44
1167	SN6		OBS	P2	A50	7	96.90-96.80	-	1.12*	1.37	0.23	1.37	*	-	0.33

1 Spec. Number: *number=problematic provenience; Raw Material: CCS=cryptocrystalline silicates; OBS=obsidian; BAS=basalt
Status: P=proximal end, P0=base only, P1=base and at least one barb, P2=base and half of blade, P3=only tip missing; M=medial frag., M1=includes part of haft element, M2=blade frag. only, M3=most of blade except tip; D=distal frag., D1=only base missing, D2=only tip present, no diagnostic features; L=lateral frag.; C=complete, but may include specimens w. broken barb(s), see dimensions; UI=unidentifiable
*=fragmentary specimen, measurement incomplete; all measurements in centimeters, weight in grams

Table 46. Attributes and Dimensions of Classified Large Bifaces, 35WH14[1]

Spec. Number	Unit	Lev.	Level Elevation	Spec. Elev.	Status	Shape	Raw Mat.	Length	Width	Thickness	Weight	Stage Side A	Stage Side B
13	A14	4	97.80-97.70	-	D	A	CCS	3.94*	1.66*	0.56	2.80	4	4
18	A12	4	97.80-97.60	97.61	C	O	CCS	4.86	3.21	0.92	13.56	2	2
21	B24	3	96.60-96.50	96.57	P	S	CCS	2.53*	2.28	0.73	3.82	3	4
49	B22	7	96.10-96.10	96.15	C	T	CCS	3.59	1.28	0.54	2.75	4	4
50	B22	7	96.20-96.10	96.14	U	U	CCS	3.67*	2.73	0.86	7.93	3	3
60	B22	8	96.10-96.00	-	P	T	CCS	3.77*	3.24	0.73	7.56	3	3
63	B22	8	96.10-96.00	-	T	U	CCS	2.19*	2.56*	0.72	4.48	2	3
75	A14	10	97.20-97.10	97.16	U	U	CCS	3.64*	4.60*	1.84	33.74	2	2
*85	B22	9	96.00-95.90	-	C	T	CCS	5.61	3.38	1.01	16.61	2	2
89	A13	2	98.00-97.90	97.94	M	U	CCS	1.80*	2.74*	0.65	3.96	2	3
108	B20	4	96.60-96.40	96.54	C	T	CCS	4.66	2.58	0.70	7.67	3	4
110	A13	4	97.80-97.70	97.74	P	R	CCS	2.81*	3.84*	0.97	9.38	2	3
*117	B22	7		96.30	D	A	CCS	4.14*	1.62*	0.55	2.86	4	4
124	B27	9	96.10-96.00	-	T	R	CCS	2.04*	3.79*	0.70	5.60	2	2
129	B25	12	95.70-95.60	95.67	C	F	CCS	4.84	2.73	1.42	15.13	2	2
131	B27	10	96.00-95.90	-	D	A	CCS	3.41*	3.19*	0.77	8.54	2	3
135	B20	10	96.00-95.90	95.94	P	R	CCS	4.97*	3.92*	1.17	24.43	2	3
138	A13	9	97.30-97.20	97.23	D	A	CCS	2.46*	2.47*	0.83	4.10	2	2
141	B27	11	95.90-95.80	-	D	A	CCS	3.52*	2.43*	0.63	5.33	3	3
150	B22	7	96.20-96.10	-	C	O	CCS	3.91	2.40	0.89	8.70	2	2
161	B14	11	95.90-95.80	-	P	T	CCS	2.73*	2.75	0.54	4.24	3	3
162	B14	11	95.90-95.80	-	P	S	CCS	2.03*	2.34	0.41	2.15	2	4
177	B22	9	96.00-95.90	-	D	U	CCS	3.83*	1.99*	0.65	6.52	2	2
192	B24	11	95.80-95.70	-	D	A	CCS	1.80*	1.73*	0.71	1.43	4	4
212	B23	9	96.00-95.90	95.96	C	O	CCS	4.86	3.57	1.00	17.79	3	3
215	B21	7	96.20-96.10	96.10	D	A	CCS	2.41*	2.53*	0.68	2.97	2	3
216	B21	7	96.20-96.10	96.10	C	R	CCS	4.35	3.82	1.63	27.22	2	2
221	B23	11	95.80-95.70	95.76	P	R	CCS	3.43*	3.11	0.97	7.29	2	3
230	B23	11	95.80-95.70	95.70	P	R	CCS	2.81*	3.11	0.93	9.06	2	2
233	B06	9	96.20-96.10	96.15	C	O	CCS	4.54	3.14	1.11	14.28	2	3
236	B23	12	95.70-95.60	95.65	C		CCS	3.77	3.23	1.84	9.59	2	3
238	B06	10	96.10-96.00	96.06	C	O	CCS	4.99	3.46	1.11	18.53	2	2
243	B21	9	96.00-95.90	95.95	P	T	CCS	2.50*	2.25	0.78	4.83	2	3
245	B06	10	96.10-96.00	96.05	D	A	CCS	3.75*	3.00*	0.78	5.82	2	3
260	B22	10	95.90-95.80	95.80	D	R	CCS	2.97*	2.26*	0.81	5.23	2	3
272	B22	11	95.80-95.70	-	D	A	CCS	1.92*	1.42*	0.36	0.71	4	4
275	B06	11	96.00-95.90	95.89	D	A	CCS	4.17*	3.10*	1.01	11.41	2	3
276	A30	5	97.40-97.30	97.34	C	T	CCS	4.12	2.24	0.72	6.14	3	3
297	B14	13	95.70-95.60	95.67	P	R	CCS	4.83*	3.53	1.12	18.76	3	3
*298	B24	13		95.66	P	T	CCS	3.18*	2.98	0.49	4.41	2	2
306	B28	6	96.40-96.30	96.34	C	O	CCS	4.11	2.69	0.73	7.29	2	2
307	A30	7	97.20-97.15	-	P	T	OBS	2.95*	2.28*	0.40	2.51	4	4
312	B14	13	95.70-95.60	95.64	U	O	CCS	4.79*	3.75*	1.03	15.91	2	3
313	B28	7	96.30-96.20	96.20	P	S	CCS	3.36*	3.85	0.82	8.45	2	3
321	A15	9	97.30-97.20	97.29	C	T	CCS	4.87	2.39	0.89	9.21	2	3
323	B25	12	95.70-95.60	95.65	P	R	CCS	2.96*	3.15*	0.91	8.95	2	3
332	B28	9	96.10-96.00	96.07	D	A	CCS	4.62*	2.93*	0.77	7.73	2	3
336	B25	12	95.70-95.70	95.61	D	A	CCS	2.29*	4.13*	1.83	14.10	2	2
337	B01	2	97.10-97.00	97.00	D	A	CCS	2.71*	2.05*	0.55	2.57	2	3
339	A30	8	97.10-97.00	97.03	D	F	CCS	2.96*	1.69	0.75	3.15	5	5
341	B25	13	95.60-95.50	95.58	D	A	CCS	1.63*	1.10*	0.43	0.64	4	4
351	B28	10	96.00-95.90	96.00	M	U	OBS	2.62*	2.05*	0.77	4.78	3	3
352	B25	13	95.60-95.50	95.53	C	T	CCS	3.35	1.95	0.64	3.57	4	4
356	B01	6	96.65-96.60	-	P	S	CCS	4.18*	3.14	1.05	13.73	2	3
360	A13	14	96.80-96.70	96.72	U	U	CCS	3.68*	4.02*	1.02	12.85	2	3
361	B01	8	96.50-96.45	-	D	R	CCS	2.94*	3.88*	0.91	8.04	2	3
373	B01	10	96.30-96.20	96.29	D	R	CCS	4.02*	2.68*	1.07	9.37	2	3
376	A11	2	98.00-97.90	97.99	P	R	CCS	3.99*	3.35*	1.21	18.39	2	3
*379	B32	7	96.20-96.10	96.15	D	A	CCS	2.04*	1.71*	0.53	1.67	4	4

Table 46. (Continued)

Spec. Number	Unit	Lev.	Level Elevation	Spec. Elev.	Sta- tus	Shape	Raw Mat.	Length	Width	Thick- ness	Weight	Stage Side A	Stage Side B
381	B28	13	95.70-95.60	95.60	D	A	CCS	2.48*	2.13*	0.56	2.27	2	3
388	B14	8	96.20-96.10	-	P	T	CCS	2.66*	4.21*	0.86	10.31	2	2
390	A11	4	97.80-97.70	97.75	P	T	CCS	2.63*	2.39	0.67	4.22	3	4
391	A11	4	97.80-97.70	97.75	C	T	CCS	3.69	2.74	0.73	6.38	4	4
397	B02	3	96.90-96.80	96.78	C	O	CCS	4.10	3.07	1.25	14.02	2	2
399	B32	9	96.00-95.90	95.97	P	R	CCS	3.04*	3.35	1.00	10.83	3	3
402	B32	9	96.00-95.90	-	D	A	CCS	2.44*	2.76*	1.01	6.52	2	2
403	A07	5	97.80-97.70	97.79	C	O	CCS	4.29	2.59	0.77	6.90	2	3
405	A07	5	97.80-97.70	97.77	C	O	CCS	5.92	4.00	1.50	29.97	2	2
407	B02	6	96.60-96.50	96.52	P	S	CCS	2.48*	2.81	0.68	5.93	3	4
408	B29	4	96.60-96.50	96.58	P	S	CCS	6.13*	3.34	1.00	15.04	2	3
*416	B20	11	95.20-95.00	-	D	A	CCS	1.20*	1.57*	0.41	0.67	4	4
430	B29	5	96.50-96.40	96.44	C	O	CCS	3.78	2.86	1.19	12.60	3	3
433	B32	11	95.80-95.70	-	P	T	CCS	2.65*	2.12	0.53	3.39	4	4
446	B02	8	96.40-96.30	96.34	U	R	CCS	2.47*	2.13*	0.64	2.96	2	3
453	B02	9	96.30-96.20	96.29	D	A	CCS	3.39*	2.38*	0.84	4.88	2	2
454	B32	12	95.70-95.60	95.68	C	F	CCS	5.10	2.78	0.83	11.47	2	2
466	B03	9	96.30-96.20	96.20	D	R	CCS	3.56*	2.98*	0.85	7.50	2	3
*470	A15	3		97.92	C	T	CCS	4.90	2.81	0.93	12.74	2	2
481	A37	10	96.90-96.80	96.82	P	S	CCS	2.47*	1.96	0.41	1.85	4	4
494	B15	9	96.10-96.00	96.07	C	T	OBS	3.24	1.61	0.43	1.79	4	4
497	B32	12	95.70-95.60	95.63	C	T	CCS	6.10	3.75	1.14	25.12	2	2
499	B32	12	95.70-95.60	95.63	C	O	CCS	4.83	3.22	0.91	11.69	2	3
503	A53	7	96.70-96.60	96.61	P	T	CCS	2.72*	2.14	0.46	2.92	4	4
517	B26	12	95.70-95.60	95.62	M	U	CCS	3.22*	2.37*	0.53	3.70	3	3
520	B15	11	95.90-95.80	95.84	C	O	CCS	5.07	3.84	0.93	16.66	1	3
521	A09	10	97.30-97.20	97.28	D	A	CCS	3.30*	2.17*	0.56	3.05	3	4
530	B15	12	95.80-95.70	95.79	T	R	CCS	4.81*	3.27*	1.08	13.23	3	3
531	B29	12	95.80-95.70	95.75	D	A	CCS	4.57*	2.42	0.86	5.39	2	3
535	B29	13	95.70-95.60	95.68	D	L	CCS	4.37*	2.50	0.58	5.07	5	5
538	A06	5	97.80-97.70	97.79	C	O	CCS	5.17	3.28	0.19	14.52	2	2
542	A21	1	97.90-97.80	97.80	T	R	CCS	2.59*	4.00*	0.93	10.57	2	2
553	A51	7	96.90-96.80	96.84	T	U	CCS	2.36*	3.56*	1.51	10.96	2	2
558	B15	13	95.70-95.60	95.65	C	O	CCS	4.71	3.10	1.25	15.50	2	2
562	B13	4	96.60-96.50	96.60	P	T	CCS	3.22*	2.45	0.52	4.95	2	4
563	B15	13	95.70-95.60	95.65	M	U	OBS	2.02*	2.77*	0.54	2.90	2	3
567	B15	13	95.70-95.60	95.63	D	A	CCS	4.94*	1.69*	0.78	4.97	2	3
569	B15	13	95.70-95.60	95.62	D	A	CCS	2.98*	2.32*	0.80	5.00	3	3
570	A05	5	97.90-97.80	97.85	D	A	OBS	3.37*	2.22*	0.45	2.79	4	4
571	A05	5	97.90-97.80	-	P	T	CCS	3.71*	2.61	0.61	6.07	4	4
576	B36	6	96.11-96.10	-	D	A	CCS	2.98*	2.62*	0.61	3.74	3	3
577	B36	7	96.10-96.00	96.09	D	A	CCS	2.85*	2.22*	0.60	4.06	2	4
581	B36	7	96.10-96.00	96.02	D	A	CCS	3.12*	1.83*	0.50	2.63	3	4
584	B36	8	96.00-95.90	95.94	D	A	CCS	3.58*	1.83*	0.56	2.92	3	4
585	B15	14	95.60-95.50	95.55	C	F	CCS	7.92	2.71	0.68	15.75	5	5
591	A05	8	97.60-97.50	97.50	P	S	CCS	2.77*	2.44	0.55	3.72	4	4
592	B36	8	96.00-95.90	95.92	C	F	CCS	7.37	2.54	0.91	17.25	3	3
596	A04	2	98.20-98.10	-	D	A	CCS	4.21*	3.14*	0.99	14.57	2	3
599	B36	9	95.90-95.80	-	D	A	CCS	3.27*	2.54*	0.56	4.21	3	4
601	A04	3	98.10-98.00	98.05	L	O	CCS	4.06	2.16*	0.73	5.70	2	3
607	A04	4	98.00-97.90	-	D	A	CCS	3.03*	1.83*	0.51	2.41	3	3
608	A04	4	98.00-97.90	97.92	P	C	CCS	4.17*	3.90*	0.61	10.80	5	5
610	A04	4	98.00-97.90	97.90	P	T	CCS	2.46*	2.35	0.56	3.10	3	4
611	B13	10	96.00-95.90	95.95	U	U	CCS	3.09*	2.75	0.77	6.21	2	2
615	B36	10	95.80-95.70	95.74	D	A	CCS	3.68*	1.65	0.50	2.38	3	4
621	B36	11	95.70-95.60	95.62	D	A	CCS	3.95*	2.97*	0.62	5.24	2	3
646	A08	4	97.80-97.70	-	T	R	CCS	2.13*	2.36*	0.60	2.67	3	3
647	B15	12	95.80-95.70	-	P	U	CCS	2.50*	2.80*	0.79	6.80	2	3

Table 46. (Continued)

Spec. Number	Unit	Lev.	Level Elevation	Spec. Elev.	Sta-tus	Shape	Raw Mat.	Length	Width	Thick-ness	Weight	Stage Side A	Stage Side B
649	A06	6	97.70-97.60	-	D	A	CCS	3.37*	2.09*	0.50	2.59	3	3
652	A02	4	98.00-97.90	97.98	D	A	CCS	3.44*	2.68*	0.76	5.08	3	3
653	B31	9	95.90-95.80	95.88	C	T	CCS	4.54	2.87	0.62	5.50	4	4
657	B31	9	95.90-95.80	95.82	C	O	CCS	9.60	7.20	2.73	145.00	1	2
662	B31	9	95.90-95.80	95.83	D	A	CCS	2.80*	2.48*	0.72	4.22	2	2
664	A25	8	97.30-97.20	97.26	D	A	CCS	1.83*	1.53*	0.36	0.69	2	4
665	B07	9	96.20-96.10	96.10	D	A	OBS	2.53*	2.63*	0.55	3.16	3	3
667	A25	9	97.20-97.10	97.11	D	A	CCS	4.65*	3.66	1.05	14.40	2	3
671	B07	10	96.10-96.00	96.00	T	R	CCS	0.79*	2.51*	0.63	2.89	3	3
673	B31	10	95.80-95.70	95.74	P	R	CCS	3.04*	2.83	0.70	7.22	2	3
677	B31	10	95.80-95.70	95.70	C	O	CCS	5.40	4.03	1.70	40.27	2	2
678	B07	12	95.90-95.80	95.81	C	O	CCS	6.50	3.99	0.87	22.02	2	2
680	B31	11	95.70-95.60	95.68	P	U	CCS	2.30*	2.94*	0.68	4.87	3	3
681	B07	12	95.90-95.80	95.82	T	R	CCS	2.80*	2.88*	0.85	6.40	2	3
685	B19	6	96.40-96.30	96.30	D	A	CCS	3.19*	2.50*	0.80	4.96	2	3
687	B38	3	96.40-96.30	96.30	D	A	CCS	4.53*	2.29*	0.74	6.00	3	4
689	B38	4	96.30-96.20	96.22	D	A	CCS	3.06*	2.97*	0.78	3.90	3	3
692	B38	5	96.20-96.10	96.12	D	A	CCS	3.91*	2.13	0.55	4.52	5	5
693	B38	5	96.20-96.10	96.12	P	S	CCS	3.24*	2.73	0.62	6.71	4	4
696	B38	6	96.10-96.00	96.10	U	U	CCS	2.93*	2.32*	0.49	3.62	2	2
697	B38	6	96.10-96.00	96.05	D	A	OBS	1.89*	1.31*	0.37	0.90	4	4
705	B38	7	96.00-95.90	95.91	M	U	CCS	2.89*	3.70*	1.17	14.18	2	2
707	B33	3	96.60-96.50	96.54	C	T	CCS	3.59	2.73	0.58	5.00	3	3
724	B33	5	96.40-96.30	-	M	U	CCS	2.35*	2.46*	0.81	5.85	3	3
725	B33	5	96.40-96.30	-	D	A	CCS	4.28*	2.73*	0.85	8.47	3	4
730	B31	1	96.70-96.60	96.60	D	A	CCS	2.17*	2.49*	0.93	4.35	2	2
738	B01	9	96.40-96.30	-	P	R	CCS	1.58*	1.81*	0.47	1.33	4	4
741	A31	2	97.80-97.70	-	P	S	CCS	2.93*	3.78	0.87	11.53	2	3
743	A45	2	97.50-97.40	-	D	A	OBS	1.34*	2.48*	0.99	2.00	2	2
752	A18	7	97.40-97.30	-	P	R	CCS	2.72*	2.04	0.47	2.46	2	3
755	B21	4	96.50-96.40	-	L	U	CCS	3.60*	1.85*	0.60	4.61	2	2
764	A18	5	97.60-97.50	-	D	A	CCS	3.32*	2.95*	0.88	4.69	2	3
765	A18	5	97.60-97.50	-	D	A	CCS	4.10*	3.45*	0.94	8.19	3	3
767	A11	1	98.10-98.00	-	D	A	OBS	1.74*	2.12*	0.45	1.38	3	3
769	A07	3	98.00-97.90	-	C	O	CCS	3.96	3.56	1.16	15.15	2	2
775	B31	9	95.90-95.80	-	P	R	CCS	2.22*	2.84*	0.66	4.52	2	2
778	B38	9	95.80-95.70	95.75	P	S	CCS	3.09*	2.45	0.76	6.83	4	4
782	B35	9	95.90-95.80	95.83	C	T	CCS	5.22	3.51	1.11	18.09	3	3
784	B05	8	96.30-96.20	96.22	C	F	CCS	9.02	3.38	1.08	33.24	3	3
793	B33	9	96.00-95.90	95.97	D	A	CCS	3.03*	1.92*	0.84	3.26	5	5
808	A21	7	97.30-97.20	-	U	R	CCS	2.11*	3.27*	0.66	5.45	3	3
824	B37	1	96.60-96.50	96.51	P	S	CCS	2.47*	1.62	0.45	1.96	4	4
827	B37	4	96.30-96.20	-	P	S	CCS	4.11*	2.70	0.96	9.98	2	3
830	B37	5	96.20-96.10	96.11	P	T	OBS	1.82*	1.90	0.37	1.00	4	4
836	A32	8	97.20-97.10	96.13	C	T	CCS	3.31	2.39	0.51	4.37	4	4
844	B37	8	95.90-95.80	95.84	C	O	CCS	5.37	4.43	2.43	53.66	2	2
848	A32	9	97.10-97.00	97.01	D	R	CCS	2.66*	2.88*	0.89	6.36	2	2
865	B12	2	96.90-96.80	96.80	P	S	CCS	4.26*	4.21	1.79	31.19	2	2
868	B34	3	96.50-96.40	96.44	U	U	CCS	3.59*	2.08*	1.14	8.92	2	2
871	B12	4	96.70-96.60	96.60	P	T	CCS	3.02*	3.03	0.74	7.77	3	3
873	B12	4	96.70-96.60	96.60	D	A	OBS	2.33*	1.83*	0.39	1.37	4	4
874	B12	5	96.60-96.50	96.55	D	A	CCS	2.68*	2.34*	0.96	5.46	2	3
885	B38	7	96.00-95.90	95.96	P	R	CCS	2.40*	2.63	0.77	5.18	2	3
890	B19	11	95.90-95.80	-	D	A	CCS	2.90*	2.05*	0.52	2.61	3	4
896	B33	4	96.50-96.40	-	D	A	CCS	4.51*	2.98*	0.81	10.25	3	3
908	B21	9	96.00-95.90	95.95	D	A	CCS	2.95*	1.95*	0.55	3.02	4	4
912	B12	7	96.40-96.30	96.38	C	U	CCS	3.74	2.91	0.99	8.33	2	2
920	B03	3	96.90-96.80	96.90	D	A	CCS	3.23*	2.56*	1.02	6.93	2	2
922	A41	6	97.30-97.20	97.29	D	A	CCS	3.42*	2.11*	0.61	3.08	2	2

Table 46. (Continued)

Spec. Number	Unit	Lev.	Level Elevation	Spec. Elev.	Sta- tus	Shape	Raw Mat.	Length	Width	Thick- ness	Weight	Stage Side A	Stage Side B
928	B04	5	96.70-96.60	96.65	D	U	CCS	3.80*	2.59	0.89	7.55	3	3
933	B04	6	96.60-96.50	96.58	D	A	CCS	3.14*	2.03*	0.75	2.99	3	3
947	B04	8	96.40-96.30	96.30	D	A	CCS	4.75*	2.86*	0.87	9.31	3	3
955	A41	10	96.90-96.80	96.83	C	T	CCS	4.96	3.31	0.76	10.11	1	3
959	A47	6	97.20-97.10	97.19	P	R	CCS	2.66*	2.20*	0.55	3.48	4	4
970	A47	7	97.10-97.00	97.01	D	A	CCS	2.30*	1.88*	0.66	2.65	3	3
979	A42	1	97.70-97.60	97.65	D	A	CCS	2.46*	3.14*	0.71	4.59	2	3
993	A48	3	97.40-97.30	97.40	D	A	OBS	2.26*	1.27*	0.62	1.45	5	5
1002	A47	4	97.40-97.30	97.30	P	S	CCS	2.61*	2.95	0.68	5.24	2	4
1010	A36	10	96.80-96.70	96.76	P	R	CCS	3.12*	3.53	0.83	10.84	3	3
1030	A48	7	97.00-96.90	96.95	D	A	CCS	3.70*	3.28*	0.81	5.90	3	3
1034	B11	4	96.60-96.50	-	D	A	CCS	3.22*	2.87*	0.85	6.21	2	2
1037	B11	4	96.55-96.50	-	T	R	CCS	2.41*	3.72*	1.43	12.54	2	2
1044	A36	6	97.30-97.20	97.22	P	S	CCS	3.50*	2.78	0.58	5.10	4	4
1051	B11	8	96.20-96.10	96.15	C	O	CCS	3.79	2.34	0.90	8.50	2	3
1057	B11	9	96.10-96.00	96.05	C	O	CCS	4.70	2.76	0.67	8.05	3	3
1058	B08	11	95.90-95.80	95.85	D	A	CCS	2.30*	1.69*	0.53	1.66	3	3
1059	A22	7	97.30-97.20	97.23	C	O	CCS	3.90	2.50	0.79	7.37	2	2
1069	A22	8	97.20-97.10	97.12	C	T	CCS	4.22	2.27	0.74	7.52	3	3
1071	A50	4	97.20-97.10	97.11	P	S	CCS	3.50*	3.03	0.70	9.88	4	4
1074	A50	5	97.10-97.00	97.06	P	R	CCS	4.62*	2.80	0.81	9.24	2	3
1085	A44	8	96.90-96.80	-	P	T	CCS	1.84*	2.12	0.49	1.90	4	4
1087	B18	8	96.20-96.10	96.11	T	R	CCS	4.58*	3.60	0.81	15.58	2	3
1092	A22	11	96.90-96.80	96.86	M	U	OBS	2.86*	1.52*	0.60	2.50	2	4
1097	A29	10	96.90-96.80	96.81	P	S	CCS	2.93*	2.22	0.63	4.00	3	3
1100	B09	6	96.40-96.30	96.32	M	U	CCS	1.96*	1.29*	0.44	0.84	4	4
1101	A49	4	97.30-97.20	97.20	C	T	CCS	3.30	2.34	0.75	5.36	3	3
1109	B09	8	96.20-96.10	96.15	M	U	CCS	2.58*	2.42*	0.63	4.52	3	3
1116	B09	9	96.10-96.00	96.00	D	A	CCS	3.83*	2.37*	0.91	6.69	3	3
1119	B09	10	96.00-95.90	-	D	A	CCS	3.29*	2.45*	0.55	3.11	2	4
1121	A29	12	96.70-96.60	96.65	L	U	CCS	3.22*	3.27*	1.09	12.18	3	3
1128	A19	2	97.90-97.80	97.86	T	R	CCS	3.27*	3.80*	1.04	14.70	2	3
1130	B17	7	96.30-96.20	96.20	P	S	CCS	1.70*	2.42	0.56	2.77	2	4
1131	A49	8	96.90-96.80	96.88	P	T	CCS	3.67*	3.09	0.83	6.88	3	4
1152	A43	8	97.00-96.90	96.92	D	A	CCS	3.79*	3.06*	1.15	10.84	2	3
1153	A43	8	97.00-96.90	96.97	C	O	CCS	4.56	2.64	1.35	13.28	2	2
1161	A28	13	96.70-96.60	96.67	U	U	CCS	3.75*	3.90*	1.04	9.46	2	2
1164	A28	13	96.70-96.60	96.65	C	O	CCS	5.69	3.53	1.88	29.46	2	3
1166	A33	9	97.00-96.95	-	C	T	CCS	5.28	1.80	0.59	4.83	4	4
1169	A43	9	96.90-96.80	96.88	D	A	OBS	2.39*	1.95*	0.46	1.68	4	4
1184	A20	3	97.60-97.65	-	C	T	CCS	3.24	2.58	0.83	5.68	2	4
1189	A19	12	96.90-96.80	96.85	P	R	CCS	2.77*	5.47*	1.10	14.60	2	2
1192	B16	12	95.80-95.70	95.74	D	A	CCS	2.90*	2.44*	0.66	3.47	2	3
1195	A26	2	97.80-97.70	97.72	D	A	CCS	3.94*	2.38*	0.70	5.96	3	3
1201	A20	7	97.30-97.20	97.21	D	A	OBS	2.11*	1.94*	0.49	1.55	4	4
1202	A20	7	97.30-97.20	97.20	C	T	CCS	5.02	2.57	0.88	10.40	3	3
1205	A23	2	97.80-97.70	97.74	D	A	CCS	2.79*	1.50*	0.56	2.16	3	4
1207	A20	9	97.10-97.00	97.03	D	A	CCS	3.37*	2.74*	0.60	4.58	2	2
1211	A20	10	97.00-96.90	96.93	L	U	CCS	5.47*	2.40*	0.88	12.40	3	3
1215	A20	10	97.00-96.90	96.90	C	O	CCS	6.75	4.25	1.39	33.01	2	3
1220	A20	11	96.90-96.80	96.89	C	O	CCS	4.69	3.52	0.65	9.60	2	2
1244	A19	13	96.80-96.70	96.79	C	O	CCS	4.99	3.09	0.89	12.03	2	2
1247	A19	13	96.80-96.70	96.75	C	O	CCS	5.74	2.96	0.99	16.16	3	3
1249	B09	11	95.90-95.80	95.82	C	O	CCS	5.22	3.45	1.33	27.21	2	3
1252	A19	14	96.70-96.60	96.60	C	O	CCS	4.82	3.24	1.23	16.08	2	2
1271	A52	3	97.30-97.20	97.21	C	T	CCS	5.10	1.92	0.43	3.63	4	4
1274	A26	12	96.80-96.70	96.73	P	R	CCS	2.87*	3.55	0.95	9.94	2	2
1278	B10	5	96.50-96.40	-	C	T	CCS	3.45	1.53	0.44	2.46	4	4
1281	B18	13	95.70-95.60	95.61	D	A	CCS	2.96*	3.09*	1.56	13.67	2	2

Table 46. (Continued)

Spec. Number	Unit	Lev.	Level Elevation	Spec. Elev.	Sta- tus	Shape	Raw Mat.	Length	Width	Thick- ness	Weight	Stage Side A	Stage Side B
1284	A06	9	97.40-97.30	97.00	C	O	CCS	6.68	3.45	0.97	17.94	2	2
1289	A27	9	97.10-97.00	97.00	P	R	CCS	3.89*	2.99	1.04	9.78	2	2
1291	B10	7	96.30-96.20	96.20	D	A	CCS	3.63*	2.45*	0.68	5.54	3	3
1300	A52	6	97.00-96.90	96.90	D	A	CCS	3.05*	1.75*	0.63	3.60	2	4
1301	A27	13	96.70-96.60	96.70	C	O	CCS	5.98	3.24	1.38	19.90	2	3
1302	B10	9	96.10-96.00	96.00	D	A	CCS	2.06*	2.10*	0.58	2.29	2	2
1305	B10	10	95.93-95.90	-	T	R	CCS	2.81*	2.82	0.68	6.80	2	3
1309	A26	10	97.00-96.90	-	U	U	CCS	2.72*	2.36*	0.59	4.46	2	3
1313	B16	2	96.80-96.70	-	D	A	CCS	2.33*	2.19*	0.73	3.35	2	2
1318	B19	10	96.00-95.90	-	C	O	CCS	3.71	2.54	0.84	8.47	2	2
1319	A20	2	97.80-97.70	-	C	T	CCS	3.72	2.59	0.76	6.78	2	2
1323	B08	12	95.80-95.70	-	P	S	CCS	1.83*	1.85	0.37	1.69	4	4
1327	B08	6	96.40-96.30	-	C	U	CCS	3.87	2.58	0.99	6.88	2	2
1331	B16	8	96.20-96.10	-	T	R	CCS	3.42*	2.91*	0.83	9.98	2	3
1333	A26	10	97.00-96.90	-	D	A	CCS	2.66*	2.09*	0.48	2.33	3	3
1352	A27	13	96.70-96.60	-	C	O	CCS	4.69	4.07	1.09	20.38	2	2
2004	B17	9	96.10-96.00	-	U	R	CCS	4.61*	4.28*	1.72	32.97	2	2
2043	B17	8	96.20-96.10	-	P	S	CCS	1.20*	1.86	0.53	1.29	4	4
2053	B21	3	96.60-96.50	-	P	R	CCS	3.17*	3.34	0.79	7.69	2	3
2067	B16	11	95.90-95.80	-	C	O	CCS	3.42	2.34	0.92	6.00	2	2
2128	B31	8	96.00-95.90	-	U	O	CCS	6.48	4.56*	0.98	27.96	1	2
2141	B23	9	96.00-95.90	-	C	O	CCS	5.90	3.90	0.96	20.92	2	3
2175	B34	6	96.20-96.10	-	C	R	CCS	5.83	4.08	1.90	42.77	2	2
2194	B35	7	96.10-96.00	-	P	Y	CCS	2.29*	2.34	0.46	1.87	4	4
2210	B11	4	96.60-96.50	-	M	U	CCS	2.12*	2.79*	0.76	4.25	2	3
2225	B31	10	95.80-95.70	-	C	O	CCS	4.86	3.40	1.02	14.42	2	2
2226	B31	10	95.80-95.70	-	L	U	CCS	5.60*	2.86*	1.62	24.54	2	2
2258	B37	4	96.30-96.20	-	M	U	CCS	2.89*	3.39*	1.25	11.81	2	2
2308	B33	7	96.20-96.10	-	D	A	CCS	3.70*	3.65*	1.26	13.86	2	3
2331	B35	6	96.20-96.10	-	L	U	CCS	4.11*	2.33*	1.35	12.50	2	2
2342	B33	9	96.00-95.90	-	D	A	CCS	3.72*	1.82*	1.85	3.80	3	3
2347	B31	4	96.40-96.30	-	M	U	CCS	3.03*	3.03*	1.01	8.58	2	2
2401	A22	11	96.90-96.80	-	U	R	CCS	2.38*	3.27*	0.80	5.77	2	2
2415	A19	12	96.90-96.80	-	L	U	CCS	3.68*	3.32*	1.11	12.49	2	2
2482	A27	8	97.20-97.10	-	U	R	CCS	3.88*	2.66*	1.10	9.83	2	2
2533	A38	7	97.20-97.10	-	P	S	CCS	1.02*	1.37	0.38	0.32	4	4
2559	A32	8	97.20-97.10	-	D	A	CCS	2.78*	2.70*	0.92	5.85	2	3
2561	A32	8	97.20-97.10	-	L	U	CCS	4.31*	2.84*	1.31	18.04	2	2
2591	A12	5	97.60-97.50	-	U	U	CCS	3.02*	3.32*	0.82	9.24	2	2
2603	A32	4	97.60-97.50	-	U	R	CCS	4.05*	2.76*	1.27	14.35	2	2
2658	A42	9	96.90-96.80	-	C	O	CCS	3.52	2.26	0.96	7.29	3	3
2665	A21	7	97.30-97.20	-	P	R	CCS	3.73*	2.34	0.77	5.12	2	3
2680	A07	9	97.40-97.30	-	D	A	CCS	3.58*	1.83*	0.51	2.72	2	3
2713	A04	3	98.10-98.00	-	L	U	CCS	3.40*	2.15*	1.03	4.71	2	2
2719	A18	5	97.60-97.50	-	M	U	CCS	2.51*	1.92*	0.62	2.10	3	3
2728	B01	3	97.00-96.90	-	D	A	CCS	2.16*	1.97*	0.60	1.85	3	3
2760	A20	11	96.90-96.80	-	U	U	CCS	2.90*	2.49*	0.67	4.43	2	2
2771	A30	8	97.10-97.00	-	U	U	CCS	2.45*	2.11*	0.87	3.62	2	2
2787	A06	1	98.20-98.10	-	U	U	CCS	2.54*	1.93*	1.00	6.23	2	2
2799	B01	5	96.80-96.70	-	D	A	CCS	2.32*	1.76*	0.61	2.30	2	3
2802	B01	5	96.80-96.70	-	D	A	CCS	5.47*	3.31*	0.75	8.74	2	3
2811	B01	4	96.90-97.80	-	L	U	CCS	2.25*	2.00*	0.64	2.66	2	2
2857	B23	8	96.10-96.00	-	D	A	CCS	3.40*	2.31*	1.02	7.24	2	3
2881	B28	15	96.50-96.40	-	U	R	CCS	2.55*	2.31*	1.16	5.42	2	2
2946	B29	7	96.30-96.20	-	U	R	CCS	4.89*	3.46*	1.22	18.02	2	2
2955	B09	4	96.60-96.50	-	L	U	CCS	4.76*	2.22*	1.21	9.40	2	2
2961	B21	5	96.40-96.30	-	U	A	CCS	3.52*	2.78*	0.64	6.21	2	2
2975	B15	2	96.80-96.70	-	M	U	CCS	3.20*	2.73	0.70	6.98	3	3
3045	B22	12	95.70-95.60	-	U	R	CCS	2.48*	1.96*	1.00	3.98	2	2

Table 46. (Continued)

Spec. Number	Unit	Lev.	Level Elevation	Spec. Elev.	Sta-tus	Shape	Raw Mat.	Length	Width	Thick-ness	Weight	Stage Side A	Stage Side B
3049	B32	12	95.70-95.60	-	D	A	CCS	3.31*	4.38*	1.14	14.70	2	2
3103	B15	10	96.00-95.90	-	P	S	CCS	1.44*	2.04	0.49	1.55	4	4
3131	B09	10	96.00-95.90	-	U	A	CCS	3.75*	2.31*	0.68	4.68	2	2
3179	B38	5	96.20-96.10	-	D	A	CCS	2.92*	2.50*	0.68	4.15	2	2

1 Specimen Number: *number=problematic provenience
Status: C=complete, M=medial, D=distal, P=proximal, L=lateral, T=Terminus (proximal or distal end), U=unidentifiable fragment
Shape: A=acute, R=round, S=square, T=triangular, F=foliate, U=unidentifiable
Raw Material: CCS=cryptocrystalline silicates, OBS=obsidian, BAS=basalt
Stage A and Stage B refer to opposite faces of a single specimen
All measurments given in centimeters, weight in grams, *=fragmentary, incomplete dimension

Table 47. Attributes and Dimensions of Drills, Microdrills, Perforators, and Gravers, 35WH14[1]

Spec. Num.	Class	Type	Raw Mat.	Status	Unit	Level	Level Elevation	Spec. Elev.	Length	Width	Thickness	Weight
48	D/P	OVATE BIF. BASE	CCS	P	B22	7	96.20-96.10	96.15	3.81	2.71	0.84	9.72
6	DRL	BIT FRAGMENT	CCS	D	B24	1	96.80-96.70	-	2.02	0.50	0.31	0.33
443	DRL	BIT FRAGMENT	CCS	F	B32	12	95.70-95.60	95.69	4.06	1.09	0.69	2.60
703	DRL	BIT FRAGMENT	OBS	M	B05	4	96.70-96.60	96.60	1.92	0.89	0.42	0.68
973	DRL	BIT FRAGMENT	CCS	D	A47	8	97.00-96.90	96.93	2.92	1.02	0.47	1.44
1135	DRL	BIT FRAGMENT	CCS	M	A19	3	97.80-97.70	97.79	2.35	0.85	0.53	1.17
1172	DRL	BIT FRAGMENT	CCS	D	A33	10	97.90-97.80	96.86	2.31	0.72	0.34	0.54
787	DRL	DIAMOND BASE	CCS	P	B38	9	95.80-95.70	-	3.92	1.50	0.63	3.31
527	DRL	EXPANDING STEM	CCS	C	B31	1	96.70-96.60	96.63	3.71	1.44	0.68	2.38
722	DRL	EXPANDING STEM	CCS	P	B35	8	96.00-95.90	95.98	3.73	1.98	0.79	4.25
829	DRL	EXPANDING STEM	CCS	P	B37	4	96.30-96.20	96.20	4.01	1.65	0.51	3.22
228	DRL	KNOBSHAPED BASE	CCS	C	B06	8	96.30-96.20	96.20	4.79	1.00	0.48	2.47
*300	DRL	REWORKED PP	CCS	P	B14	13	95.70-95.60	95.68	4.95	1.77	0.80	5.82
660	DRL	ROUND BASE	OBS	C	B31	9	95.90-95.80	95.84	2.80	1.43	0.38	1.02
490	DRL	ROUND BASE?	CCS	D	B29	9	96.10-96.00	96.00	2.58	1.55	0.41	1.14
411	DRL	SERRATED BASE	CCS	P	B32	10	95.90-95.80	95.86	2.67	1.17	0.37	1.00
314	DRL	SUBRECTANG BASE	CCS	P	B28	7	96.30-96.20	96.21	4.05	1.09	0.56	2.43
1066	DRL	TRIANGULAR BASE	CCS	P	A29	8	97.10-97.00	-	2.21	1.99	0.59	2.12
750	DRL	UNFORMED BASE	CCS	C	B23	10	95.90-95.80	-	2.38	0.97	0.53	1.08
2715	GRV	BIFACE FRAGMENT	CCS	C	A04	3	98.10-98.00	-	3.10	2.45	1.14	10.04
2378	GRV	CHUNK W 3 UNI E	CCS	C	A19	7	97.40-97.30	-	3.92	3.03	2.09	16.67
308	GRV	EDGED FLAKE	CCS	C	A30	7	97.20-97.10	-	3.82	1.86	0.95	5.49
663	GRV	EDGED FLAKE	CCS	C	B07	9	96.20-96.10	96.12	2.07	1.31	0.33	0.99
2086	GRV	EDGED FLAKE	CCS	D	B10	7	96.30-96.20	-	2.13	1.91	0.71	2.56
2926	GRV	EDGED FLAKE	CCS	C	B28	12	96.80-96.70	-	3.32	3.27	1.15	-
2943	GRV	EDGED FLAKE	CCS	D	B29	7	96.30-96.20	-	2.43	2.32	0.33	2.13
1134	GRV	REWORKED BIF FR	CCS	C	A49	8	95.90-95.80	95.82	2.05	1.10	0.51	0.76
1143	GRV	REWORKED BIFACE	CCS	D	A43	8	97.00-96.90	96.95	2.68	1.96	0.61	3.03
2564	GRV	REWORKED BIFACE	CCS	D	A40	10	96.90-96.80	-	2.51	1.95	0.58	3.12
3237	GRV	REWORKED BIFACE	CCS	C	B14	6	96.40-96.30		6.31	2.94	0.93	16.23
2777	MDR	BI-POINTED	CCS	C	A18	3	97.80-97.70	-	1.41	0.86	0.24	0.27
776	MDR	BIFACE TIP	CCS	D	A12	7	97.40-97.30	-	1.14	0.96	0.33	0.26
2667	MDR	EDGED FLAKE	OBS	C	A28	10	97.00-96.90	-	2.02	0.91	0.22	0.24
2893	MDR	T-SHAPED	CCS	C	B23	2	96.70-96.60	-	1.31	1.24	0.38	0.48
2729	MUL	BURIN W CONVX E	CCS	C	B01	3	97.00-96.90	-	4.92	1.97	0.65	6.33
509	MUL	GRV-SCR-BIF EDG	CCS		B15	10	96.00-95.90	96.00	3.67	2.17	0.70	6.50
349	MUL	PRF-GRV-BIF EDG	CCS	C	B01	5	96.80-96.70	96.70	7.33	2.11	0.73	7.80
165	MUL	PRF-NTCH-UNIFAC	CCS	C	B25	10	95.90-95.80	-	3.98	3.14	0.43	4.98
1224	PRF	BIFACE FRAGMENT	CCS	C	B17	12	95.80-95.70	95.75	4.82	0.60	0.87	5.91
128	PRF	BIT FRAGMENT	CCS	M	A13	9	97.30-97.20	97.28	1.03	1.19	0.61	0.66
706	PRF	BIT FRAGMENT	CCS	M	A25	12	96.90-96.80	96.89	0.88	1.34	0.66	1.07
761	PRF	BIT FRAGMENT	CCS	D	A18	3	97.80-97.70	-	2.11	0.73	0.25	0.38
327	PRF	CORE PUNCH?	CCS	C	B14	14	95.60-95.50	95.58	4.66	2.89	1.48	19.59
483	PRF	DIAMOND-SHAPED	CCS	C	B29	9	96.10-96.00	96.03	4.02	2.04	0.71	4.27
638	PRF	DIAMOND-SHAPED	CCS	C	A25	4	97.70-97.60	97.67	4.29	2.28	0.62	4.32
892	PRF	DIAMOND-SHAPED	CCS	C	B37	4	96.30-96.20	-	3.28	1.71	0.60	2.43
286	PRF	EDGED FLAKE	CCS	M	B28	4	96.60-96.50	-	2.35	1.20	0.31	0.88
395	PRF	EDGED FLAKE	CCS	C	B32	8	96.10-96.00	96.02	5.24	2.10	0.64	6.24
477	PRF	EDGED FLAKE	CCS	C	A53	3	97.10-97.00	-	4.98	3.00	1.02	11.59
1341	PRF	EDGED FLAKE	CCS	C	A34	9	97.10-97.00	-	2.08	1.43	0.38	1.05
2747	PRF	EDGED FLAKE	CCS	C	A03	2	98.20-98.10	-	4.00	1.07	0.58	2.01
2751	PRF	EDGED FLAKE	CCS	C	A30	6	97.30-97.20	-	1.80	1.76	0.49	1.05
2878	PRF	EDGED FLAKE	CCS	C	B22	10	95.90-95.80	-	2.21	1.52	0.37	1.24
956	PRF	FOLIATE	CCS	C	B03	9	96.30-96.20	96.20	3.07	1.21	0.44	1.57

Table 47. (Continued)

Spec. Num.	Class	Type	Raw Mat.	Sta-tus	Unit	Lev-el	Level Elevation	Spec. Elev.	Length	Width	Thick-ness	Weight
444	PRF	POSSBILE BIT FR	CCS	M	B15	2	96.80-96.70	96.73	1.45	1.01	0.49	0.92
2201	PRF	PUNCH W. UNIF E	CCS	C	B11	6	96.40-96.30	-	6.72	3.64	1.50	25.44
659	PRF	REWORKD PP ESI4	CCS	C	B07	9	96.20-96.10	96.17	3.40	2.45	0.58	3.00
744	PRF	REWORKED BIFACE	CCS	D	A45	4	97.30-97.20	-	2.11	1.42	0.52	1.21
568	PRF	REWORKED PP	OBS	D	B13	5	96.50-96.40	96.43	2.68	1.72	0.43	1.38
704	PRF	REWORKED PP	CCS	C	B33	3	96.60-96.50	96.60	2.41	1.70	0.50	1.80
1297	PRF	REWORKED PP	OBS	D	A34	13	97.70-97.60	96.70	2.87	1.34	0.41	0.81
804	PRF	REWORKED PP SN3	OBS	C	B19	8	96.20-96.10	96.10	3.11	1.89	0.41	1.64
822	PRF	REWORKED PP SN5	OBS	C	B30	5	96.30-96.20	96.20	6.54	1.69	0.52	3.62
699	PRF	REWORKED PP SN5A	OBS	C	B33	2	96.70-96.60	96.68	2.60	1.58	0.47	1.40
491	PRF	REWORKED PP SN5B	OBS	C	B15	8	96.20-96.10	96.10	2.12	1.65	0.48	1.14
213	PRF	UNIF WORKED FLK	CCS	C	B06	6	96.50-96.40	96.42	2.52	1.15	0.29	0.81

1 All measurements in centimeters, weight in grams
<u>Specimen Number</u>: *=problematic provenience
<u>Class</u>: D/P=drill/perforator, GRV=graver, DRL=drill, MUL=multipurpose tool
MDR=microdrill, PRF=perforator
<u>Raw Material</u>: CCS=cryptocrystalline silicates, OBS=obsidian, BAS=basalt
<u>Status</u>: C=complete, D=distal, P=proximal, M=medial, L=lateral, F=fragment

Table 48. Attributes and Dimensions of Notches, 35WH14[1]

Spec. Number	No. of Notches	Additional Features	Raw Mat.	Unit	Level	Level Elevation	Spec. Elev.	Length	Width	Thick-ness	Weight
628	1	1 CONCAVE EDGE	CCS	B31	7	96.10-96.00	96.01	9.00	6.53	3.13	120.31
2030	1		CCS	B12	7	96.40-96.30	-	2.50	2.10	0.84	4.44
2394	1		CCS	A43	4	97.40-97.30	-	3.53	2.34	1.00	7.33
2459	1	1 IRREG E; GRV?	CCS	A43	5	97.30-97.20	-	2.96	1.92	0.79	3.74
2525	3	1 GRV; OCHRE	CCS	A24	3	97.90-97.80	-	4.64	2.82	1.03	8.64
2652	2	1 CONC EDGE; GRV?	CCS	B03	5	96.70-96.60	-	3.69	2.49	0.62	4.61
2982	1	1 CONCAVE EDGE	CCS	B29	12	95.80-95.70	-	2.30	2.00	0.43	1.58
3114	1	1 STR EDGE	CCS	B13	1	96.90-96.80	-	3.14	2.12	0.54	4.14
3126	1	2 STR USED EDGES	CCS	B38	6	96.10-96.00	-	5.32	2.56	0.80	7.88
3141	1		CCS	B36	7	96.10-96.00	-	2.65	2.11	0.99	4.83
3183	1	1 CONC USED EDGE	CCS	B28	10	96.00-95.90	-	1.94	2.01	1.85	3.39

1 All measurements in centimeters, weight in grams

Table 49. Attributes and Dimensions of Formed Unifaces, 35WH14[1]

Spec. Number	Type	Sub-Type	Raw Mat.	Unit	Level	Level Elevation	Spec. Elev.	Length	Width	Thick-ness	Weight
55	C	BEL	CCS	B24	8	96.10-96.00	-	2.86	2.74	0.65	4.80
269	C	BEL	CCS	B22	11	95.80-95.75	-	2.55	2.88	0.53	3.93
285	C	BEL	SQZ	A45	4	97.30-97.20	97.28	2.62	2.94	0.54	5.60
580	C	BEL	CCS	A17	7	97.50-97.40	97.40	2.73	3.04	0.70	5.91
708	C	BEL	CCS	B35	7	96.10-96.00	96.09	3.24	2.94	0.74	7.41
759	C	BEL	CCS	A18	3	97.80-97.70		2.47	2.32	0.67	4.24
870	C	BEL	CCS	B12	4	96.70-96.60	96.60	2.88	3.07	0.74	5.79
1190	C	BEL	CCS	A19	12	96.90-96.80	96.85	2.60	2.12	0.66	5.62
139	C	E	CCS	A13	9	97.30-97.20	97.20	4.50	3.97	1.15	19.28
210	C	E	CCS	B21	4	96.50-96.40	-	2.60*	2.40	0.35	2.80
259	C	E	CCS	B22	11	95.80-95.70	95.77	4.49	3.22	0.77	9.68
414	C	E	CCS	B06	14	95.70-95.60	95.66	3.10	2.05	0.44	2.23
840	C	E	CCS	A32	8	97.20-97.10	96.10	1.91	1.97	0.70	2.25
1245	C	E	CCS	B09	11	95.90-95.80	95.85	2.24	2.38	0.56	3.68
2008	C	E	CCS	B10	8	96.20-96.10	-	2.79*	2.65	1.48	15.39
2351	C	E	CCS	B12	4	96.70-96.60	-	2.60*	2.08	0.67	4.44
2540	C	E	CCS	A11	3	97.90-97.80	-	2.61*	2.07*	0.70	4.63
2571	C	E	CCS	A41	8	97.10-97.00	-	2.97	2.17	0.82	5.92
2635	C	E	CCS	A42	6	97.20-97.10	-	2.14*	2.03*	0.73	2.36
3158	C	E	CCS	B09	2	96.80-96.70	-	2.25	2.39*	1.44	7.81
3191	C	E	CCS	B13	9	96.10-96.00	-	2.75	2.13	0.49	2.38
3223	C	E	CCS	B33	2	96.70-96.60	-	1.88*	2.32	1.05	5.28
151	C	IND	CCS	B22	8	96.10-96.00	-	2.52*	0.83*	0.59	1.31
194	C	IND	CCS	B26	9	96.00-95.90	-	2.41	2.25	0.49	2.62
249	C	IND	CCS	B06	10	96.10-96.00	96.03	2.51*	1.42*	0.70	1.91
274	C	IND	CCS	A30	5	97.40-97.30	97.32	4.96	2.40*	1.26	16.02
369	C	IND	CCS	B28	12	95.80-95.70	95.77	2.68*	1.95*	1.23	6.46
526	C	IND	CCS	A51	2	97.40-97.30	97.39	1.90*	0.75*	0.39	0.51
690	C	IND	CCS	B07	14	95.70-95.60	95.60	2.27*	1.82*	0.65	1.28
772	C	IND	CCS	A04	2	98.20-98.10	-	2.74	1.72	0.50	2.40
777	C	IND	CCS	B33	6	96.30-96.20	-	3.08	1.16*	0.48	1.26
1018	C	IND	CCS	B08	9	96.10-96.00	96.00	3.42*	3.89	0.94	14.13
2035	C	IND	CCS	B08	10	96.00-95.90	-	3.41*	2.06*	0.97	4.59
2145	C	IND	CCS	B23	9	96.00-95.90	-	1.10*	0.88*	0.44	0.38
2179	C	IND	CCS	B12	5	96.60-96.50	-	2.12*	1.33*	0.45	1.60
2449	C	IND	CCS	A22	10	97.00-96.90	-	2.26*	1.88*	0.90	2.85
2462	C	IND	CCS	A23	6	97.40-97.30	-	2.67*	1.30*	0.66	1.95
2508	C	IND	CCS	A43	3	97.50-97.40	-	1.29*	2.39*	0.56	1.22
2531	C	IND	CCS	A19	13	96.80-96.70	-	3.20*	2.76*	0.73	8.00
2536	C	IND	CCS	B02	6	96.60-96.50	-	4.71	3.43	1.64	27.50
2617	C	IND	CCS	A48	5	97.20-97.10	-	1.47*	0.76*	0.61	0.38
2637	C	IND	CCS	A42	5	97.30-97.20	-	1.27*	2.40*	0.71	2.08
2661	C	IND	CCS	B03	6	96.60-96.50	-	2.74*	3.39*	1.00	8.44
2953	C	IND	CCS	B09	13	95.70-95.60	-	4.59	2.85*	1.22	23.60
3015	C	IND	CCS	B21	8	96.10-96.00	-	0.46*	1.11*	0.73	0.86
69	C	OVT	CCS	B14	10	96.00-95.90	95.95	3.19	2.45	0.92	7.81
220	C	S	CCS	B23	11	95.80-95.70	95.76	5.44	2.70	0.84	9.74
289	C	S	CCS	A15	9	97.30-97.20	97.30	4.77	1.92	0.70	7.14
358	C	S	CCS	B25	14	95.50-95.40	95.47	2.81	1.08	0.29	1.13
401	C	S	CCS	B32	9	96.00-95.90	95.96	2.91	1.96	0.46	3.11
544	C	S	CCS	A21	1	97.90-97.80	97.80	3.13	2.72	1.31	9.43
1105	C	S	CCS	B09	7	96.30-96.20	96.23	3.82	3.01	0.70	8.78
1203	C	S	CCS	A20	7	97.30-97.20	97.20	3.27	1.79	0.39	1.96
2276	C	S	CCS	B08	8	96.20-96.10	-	4.85	3.46	1.30	24.71
2522	C	S	CCS	A36	8	97.00-96.90	-	2.55*	3.16*	1.01	7.46
2527	C	S	CCS	A24	3	97.90-97.80	-	2.43	2.51	0.56	4.02
2824	C	S	CCS	A13	2	98.00-97.90	-	4.72*	1.87*	1.33	8.95
2068	C	SPD	CCS	B12	10	96.10-96.00	-	4.64	2.69	0.92	9.72
656	C	TRI	CCS	B31	9	95.90-95.80	95.85	3.75	3.49	0.85	10.02

Table 49. (Continued)

Spec. Number	Type	Sub-Type	Raw Mat.	Unit	Level	Level Elevation	Spec. Elev.	Length	Width	Thick-ness	Weight
83	CC	CVT	OBS	B26	11	95.80-95.70	-	1.25*	1.06	0.25	0.36
636	CC	CVT	CCS	B07	7	96.40-96.30	-	2.74*	3.10*	0.80	5.71
976	CC	CVT	CCS	B03	12	96.10-96.00	95.95	2.36*	2.42*	0.59	4.21
1227	CC	CVT	CCS	B17	12	95.80-95.70	95.72	2.73*	1.77	0.44	2.20
2188	CC	CVT	CCS	B07	2	96.90-96.80	-	1.57*	1.26*	0.32	0.82
3193	CC	CVT	CCS	B13	3	96.70-96.60	-	2.23*	1.46	0.60	1.81
698	CCV	CVT	CCS	B38	6	96.10-96.00	96.05	2.30*	1.92*	0.43	1.94
901	CCV	CVT	CCS	B23	3	96.60-96.50	-	4.46	3.21	0.87	10.80
2404	CS	CVT	CCS	A33	8	97.10-97.00	-	2.20	2.40	0.42	2.08
2732	CS	CVT	CCS	A02	3	98.10-98.00	-	2.22	1.53	0.85	2.45
546	CS	ES	CCS	A51	5	97.10-97.00	97.00	3.62	2.58	0.69	5.80
1064	CS	ES	CCS	A44	5	96.20-97.10	97.12	3.73	2.68	0.85	5.89
1226	CS	ES	CCS	B17	12	95.80-95.70	95.75	3.56	2.95	0.53	4.71
2443	CS	ES	CCS	A27	1	97.90-97.80	-	5.37	2.66	1.10	15.27
2493	CS	ES	CCS	A42	7	97.10-97.00	-	4.29	3.66	0.46	19.89
2578	DNT	E	CCS	A40	4	97.50-97.40	-	3.30	1.99	0.87	4.23
429	HK		CCS	B32	11	95.80-95.70	-	3.54*	3.28*	0.50	3.69
2582	HK		CCS	A40	4	97.50-97.40	-	2.21	1.82	0.58	1.66
2972	HK		CCS	B15	7	96.30-96.20	-	2.70*	1.66*	0.42	1.89
2924	MUL		CCS	B14	8	96.20-96.10	-	3.72	3.49	1.24	12.31
396	S	IND	CCS	B27	13	95.70-95.60	95.63	2.37*	1.98*	0.86	3.62
*2242	S	IND	CCS	B30	2	96.60-96.50	-	2.06*	1.33*	0.58	1.48
2562	S	IND	CCS	A42	4	97.40-97.30	-	2.60*	2.10*	0.61	3.01
2614	S	IND	CCS	A21	9	97.10-97.00	-	2.19*	1.88*	1.03	4.05
2628	S	IND	CCS	A09	2	98.10-98.00	-	2.78*	1.51*	1.24	3.87
2757	S	IND	CCS	B02	5	96.70-96.60	-	3.24	1.84	1.21	6.91
2944	S	IND	CCS	B29	7	96.30-96.20	-	2.05	2.66	1.03	6.22
1126	S	PL	CCS	A43	6	97.20-97.10	97.15	2.42*	2.12	0.41	2.97
1148	S	TRI	CCS	B17	9	96.10-96.00	96.03	4.61	3.53	1.12	14.89

1 Specimen Number: *number=problematic provenience
Type: C=convex, CV= concave, S=straight, DNT=denticulate, HK=hook-like, MUL=multipurpose
Variety: DSC=discoidal, S=side, E=end, TD=teardrop, PL=parallel-sided, TRI=trilateral, IND=indeterminate, BEL=bell-shaped, OVT=ovate, SPD=spade-shaped, CVT=convergent
Raw Material: CCS=cryptocrystalline silicates, SQZ=seam quartz, OBS=obsidian
All measurements in centimeters, weight in grams

Table 50. Attributes of Worked Bone and Antler, 35WH14[1]

Spec. Num.	Type	Comments	Raw Mat.	Unit	Lev.	Elevation	Spec. Elev.	Status	Length	Width	Thickness	Weight
447	AWL		BON	B15	13		95.61	D	2.40	0.50	0.55	0.49
163	AWL	BURNT AND POLISHED	BON	A30	6		96.25	D	2.34	0.85	0.48	0.50
57	AWL	LATERAL METAPODIAL	BON	B14	11	95.90-95.80	-	C	7.21	0.76	0.54	1.45
540	AWL	LONGITUDIN. SPLIT TIP BURNT	ANT	B38	6		96.00	D	1.72	0.70	0.42	0.34
298	AWL	LONGITUDINALLY SPLIT TIP	BON	B02	7		96.45	D	3.52	0.59	0.62	0.86
402	AWL	POLISHED	BON	B15	11		95.82	D	6.88	1.05	0.49	2.49
402	AWL	POLISHED	BON	B15	11		95.82	D	4.56	0.91	0.41	1.25
602	AWL	POLISHED	BON	A32	12	96.90-96.80	-	D	5.37	1.43	0.59	3.09
639	AWL	POLISHED	BON	A46	4		97.39	M	3.34	1.03	0.58	2.00
656	AWL	ROUND SECTION, NEEDLE-LIKE	BON	A46	7		97.05	D	3.26	0.45	0.45	0.55
1023	AWL	SMALL FRAGMT. POSSIBLE AWL?	BON	A42	4	97.40-97.30	-	F	2.20	0.84	0.52	0.65
579	FBT	BURNED,POLISHED, ROUNDED TIP	BON	B38	10	95.70-95.60	-	D	2.30	0.91	0.30	0.69
1544	FBT	MATCHES BN-1193	BON	B31	8	96.00-95.90	-	M	1.16	1.12	0.25	0.36
1193	FBT	PARALLEL SIDES, SPATULATE?	BON	B23	12	95.70-95.60	-	M	5.55	1.12	0.26	1.63
935	FBT	SMALL SPATULATE FRAGMENT	BON	A52	5	97.10-97.00	-	D	2.25	0.75	0.25	0.41
1549	FBT	SPAT. RECONSTRUCTED, 2 TOOLS	BON	A17	7		97.40	F	7.62	1.19	0.39	2.95
44	FBT	TAPERED	BON	A16	8		97.35	D	17.50	2.31	0.35	7.09
1545	FBT	TAPERED	BON	B05	8	96.30-96.20	-	D	1.19	0.53	0.28	0.11
722A	GAM	FOSSILIZED LONG BONE SEGMENT	FBN	B08	13		95.70	M	3.46	1.35	0.40	1.45
722B	GAM	FOSSILIZED LONG BONE SEGMENT	FBN	B08	13		95.70	M	3.07	1.12	0.35	1.15
722C	GAM	FOSSILIZED LONG BONE SEGMENT	FBN	B08	13		95.70	M	2.98	1.28	0.37	1.44
722D	GAM	FOSSILIZED LONG BONE SEGMENT	FBN	B08	13		95.70	M	2.81	1.16	0.37	1.29
722E	GAM	FOSSILIZED LONG BONE SEGMENT	FBN	B08	13		95.70	M	2.79	1.51	0.43	1.67
722F	GAM	FOSSILIZED LONG BONE SEGMENT	FBN	B08	13		95.70	M	2.73	1.37	0.47	1.59
722G	GAM	FOSSILIZED LONG BONE SEGMENT	FBN	B08	13		95.70	M	2.66	1.17	0.34	1.13
736	IND	BEAM SEGMENT	ANT	A22	6	96.80-96.50	96.75	F	5.71	2.80	2.17	17.85
920	IND	BEVELED EDGE	BON	B25	4	96.50-96.40	-	F	2.87	1.11	0.34	0.71
917	IND	BEVELED EDGE OPP. EDGE FLAKED	BON	B25	4	96.50-96.40	-	M	3.24	1.25	0.92	1.49
217	IND	BURNT AND POLISHED	BON	B28	10		95.99	M	2.43	0.66	0.40	0.49
1548	IND	BURNT AND POLISHED	BON	B26	11	95.80-95.70	-	F	1.50	1.12	0.22	0.27
940	IND	BURNT AND SMOOTHED	BON	B25	12	95.70-95.60	-	M	1.52	0.81	0.66	0.74
905	IND	BURNT,POLISHED; SMOOTHED EDGE	BON	A42	1	97.70-97.60	-	F	1.97	0.57	0.29	0.25
1261	IND	CALCINED	BON	A43	11	96.70-96.60	-	M	1.69	0.95	0.41	0.54
1312	IND	CUT? SMOOTHED?	ANT	A43	12	97.20-97.10	-	F	3.02	2.01	0.82	2.79
154	IND	CYLIND. FRAG.,CUTMARKS AT END	ANT	A30	5	97.40-97.30	-	M	3.65	1.44	1.71	1.91
1067	IND	FLAT, EDGES ROUNDED	BON	B23	12	95.70-95.60	-	M	2.46	0.73	0.30	0.50
1546	IND	FLAT, LATERAL FR., ROUND EDGES	BON	B04	6	96.60-96.50	-	F	1.94	0.63	0.37	0.49
1262	IND	FLAT, PARALLEL SIDES	BON	A43	11	96.70-96.60	-	M	1.73	1.10	0.34	0.60

Table 50. (Continued)

Spec. Num.	Type	Comments	Raw Mat.	Unit	Lev.	Elevation	Spec. Elev.	Sta-tus	Length	Width	Thick-ness	Weight
1291	IND	FLAT, PARALLEL SIDES	BON	A41	11	96.80-96.70	-	M	1.90	1.20	0.26	0.48
1330	IND	FLAT, TAPERING	BON	B24	13	95.60-95.50	-	M	0.97	0.38	0.16	0.06
1293	IND	FLAT,PARALL.SIDES; MATCH 1291?	BON	A41	11	96.80-96.70	-	M	2.42	1.38	0.35	0.77
1258	IND	FLAT,TAPERING SIDES; RD. EDGES	BON	B20	4	96.60-96.50	-	M	2.34	0.91	0.29	0.55
1263	IND	INTERIOR DISHED, ROUNDED EDGE	BON	A43	11	96.70-96.60	-	M	2.75	1.04	0.43	0.90
391	IND	LATERAL FRAGMT, END SMOOTHED	ANT	B02	13		95.56	F	8.65	2.44	0.76	10.33
1547	IND	LONGBONE FRAGMT., CHANNELED	BON	A24	6	97.60-97.50	-	M	3.52	1.33	0.53	2.02
171	IND	LONGBONE FRAGMT., CORNER WORN	BON	B14	13		95.67	F	6.97	1.66	1.06	7.89
766	IND	ONE END NOTCHED	ANT	?	?	?	-	F	2.91	1.62	1.16	3.19
873	IND	POLISHED	BON	B28	11		95.88	M	2.15	1.03	0.65	1.23
208	IND	POLISHED,INCISED OR TOOTHMARKS	BON	B14	14		95.50	M	5.86	0.92	0.65	3.49
658	IND	ROUNDED EDGE	BON	B04	6	96.60-96.50	-	F	2.54	0.72	0.32	0.60
387	IND	SCRAPED LONGBONE SEGMENT, CUT	BON	A53	7		96.62	M	2.88	1.24	0.41	1.38
64	IND	SCRAPED TINE, POLISHED TIP	ANT	B06	10		96.10	C	6.18	1.80	1.46	8.85
586	IND	SCRAPED,CUT,POLISHED,FOSSIL?	BON	B37	4	96.30-96.20	-	F	3.80	1.03	0.85	2.31
116	IND	SLIVER, 4 PARALLEL CUT MARKS	BON	B06	10		96.00	F	1.94	0.63	0.45	0.43
1198	IND	SMOOTHING, EXTERIOR/INTERIOR?	BON	B23	12	95.70-95.60	-	F	1.94	1.50	0.47	0.79
1105	IND	SURFACE SMOOTHED	BON	B27	13	95.70-95.60	-	M	4.30	1.10	0.57	1.89
165	ORN	BILAT INCISED POLISHED, BURNED	BON	A30	6	96.30-96.20	-	M	1.55	1.03	0.66	0.59
472	ORN	CYLINDRICAL BEAD	BON	B14	13	95.70-95.60	-	F	1.40	1.02	0.30	0.31
113	ORN	TUBULAR BEAD	BON	B06	10		96.02	C	1.07	0.25	0.25	0.07

1 All measurements in centimeters, weight in grams
<u>Type</u>: AWL=awl, FBT=flat bone tool, GAM=gaming piece, IND=indeterminate, ORN=ornament
<u>Raw Material</u>: BON=bone, ANT=antler, FBN=fossilized bone
<u>Status</u>: C=complete, D=distal, M=medial, F=fragment

APPENDIX C

REPORTS ON THE FAUNAL ANALYSIS OF 35WH7 AND 35WH14,

BY JOANNE M. MACK

REPORT ON THE FAUNAL ANALYSIS OF 35WH14 (PINE CREEK VILLAGE)

by

Joanne M. Mack, Ph.D.

Pine Creek Village (35WH14) has a faunal assemblage of over 1,700 examined items, catalog numbers B-1 to B-1544[1]. The discrepancy between the number of bones and the catalog numbers results from a catalog system which in some cases numbers up to 3 different identifiable and as many as 21 different unidentifiable bones with the same catalog number. In this analysis, 1341 specimens of this faunal assemblage have been identified to a taxonomic level of class or below. Of the identifiable items, only 39 are whole, many of these teeth. The vast majority of the bone items are not only partial but can only be described as fragmentary, often the medial section of long bones. This is only partly due to the extremely poor condition of some of the bone. Much of these bone pieces seem to have resulted from manual breaking of the bone, likely to extract marrow. To complicate analysis of the bone from this site, the original processing of the bone included the application of shellac on a few of the larger pieces of bone. Shellac alters the surface of bone, so identification of bone tools becomes impossible on those pieces. The above limitations result in far less information than one may normally expect from a faunal assemblage of this size.

The following taxonomic categories are represented in the collection. The number following each category gives the total number of bone elements, fragmentary and whole, identified to the particular category (class, order, family, genus, and species):

Class:

Fish: 8

Reptiles: 3
- Family: Testudinidae 2
  - Genus/Species: Clemmys marmorata: 1
- Family: Colubridae 1

Bird: 10
- Passarine: 1 (Family unidentifiable)
- Family: Scolopacidae 1
  - Genus/Species: Numenius americanus (Long-billed Curlew): 1
- Tetraonidae 2
  - Genus/Species: Bonasa umbellus (Ruffed Grouse): 2

Mammal: 1235
Order: Lagomorpha: 54
- Family: Leporidae: 54

1. Worked specimens are not included in this discussion.

Order: Lagomorpha (continued)
Genus/Species: Sylvilagus nuttallii (Nuttall's Cottontail): 47
Lepus sp. (Jackrabbit): 1

Order: Rodentia: 29
Family: Sciuridae: 7
Genus/Species: Spermophilus sp. (Ground Squirrel): 3
Eutamias sp. (Chipmunk): 2
Marmota flaviventris (Yellow-bellied marmot): 2
Geomyidae: 3
Genus/Species: Thomonys talpoides (Northern Pocket Gopher): 3
Zapodidae: 1
Genus/Species: Zapus princeps (Western Jumping Mouse): 1
Cricetidae: 10
Genus/Species: Neotoma cinerea (Bushytail Woodrat): 7
Microtus sp. (Vole): 3
Erethizontidae: 1
Genus/Species: Erethizon dorsatum (Porcupine): 1

Order: Carnivora: 8
Family: Canidae: 3
Genus/Species: Canis sp.: 2
Canis latrans (Coyote): 1
Felidae: 2
Genus/Species: Felis concolor (Cougar): 2
Procyonidae: 1
Genus/Species: Procyon lotor (Raccoon): 1

Order: Artiodactyla: 542
Family: Cervidae: 359
Genus/Species: Cervus canadensis (Elk, Wapiti): 40
Odocoileus hemionus (Mule Deer): 286
Bovidae: 9
Genus/Species: Ovis canadensis (Mountain Sheep): 9
Antilocapridae: 4
Genus/Species: Antilocapra americana (Antelope): 4

Various observations have been made on each bone element in the assemblage, including an attempt to categorize each piece as to sex and age, notation as to whether cut or tool marks appear on the elements, and the identification of bone tools within the assemblage not previously recognized. All these observations have been limited by the shellac and the fragmentary condition of the bone. However, 39 bone fragments show cut marks, most multiple and one long bone fragments. There are some examples of cut marks on pelvis, scapula, ribs, skull fragments, and mandibles. Most of the cut marks likely result from skinning and/or butchering practices. A few tool fragments also exhibit cut marks, which may result from the tool manufacturing processes. The identification of the sex of the animals represented by the bone elements has been determined in only 197 cases. Ninety-two bones from mule deer (Odocoileus hemionus) are from females and 71 are from males. Some of these are fragments of antler. The identification of adult and juvenile bones has been somewhat more successful, most bones identified being adult. Juveniles have been identified by incomplete ossification of the epiphysis of long bones and b tooth eruption, particularly among the ungulates. Most juvenile bones are from Artiodactyla, particular those which can be aged. Two jaws from mule deer (Odocoileus hemionus) come from animals about two and half years old. One mule deer is 18-20 months old and one is 23-24 months old. An elk (Cervus canadensis) juvenile ages to 18-20 months old. A big-horn sheep (Ovis canadensis) ages to between 30 and 32 months old. The remainder of the bones come from the juveniles of rodents, with one from a coyote. In total 38 bones can be considered from juvenile individuals.

Though the data available from this collection limits interpretation, there are some interesting indications of season of use and diet from this assemblage. Clearly two species are overwhelmingly part of the diet, mule deer (Odocoileus hemionus) and rabbit (Sylvilagus nuttallii). The various rodents are present not as a result of human activity but through the efforts of the rodents' own burrowing activities, the only exceptions being the porcupine (Erethizon dorsatum), and perhaps the chipmunk (Eutamias sp.). Of the birds present, only the grouse (Bonasa umbellus) and the curlew (Numenius americanus) may be the result of hunting by human beings. The two turtle bones may also be from the use of this animal as food, though turtle-shell rattles may have been its major use. The coyote (Canis latrans) may be present as an animal hunted for its pelt.

From the faunal material the season of use of this site may be hypothesized to be at least from late Winter to late Summer and possibly year round. The juvenile Artiodactyla mandibles and teeth, which can be accurately aged indicate they were taken in late Winter or early Spring and late Spring or early Summer. Mule deer fawn are born from April through June, while both elk and big-horn sheep are born from May to June. Since the juvenile mule deer and elk age to approximately a year and an half old and the sheep to two and an half years old, they must have been killed in late Winter or early Spring. The two-year old deer would indicate presence in late Spring or early Summer. Since the males shed their antlers in March or April, the males represented in the assemblage may have been killed in early Summer, but the larger specimens likely represent males killed in late Summer or even Fall. The presence of turtle bone may also point to the Spring, though Summer may be more likely. Turtles hibernate for part of the year; however, the season of hibernation varies from region to region. In some areas they hibernate in the summer, in others they hibernate in the winter. I expect them to hibernate in the winter along the tributaries of the John Day, as they do along the Klamath River, but one would need the life history information for Western Pond Turtles (Clemmys marmorata) for the southern Columbia Plateau to confirm a winter hibernation.

The faunal evidence available for Pine Creek Village indicates it is a village, which seems to be occupied from at least late Winter to late Summer. The inhabitants appear to have hunted primarily mule deer and rabbits, but other animals have been occasionally hunted successfully: mammals (particularly other large Artiodactyla), reptiles, birds, and fish. The season of the year most activity at the site took place seems to be late Winter into late Summer. The fragmentary nature of all the bone, even skull and mandibles of large animals, indicates thorough processing of the bone.

REPORT ON THE FAUNAL ANALYSIS OF 35WH7 (COVE CREEK II)

by

Joanne M. Mack, Ph.D.

Cove Creek II (35WH7) has a faunal assemblage of over 1900 items, catalog numbers B-1 to B-264. The discrepancy between the number of bones and the catalog numbers results from a catalog system which in some cases numbered up to 15 different bones with the same catalog number. Forty-one percent (775) of this faunal assemblage are identifiable to some taxonomic level. Of the identifiable items, only 49 are whole; the vast majority are not only partial but can only be described as fragmentary, often the medial section of long bones. This is partly due to the extremely poor condition of much of the bone. To complicate analysis of the bone from this site, the original processing of the bone included the application of shellac on most of the larger pieces of bone. Shellac alters the surface of bone, so identification of bone tools becomes impossible in this collection in all but a few cases. The above limitations result in far less information than one may normally expect from a faunal assemblage of this size.

The following taxonomic categories are represented in the collection. The number following each category gives the total number of bone elements, fragmentary and whole, identified to the particular category (class, order, family, genus, and species):

Class:

Fish: 4

Reptiles: 11
- Family: Testudinidae 11
  - Genus/Species: Clemmys marmorata: 11

Bird: 11
- Passarine: 1 (Family unidentifiable)
- Family: Tytonidae 2
  - Genus/Species: Otus asio (Screech Owl): 2
- Strigidae 1
  - Genus/Species: Asio otus (Long-eared Owl): 1
- Tetraonidae 1
  - Genus/Species: Dendragapus obscurus (Blue Grouse): 1

Mammal: 749

Order: Lagomorpha: 47
- Family: Leporidae: 46
  - Genus/Species: Sylvilagus nuttallii (Nuttall's Cottontail): 43
  - Lepus sp. (Jackrabbit): 3

Order: Rodentia: 48
- Family: Sciuridae: 1
  - Genus/Species: Tamiasciurus douglasii (Chickaree): 1
- Geomyidae: 7
  - Genus/Species: Thomonys talpoides (Northern Pocket Gopher): 7

Order: Rodentia (continued)
Castoridae: 3
Genus/Species: Castor canadensis (Beaver): 3
Cricetidae: 23
Genus/Species: Neotoma cinerea (Bushytail Woodrat): 7
Microtus sp. (Vole): 16
Erethizontidae: 5
Genus/Species: Erethizon dorsatum (Porcupine): 5

Order: Carnivora: 7
Mustelidae: 3
Genus/Species: Lutra canadensis (River Otter): 2
Felidae: 4
Genus/Species: Felis concolor (Cougar): 1
Lynx rufus (Bobcat): 3

Order: Artiodactyla: 297
Cervidae: 209
Genus/Species: Cervus canadensis (Elk, Wapiti): 25
Odocoileus hemionus (Mule Deer): 166
Odocoileus sp.: 3
Bovidae: 3
Genus/Species: Ovis canadensis (Mountain Sheep): 3

Various observations have been made on each bone element in the assemblage, including an attempt to categorize each piece as to sex and age, notation as to whether cut or tool marks appear on the elements, and the identification of bone tools within the assemblage not previously recognized. All these observations have been limited by the shellac and poor condition of the bone. Only two bone fragments show cut marks, a medial fragment of an antler and the distal end of a carnivore phalange. The cut mark on the phalange goes around the shaft of the bone, indicating the phalange is likely the debitage from the making of bone beads. There are three cut marks on the antler fragment. these cut marks also may be the result of tool making. The identifiaction of the sex of the animals represtned by the bone elements can be determined with confidence in only 44 cases. Twenty-seven bones from mule deer (Odocoileus hemionus) are from females and ten are from males. A single bone from a big-horn sheep (Ovis canadensis) seems to be from a male. The identification of adult and juvenile bones has been somewhat more successful, most bones identified being adult. Juveniles have been identified by incomplete ossification of the epiphysis of long bones and by tooth eruption, particularly among the ungulates. Ten bones from elk (Cervus canadensis) are from juveniles; the teeth specifically from an animal approximately one and half years old. The jaw from a mule deer (Odocoileus hemionus) also comes from an animal about eighteen to twenty months old. The remainder of the bones come from the juveniles of rodents and rabbits, with one from an inidentified medium-size carnivore and one from a big-horn sheep (Ovis canadensis) which ages to between 30 and 32 months old. In total 26 bones can be considered from juvenile individuals.

Though the data available from this collection limits interpretation, there are some interesting indications of season of use and diet from this assemblage. Clearly two species are overwhelmingly part of the diet, mule deer (Odocoileus hemionus) and rabbit (Sylvilagus nuttallii). The various rodents are present not as a result of human activity but through the efforts of the owls and the rodents' own burrowing activities, the only exceptions being the beaver (Castor canadensis), the procupine (Erethizon dorsatum), and the squirrel (Tamiasciurus douglasii). Of the birds present, only the grouse (Dendragapus obscurus) may be the result of hunting by human beings. The few turtle bones may also be from the use of this animal as food, though trutle-shell rattles may have been its major use. The river otter (Lutra canadensis) may also not be present as a food source alone but also for its pelt.

From the faunal material the season of use of this site may be hypothesized to be during late Winter through late Spring. The juvenile Artiodactyla mandibles and teeth, which can be accurately aged indicate they were taken in late Winter or early Spring. Mule deer fawn are born from April through June, while both elk and big-horn sheep are born from May to June. Since the juvenile mule deer and elk age to approximately a year and an half old and the sheep to two and an half years old, they must have been killed in late Winter or early Spring. This time of the year is also supported by the much higher number of female deer. Male mule deer do not travel with females and yearlings after the mating season in late Fall. Since the males shed their antlers in March or April, the males represented in the assemblage likely have been killed in the late Spring or early Summer. The presence of some turtle bone may also point to the Spring, though Summer may be more likely. Turtles hibernate for part of the year; however, the season of hibernation varies from region to region. In some areas they hibernate in the summer, in others they hibernate in the winter. I expect them to hibernate in the winter along the tributaries of the John Day, as they do along the Klamath River, but one would need the life history information for Western Pond Turtles (Clemmys marmorata) for the southern Columbia Plateau to confirm a winter hibernation.

The faunal evidence available for Cove Creek II indicates it is a seasonal camp. The inhabitants appear to have been occasionally hunted successfully: mammals, reptiles, birds, and fish. The season of the year most activity at the site took place seems to be late Winter into Spring. Some bone tool and ornament manufacture has taken place as evidenced by the cut carnivore phalange and the single antler fragment exhibiting cut marks. The evidence for bead-making suggests a seasonal camp with residence of some duration, not simply a hunting camp inhabited for a few days.

APPENDIX D

REPORTS ON THE MACROBOTANICAL ANALYSIS OF 35WH7 AND 35WH14,

BY NANCY A. STENHOLM

BOTANICAL ANALYSIS OF SITES 35WH7 AND 35WH14

by

Nancy A. Stenholm

Introduction

The study of vegetable materials found in archaeological matrices, termed archaeobotany or paleoethnobotany, provides valuable information about the resource base of peoples inhabiting a site. Botanical material, with lithic and faunal data, gives archaeologists means to make inferences about patterns of subsistence, to interpret site features, and to suggest seasonality of site use.

The importance of botanical analysis in the investigation of hunter-gather subsistence cannot be overstated. The field is new and rapidly growing. While the proportion of plant to non-plant products in the subsistence economy cannot be absolutely determined, relative proportions of plant, lithic, and animal products can be determined by weight and volume in flotation samples.

Methods

Although vegetable materials utilized by prehistoric people decay rapidly, evidence of plant gathering preparation, and use is often preserved as charred, microscopically identifiable particles contained in soil samples. Because these materials are seldom recovered _in situ_ or during routine screening, general processing procedures for botanical samples are different from those used for faunal material and lithics. Processing soil samples consists of six steps: (1) weighing and determining the volume of the dried matrix, (2) water separation (flotation) of the light from the heavy fraction, (3) drying of the two fractions, (4) chemical separation of the heavy fraction, (5) drying of the two fractions, and (6) weighing the light and heavy fractions.

Water separation consists of simply submerging a container with a fine (5.0-0.6 mm) screen in water and working the matrix until clays, silts, and sands wash out, and light materials float to the surface. Floating material (the light fraction) is removed from the surface of the water and both it and the residue at the bottom of the container (the heavy fraction) are dried.

Since some charcoal will not float without additives to increase water density, the heavy fraction is submerged in liquid with a specific gravity of 1.2. The light fractions of both flotations are combined before weighing and subsamples drawn for detailed analysis. The light fraction is passed through nested screens, and 0.25 g of material caught between 3.0 and 2.0 mm mesh is completely identified. Experience shows that most soil samples weighing from 1 to 2 kg (1 to 2 liters) have charcoal (or other plant material) in this fraction with an array of several taxa. When samples have so little charcoal that standard subsamples cannot be drawn, all available charcoal is picked by hand from the sample and weighed.

Identification is done with the aid of a zoom binocular microscope with continuous magnification to 150x. Weights are taken in milligrams rounded to the nearest hundredth of a gram. Tabulation and recording are made on the botanical scan sheet A primary distinction is made between charred (or semi-charred) material and non-charred material since the carbonized material resists decay for considerable periods of time. The non-charred material is more likely to represent recent materials incorporated into the sample matrix through bioturbation. The uncharred floral material is identified and noted.

Microscopic analysis begins with manual separation of charred and semi-charred botanical materials from all other materials in the subsample. Both groups are weighed, and the amount of archaeobotanical charcoal is recorded. This figure aids in estimating the total carbon or the total uncarbonized flora in the sample (the "carbon/uncarbonized flora percentage or carbon/flora content"). Both figures are useful in predicting the presence of certain kinds of features such as occupation floors, hearths, trash pits, and the like associated with burning. Low purity figures can indicate bioturbation. A check of the float sample may confirm the possibility through presence of insect parts, modern flora or rodent remains.

Analysis proceeds with identification of carbonized material to taxa. The material is divided into woody material, seeds, surface and subsurface fruit, root, and stem tissue, and dissociated tissue types. For the most part, family and genus identifications can be made from wood and seeds, some bark and certain portions of stem tissue (including bud, flower, leaf, and fruit fragments). For instance, conifer needles preserve well, and they are relatively easy to identify compared with the more fragile leaves of hardwood species. Fern stems are easy to identify compared with the softer stems of most herbaceous plants. Species identification is more difficult. Tissues rarely can be identified taxonomically, but the distinction of general tissue types can be important in assessing preservation factors as well as presence of processing and technological activities. Presence of fibers and bark

Table 1. Samples by Weight, Volume, and Carbon Content, 35WH7

Test Trenches	Flot No.	Total (Kg)	Total (L)	Carbon (G)	Carbon (%)
TT-1	2	1.3	1.0	29.79	2.36%
TT-2	1	0.5	0.4	0.02	<0.01%
TT-3	3	3.1	2.2	7.48	0.24%
TT-4	3	1.9	1.6	0.46	0.24%
Total	9	6.8	5.2	37.75	0.56%

tissues, for instance, may indicate cordage production. Seed coat fragments may indicate fruit or seed processing associated with grinding or pounding. Other tissues may be remnants from processing soft parts of foods and medicines. Such dissociated tissues can be divided into groups. A glassy or shiny material may represent plant saps, juices, or resins. It is amorphous black or dark brown material with bubble or steam cavities. When it is found with wood cells it is most likely to be wood pitch or conifer resin. When it is associated with other softer tissue types, such as starchy parenchymoid or fruity epithelioid tissues, it may processed edible tissue (PET). At the moment, the PET category is divided into two groups: tissue which resembles sugar-laden fruit or berry tissue without the seeds (called PET fruity); and, tissue with starchy storage cells (PET starchy), likely from edible roots.

Analysis of a flotation sample ends after the remainder of the light fraction and all of the heavy fraction have been scanned for diagnostic pieces of charcoal, lithics, bone, shell, and other cultural material. Diagnostic floral material is added to the data sheet and its presence in the flot is registered as a trace (less than 0.01 g). Lithics, bone, and shell are weighed project they may be counted as well. The presence of burned earth, pigment, and historic materials is noted. Modern rodent, insect and plant remains are kept in order to determine species active in the environment influencing bioturbation. Ancient bioturbation is indicated by charred insect dissemules.

The Study--35WH7

This section concerns 9 flotation samples and 3 spot or special samples from site 35WH7. Table 1 shows the flotation samples by weight, volume, carbon and floral content in grams, and as percentages of the sample weight. The three spot samples (Table 5) have western Juniper (Juniperus occidentalis), hackberry (Celtis douglasii), and bitterbrush

Table 2. Plant Taxa Yield from Selected Sites in Eastern Oregon[1]

Site	Approximate Dates	Flot Kg	Carbon Content	No.of Taxa	No.Taxa /kg.
John Day River Area,					
Pine Creek Basin					
35WH7	350-2380 BP	7	0.56%	12	1.7
35WH14	900-2580 BP	2	0.68%	6	3.0
35WH21	300-900 BP	11	0.12%	13	1.2
35GM91	2500-6000 BP	40	0.01%	12	0.3
Ochoco Mountains,					
35WH122, all samples		19	0.3%	11	0.6
35WH122	140-200 BP	9	0.2%	8	0.9
35WH122	1430-1020 BP	10	0.5%	7	0.7
Madras Region,					
35JE49	4400-8000 BP	22	0.23%	19	0.8
35JE51B	TBA	18	0.02%	8	0.4
35JE319	3000-5800 BP	39	0.04%	5	0.1
Paulina Lake Region,					
35DS34, all samples		33	0.70%	11	0.3
Modern soil	<1300 BP	2	0.13%	1	0.5
Post-Mazama	1300-6500 BP	3	5.05%	2	0.7
Pre-Mazama	6500-9000 BP	28	0.25%	11	0.4
Newberry Caldera					
35DS219	<1300 BP	6	1.07%	2	0.3
35DS220	<1300 BP	2	0.60%	2	1.0
35DS486	1300-3500 BP	3	0.70%	3	1.0

1 Adapted from Stenholm 1987, 1991b, 1992a-b,, 1993a-c,e

(antelope brush, Purshia tridentata). All three were probably used as fuel.

Five flotation samples contained sufficient carbonized remains for standard subsamples. The remainder were largely devoid of carbonized remains so that standard subsamples could not be drawn. The carbon was removed and weighed by hand.

Carbon percentages run from a high of 3.1% in a Test Trench 1 sample, to a low of 0.004% in one sample each from Trenches 2 and 4. The site average of 0.6% is an average amount for open sites dating to the last 2000 yrs BP (Table 2).

All samples have a colorful array of lithic flakes (N=339 at 8.34 g). Most are obsidian and CCS flakes. Four samples contained green flakes[1], and four had basalt flakes. In addition, a projectile point tip was found in Trench 1, and a core, or bifacial tool fragment was found in Trench 4. All samples had fragments of burned and unburned mammal bone which weigh 3.90 g. One sample contained 0.01 g of egg-shell, and one contained bivalve shell (at 0.01 g). Finally 6 samples contained red pigment, and one contained possible green pigment.

Sixty-eight percent have bits of modern flora, but bioturbation is only marked in one Test Trench 1 sample. Only three contained modern insect parts.

Table 2 shows the number of plant taxa identified in flotation samples in sites investigated recently in eastern Oregon. Note that the average carbon content of the soil is relatively high in comparison to that of other sites in the area, and the taxal yield for unit of soil analyzed is excellent.

The botanical array is shown in Table 3. The array consists of a minimum of 12 taxa. It has a large amount of hardwood compared to conifer wood, and at least two species serviceberry (<u>Amelanchier alnifolia</u>) and mountain mahogany (<u>Cercocarpus</u> <u>ledifolius</u>) are choice tool woods.

Conifer

Conifer charcoal contributes 20% of the assemblage weight. Western juniper (<u>Juniperus</u> <u>occidentalis</u>) is the most important conifer at the site by weight and number of appearances. It appears in is all but one flotation sample, and in all spot samples. This indicates use as fuel.

A pine family (Pinaceae) wood which could not be identified further is found in one sample.

It is noteworthy that conifer needles, bark, and other non-wood tissue was not found. This suggests that some wood could have been deliberately divested of these parts before burning (e.g. as in construction material). Even long dead branches retain bark for considerable periods of time. It is possible that juniper wood lacking, or cleaned of bark and twigs may have been carried to the site for purposes other than firewood. Turner notes that juniper wood had important uses

Table 3. The Botanical Assemblage of site 35WH7 by Flotation Weight (g) and Number of Appearances (#).

Specimen	Test Trench 1 (N=2) g	#	Test Trench 2 (N=1) g	#	Test Trench 3 (N=3) g	#	Test Trench 4 (N=3) g	#	TOTAL (N=9) g	#
CONIFER (20%)										
Juniper	0.03	2	<0.01	1	0.09	3	0.04	2	0.16	8
Pine family	0.01	1							0.01	1
HARDWOOD (73%)										
Sage	<0.01	1							<0.01	1
Willow/Poplar	0.01	1							0.01	1
Serviceberry					0.02	1			0.02	1
Mountain mahogany	<0.01	1							<0.01	1
Bitterbrush	0.18	2	<0.01	1	0.09	3	0.01	2	0.28	8
Hackberry	0.25	2	<0.01	1	0.06	3	0.01	2	0.32	8
Other					0.02	1			0.02	1
EDIBLE TISSUE (1%)										
PET, fruity	<0.01	2			0.01	1			0.01	3
OTHER TISSUE (<1%)										
Seeds,										
chenopodium, 3	<0.01	1			<0.01	1			<0.01	2
bedstraw, 5	<0.01	2			<0.01	1			<0.01	3
hackberry, 2	<0.01	1			<0.01	1			<0.01	2
Grass	<0.01	1							<0.01	1
Herb Stem	<0.01	2							<0.01	2
Other	<0.01	1					<0.01	2	<0.01	2
TOTAL	0.48		<0.01		0.29		0.06		0.83	

in manufactured items, particularly bows. While boughs, bark, and berries were used for fumigation, purification, and in medicinal washes by most Interior groups (Turner 1979:72-73; Turner, Bouchard, and Kennedy 1980:19-20).

Hardwood

Hardwoods contribute 73% of the assemblage weight. The most important species by weight is hackberry (Celtis douglasii), followed closely by bitterbrush (Purshia tridentata). These are the preferred hardwoods in spot samples as well. In addition, there is a little willow or poplar, some serviceberry, and mountain mahogany, a trace of sage (Artemisia sp.), and a small amount of hardwood which cannot be identified further. Where sage has been found in flots, it has usually been present as fuel. Bitterbrush probably had this function as well (Stenholm 1985:430-431; Turner et al. 1980:79). It is not particularly suitable for tool making, and most ethnographies list it as a fuel species. Serviceberry, (Amelanchier alnifolia), is an important food species, whose wood can be used for manufactures and toolmaking. It can be burned, but the stems are small, limiting its utility as fuel.

Members of the willow family such as, poplar, aspen and willow are common in sites both east and west of the Cascades. Willow is a good material for flexible, and its bark is useful for cordage and medicine. Poplar is sometimes burned as a casual fuel, and it has other uses, such as in hide preparation, or small constructions.

Mountain mahogany is a tough dense wood, often mentioned as a construction wood (e.g. for digging sticks). It can be burned as fuel. For instance, it is the most important hardwood by weight at Carlon Village and Boulder Village, appearing in 41% of the samples. At least two artifacts were identified from a historic Wickiup at Boulder Village in contexts which suggest floral food processing (Stenholm, 1993d).

The large amount of hackberry deserves comment. This is the first large amount of the wood assemblage at any site. Small amounts are found in eastern Washington sites (Stenholm 1985:431). Hackberry is a gnarly shrub or small tree of dry canyon-slopes. The fruit, 6-10 mm in diameter, are technically edible, but they may be considered a marginal food source because of scant flesh. Charred fruits have been found in a number of archaeological sites on the Upper Columbia River (e.g, 45OK2/2A, 45OK18, 45OK250, and 45OK258 see Stenholm 1985: Table 13-1) and eastern Oregon (e.g, 35JE49, Stenholm 1992). But there are never enough to posit human use.

Edible Tissue

PET fruity tissue is found in 3 samples: two from Test Trench 1 and one sample from Test Trench 3. The tissue contains shiny cavities, indication a high sugar content. There were no other distinguishing features, other than to note that serviceberry wood is present, suggesting a possible source for the tissue.

Other Tissue

The Other tissue category is represented several seeds: 5 bedstraw fruits (Galium sp.), fragments from two hackberry seeds, and at least 3 moderately large (1.0 mm in diameter) chenopodium (goosefoot, Chenopodium sp.) achenes. Bedstraw and chenopodium seeds are summer indicators. Hackberries, by contrast, are not good seasonal indicators because they are persistent on branches[2]. The wood and berries are scarcely mentioned in the ethnographic and ethnobotanical literature.

The bedstraw fruits are smooth, approximately 1.6-2.0 mm in diameter--indicating fragrant bedstraw (G. triflorum), or perhaps northern bedstraw (G. boreale). Both species are widely distributed in open woods and moist thickets. Thus their presence in the samples may be fortuitous. A flot from 35JE49, for instance contained a single galium fruit (Stenholm 1992).

It is difficult to find mention of bedstraw fruits in ethnographic accounts. They do not appear to be edible. Scented bedstraw leaves (G. trifolium) have been used cosmetically, and as a hair wash by coastal people (Gunther 1945: 46).

All chenopodium seeds are fully charred but not popped. This could suggest preparation; however, it should be noted that some chenopodium species are weedy and prefer disturbed habitats such as campsites. Fresh seeds from intrusive plants blown into a hearth could be charred accidentally[3].

There are traces of a large grass with solid stems in one sample, herbaceous stem tissue in two, and a plant terminal and dense blocky tissue in one sample each. The latter tissue is unusual because there is no obvious organization: a blocky conglomerate in which most of the cells are fragmentary and compressed to about 2-3 mm thickness. It might represent processed floral tissue, but the sample is so small that more is needed for study. Similar tissue has been seen before (e.g. at 34DS34 in pre-Mazama Levels, and at 35WH21).

Summary

In summary, the samples contain at least 12 taxa including two conifers, and at least seven hardwoods. Juniper and bitterbrush and hackberry were fuel. Some juniper and other hardwoods may have been present as raw material for tools or manufactures. There is very bark and other structures (such as leaves, seeds, or twigs) present and this suggest processing. The edible category is small, not enough to document purposeful gathering. Two seeds (hackberry and chenopod) are edible, but they may present as result of accidental inclusion. Bedstraw fruits may also be intrusive, but the plant has use and their presence is intriguing. The seeds and the possible fruit tissue point to summer activity.

The Samples from 35WH7

Table 4 shows the most recent samples in tabular form. Spot samples are described in Table 5. Comments are added when relevant.

Test Trench Samples

When comparing the arrays from the Test Trenches, domestic activity is best reflected in Trench 1 samples, is relatively good in Trench 3, and 4 samples, and is poor in Trench 2 sample.

Test Trench 1

Occupational debris is heaviest in Trench 1 (carbon average of 2.4%), and the two samples were probably extracted from areas of dense activity. Nearly 60% of the plant remains are from this area. The samples have all 12 plant taxa and the carbon content is very high (it averages 2.4%). The samples contain about 30% lithics and 80% of the bone weight. It also contains the only eggshell and bivalve shell. In addition to a colorful batch of lithic flakes, a projectile point tip is present.

The chenopodium and bedstraw seeds suggest summer occupation. The eggshell suggests spring or early summer. If the fruity tissue is serviceberry, then most likely time of occupation is early summer.

Test Trench 2

The spot sample near a fire pit clearly shows a mixture of the postulated fuel woods (juniper, bitterbrush, and hackberry), and it is mirrored by the flot sample. The flotation sample, with a very low carbon content of 0.004%, a low amount of lithic debitage and bone (burned), less than 1% of the total assemblage weight. This suggests the flotation samples are from an area somewhat peripheral to cultural activity with burned features.

Test Trench 3

The botanical array from Trench 3 is similar to that of Trench 1, but in less dense form. There are 8 taxa present. The carbon content of the soil, 0.2% is a little below samples which date in excess of 1 or

Table 4. Flotation Sample Summary including Carbon Content, Lithic Flakes and Bone, 35WH7.

Unit	No.	Wgt.	L.	Carbon		Lithics		Bone
		g		g	C%	#	g	g
TT1A	43	450	0.4	14.09	3.13	25*	0.94@	1.43+
TT1F	34	810	0.6	15.70	1.94	82#**	1.59@	1.72++
TT2BC	35	520	0.4	0.02	<0.01	7	0.08@	0.02
TT3	37	616	0.4	0.14	0.23	15	0.18	0.18
TT3	38	585	0.4	1.69	0.29	26#	8.32	0.16
TT3F	45	1858	1.4	5.65	0.30	124*,**	0.68@	0.18
TT4	36	507	0.4	0.07	0.14	9*	0.08	0.03
TT4d	40	846	0.7	0.37	0.43	36#**	0.32@	0.14
TT4E	39	563	0.5	0.02	<0.01	16*,**	0.19@	0.04
Total	9	6755	5.2	37.35	0.56	339	8.34	3.90

* Basalt flake present.
** Green flakes present.
\# formed artifact present.
\+ 0.01 g of bivalve shell in addition.
++ 0.01 g of eggshell in addition.
@ pigment present.

Table 5. Spot Samples from 34WH7.

Unit	No.	Comments
TT2H	41	8.70 g of charcoal, approximately 45% each juniper and hackberry, and 5% bitterbrush. Sample is associated with a fire pit.
TT4C	42	18.60 g of charcoal: approximately 70% hackberry, 23% bitterbrush, and 2% juniper.
TT4J	44	4.53 g of charcoal: 95% juniper, 5% bitterbrush. Unburned mammal bone is present.

2 millennia. It lacks the mountain mahogany, an excellent tool species, but has serviceberry wood, another tool species. Otherwise the assemblage has the same fuels, PET tissue, and small seed array.

The three samples contain 20% of the carbon, 52% of the lithics, and 13% of the bone by weight. In short there seems to be less bone and floral remains. Lithics and pigment are varied (Sample 45 has green as well as red pigment present and Sample 38 has a fragment of a bifacial tool).

Chenopodium, bedstraw and fruity tissue suggest an early to mid-summer occupation.

Test Trench 4

The botanical array of Trench 4 is similar to that of Test Trench 2. The carbon content, 0.2%, identical to Trench 3 suggesting contermporaneity. Spot samples mirror the fuel species present, but there is little other floral material to suggest activity other than hearth-related burning: The samples contain 1% of the floral remains (similar to Trench 2 sample), 6% of the lithics, and 5% of the bone. Two samples have red pigment present.

The Study--35WH14, Pine Creek Village

This section concerns 4 flotation samples and 7 spot or special samples from site 35WH14. Table 6 shows the flotation samples by weight, volume, carbon and floral content in grams, and as percentages of sample weight. The spot samples (Table 10) have western Juniper (*Juniperus occidentalis*), lodgepole pine (*Pinus contorta*), bitterbrush (antelope bush, *Purshia tridentata*), serviceberry (*Amelanchier alnifolia*), and buckthorn (cascara, *Rhamnus* sp.). Juniper, pine and bitterbrush are probable fuel species.

One flotation sample from the Lower Housepit contained sufficient carbonized remains for a standard subsample. The remainder were largely devoid of carbonized remains so that standard subsamples could not be drawn. The carbon was removed and weighed by hand.

Carbon percentages run from a high of slightly over 1% in one sample from the lower Housepit, to a low of 0.006% in the sample associated with a grinding stone ("metate"). The site average of 0.7% is largely a reflection of the large Feature 4 sample. The three samples with an average carbon content of approximately 0.2% is lower than average amount for housepit debris.

All flotation samples have lithic flakes (N=39 at 0.93 g). Most are obsidian and CCS flakes. One sample contained a basalt flake.

Table 6. Samples by Weight, Volume, and Carbon Content

Flotation Sample	Flot No.	Total (G)	Total (L)	Carbon (G)	Carbon (%)
Upper Housepit:					
Feature 3 assoc.	2	372	0.2	0.35	0.94%
Feature 5 assoc.	4	307	0.3	0.07	0.02%
Lower Housepit:					
Feature 4 assoc.	9	858	1.0	9.41	1.09%
Grinding stone	46	157	0.1	0.01	0.01%
Total	4	1594	1.71	0.84	0.68%

Three flotation samples had fragments of mammal bone weighing 0.29 g. Those from Features 4 and 5 contained burned and unburned bone. Feature 4 contained a trace (<0.01 g) of shell, and Feature 5 had burned earth and red pigment.

One sample from Upper Housepit had a few modern seeds present, and in general, bioturbation is not a problem for these samples.

All in all, the samples show good preservation of the paleobotanical remains.

Table 7 shows the number of plant taxa identified in flotation samples in sites investigated recently in eastern Oregon.

Note that the average carbon content of the soil is relatively high in comparison to that of other sites in the region, and the taxal yield for unit of soil analyzed is excellent[4].

The botanical array is shown in Table 8. The array consists of a minimum of 6 taxa. It has a large amount of hardwood compared to conifer wood, largely due to one flot from the lower housepit. The array is somewhat skewed because of that sample. The spot samples (Table 10) indicate lodgepole pine and juniper are more important than suggested in the table. And that serviceberry, and bitterbrush are present, and probably important as well.

Table 7. Plant Taxa Yield from Selected Sites in Eastern Oregon[1]

Site	Approximate Dates	Flot Kg	Carbon Content	No.of Taxa	No.Taxa /kg.
John Day River					
Pine Creek Basin					
35WH7	350-2380 BP	7	0.56%	12	1.7
35WH14	900-2580 BP	2	0.68%	6	3.0
35WH21	300-900 BP	11	0.12%	13	1.2
35GM91	2500-6000 BP	40	0.01%	12	0.3
Ochoco Mountains,					
35WH122, all samples		19	0.30%	11	0.6
35WH122	140-200 BP	9	0.20%	8	0.9
35WH122	1430-1020 BP	10	0.50%	7	0.7
Madras Region,					
35JE49	4400-8000 BP	22	0.23%	19	0.8
35JE51B	TBA	18	0.02%	8	0.4
35JE319	3000-5800 BP	39	0.04%	5	0.1
Paulina Lake Region,					
35DS34, all samples		33	0.70%	11	0.3
Modern soil	<1300 BP	2	0.13%	1	0.5
Post-Mazama	1300-6500 BP	3	5.05%	2	0.7
Pre-Mazama	6500-9000 BP	28	0.25%	11	0.4
Newberry Caldera					
35DS219	<1300 BP	6	1.07%	2	0.3
35DS220	<1300 BP	2	0.60%	2	1.0
35DS486	1300-3500 BP	3	0.70%	3	1.0

1 Adapted from Stenholm 1987, 1991b, 1992a-b, 1993a-c,e

Conifer

Western (Juniperus occidentalis) is the most important conifer at the site by weight and number of appearances. It appears in two flot and four spot samples. This suggests use as fuel. A small amount of juniper (9 pieces at 0.2 g) from an Upper Housepit flot (#6) appears artifactual in nature. These are fragments from possibly two incompletely charred artifacts. The fragments have surviving lengths which vary from 3.5 mm to 18 mm each. The pieces may represent two skewer-like items with square to rectangular cross sections (they vary from 3.5 x 3.5 mm to

Table 8. The Botanical Assemblage of site 35WH14 by Flotation Weight (g) and Number of Appearances (#).

TAXA	Upper Housepit (N=2) g	#	Lower Housepit (N=2) g	#	TOTAL (N=4) g	#
CONIFER (<1%)						
Juniper	<0.01	2			<0.01	2
Other			<0.01	1	<0.01	1
HARDWOOD (99%)						
Poplar/aspen			0.19	1	0.19	1
Buckthorn	<0.01	1			<0.01	1
Other	<0.01	1			<0.02	1
EDIBLE TISSUE (<1%)						
Pit, fruity			<0.01		<0.01	1
OTHER TISSUE (<1%)						
Seed coat	<0.01	1			<0.01	1
Herb Stem	<0.01	1			<0.01	1
TOTAL	<0.01		0.19		0.19	

3.5-2.5 mm in cross section) and they have a slight curvature at the tip. The length of the items remains unknown.

Turner notes that juniper wood had important uses in manufactured items, particularly bows. While boughs, bark, and berries were used for fumigation, purification, and in medicinal washes by most Interior groups (Turner 1979:72-73; Turner, Bouchard, and Kennedy 1980:19-20).

The oldest juniper in archaeological flots is found at site 35JE49 (Stenholm 1992a). Juniper artifacts are found in spot and flot samples from a historic Wickiup at Boulder Village (Stenholm 1993d).

Other conifer, probably pine family (Pinaceae) wood is found in one sample. Spot samples suggest that this may be lodgepole pine, a good fuel species common in eastern Oregon and Washington flots.

Hardwood

Hardwoods contribute 99% of the assemblage weight, nearly all of it poplar (or aspen, Populus sp.), with a trace of buckthorn. In addition, two twig fragments were identified from the upper housepit.

Members of the willow family such as, poplar and aspen are common in sites both east and west of the Cascades. Poplar is sometimes burned as a casual fuel, and it has other uses, such as in hide preparation, or in small constructions.

Apart from the bark, buckthorn (or cascara) the wood has few documented uses. However it is tough and flexible, and could be used for a variety of construction projects.

Serviceberry is found in one spot sample. Serviceberry wood is useful for artifact manufactures, such as arrows, digging sticks, spears and seed beaters (Turner et al. 1980:123). Serviceberry wood is not mentioned in the ethnobotanical literature as a fuel although it (as well as any wood) could have been burned whenever dead branches are present the in the environment.

Finally, bitterbrush is found in flotation and spot samples. When bitterbrush has been found, it is present as fuel (Stenholm 1985).

Edible Tissue

A trace of dense fruit pit is found in lower Housepit near a grinding stone ("metate"). The coat tissue is dense and hard, and at least 3 mm thick. This suggests a member of the rose family, probably cherry (Prunus sp.) or hawthorn (Crataegus sp.). We need more samples for a more complete identification.

Other Tissue

The Other tissue category is represented by a trace of leathery fruit coat, and a trace of herbaceous stem tissue which cannot be further identified.

Summary

In summary, the samples contain at least 6 (8 with serviceberry and bitterbrush from spot samples) taxa including two conifers, 5 hard

Table 9. Flotation Sample Summary including Carbon Content, Lithic Flakes and Bone, 35WH14.

Unit	No.	Wgt.	Carbon		Lithics		Bone
		g	g	C%	#	g	g
Upper Housepit:							
202.90x87.10y	2	372	0.35	0.94	2	0.01	0.00
202x86y	4	307	0.07	0.02	11*	0.21	0.08**
Lower Housepit:							
204.00x76.00y	9	858	9.41	1.09	21	0.49	0.19+
209.29x76.50y	46	157	0.01	<0.01	5	0.22	0.02
Total	4	1594	10.84	0.68	39	0.93	0.29

* Basalt flake present.
** Red pigment and burned earth present.
+ 0.01 g of bivalve shell in addition.
++ pigment present.

woods, a possible edible fruit (pit tissue), and a trace of other tissue. Juniper and bitterbrush was probably used as fuel. Some juniper and perhaps hardwoods, such as serviceberry and buckthorn, may have been present in the samples as raw material for tools and other manufactures. The seed coat and the possible fruit pit tissue suggest summer activity.

The Samples from 35WH14

Table 9 shows the flots samples in tabular form. Table 10 describes the spot samples. Comments are added when relevant.

Contents of three spot samples are given below. Note that one sample contains remnants of at least two juniper artifacts. All but one sample contain wood.

Upper Housepit Samples

The samples from Feature 3 contain charred juniper wood and a little bark, presumably burned as fuel, as well as at least two juniper

Table 10. Spot Samples from 34WH14.

Unit	No.	Comments
Upper Housepit:		
	1	Associated with Feature 3 date of 890± 20 BP; approximately 172 g of juniper charcoal. Also several pieces of uncharred juniper (0.02 g) appear to be from a two small tabular WMOs with skewer-like or pointed ends.
	3	Associated with Feature 5 date of 1500±25 BP; Approximately 71 g charcoal: 82% serviceberry, 28% Juniper, and 1% buckthorn.
	5	0.07 g of yellow pine and bitterbrush charcoal.
	6	2.78 g of unburned juniper in good (surface) to excellent (interior) condition.
Lower Housepit:		
	7	1.68 g Juniper, 2.09 g Lodgepole pine (P. Contorta)
	8	Associated with a date of 2580±80 BP, 18.5 g of lodgepole pine branch. Portions are charred and uncharred.
	10	0.01 g of herbaceous tissue.

artifacts. Apart from an obsidian and a CCS flake, no other cultural materials were encountered.

The samples associated with Feature 5 (a grinding stone), are mostly woods: juniper, bitterbrush, serviceberry, and buckthorn. There is a trace of hardwood twigs, a fragment of leathery seed coat, and epithelial tissue which could not be identified further.

The flot samples have 6 obsidian, four CCS and 1 basalt flake; calcined and unburned mammal bone burned earth; and, red pigment.

The diversity in the botanical and non-botanical arrays suggests general purpose midden. It seems to reflect several activities, such as food (faunal) or possibly tool preparation featuring hardwoods.

Lower Housepit Samples

Flotation sample #9 associated with feature 4, contains a large amount of mature poplar charcoal, CCS and obsidian flakes, burned and unburned mammal bone (large and small mammal) and a trace of shell.

Flotation sample, #46, with only 0.01 g of carbon present, has a trace of conifer (judging from spot samples, it is probably lodgepole pine), and a fragment of a possible edible fruit pit present. The lithic array consist of 1 obsidian flake, 1 CCS flake, and three CCS chunks. There is a little uncharred mammal bone present.

The low carbon content, low amount of lithic debitage and bone in this sample suggests this is an area somewhat peripheral to activities featuring burning (e.g., hearths). The presence of a dense seed coat near the grinding stone, points toward food preparation. Thus far, two domestic dwellings have grinding stones with preserved fruit remains in direct association: House 2, Playa 9 in the Fort Rock Basin (Stenholm 1993d) and Heath Cliff Hills, site 35JE319 (Stenholm 1993b). The oldest cherry remains are from pre-Mazama matrices at 35DS34 (Stenholm 1993e). These finds document grinding stones use in processing fruit. They also show that wild cherries and serviceberries were gathered by Native Americans in this area for thousands of years.

Sources Cited

Gunther, Erna

1945 Ethnobotany of Western Washington. University of Washington Publications in Anthropology (10)1.

Stenholm, Nancy

1984 Botanical Assemblage. In Archaeological Investigations at Sites 45-OK-250 and 45-OK-4, Chief Joseph Dam Project, edited by S.K. Campbell, pp.161-177. University of Washington, Office of Public Archaeology.

1985 Botanical Assemblage. In Summary Of Results, Chief Joseph Dam Cultural Resources, Washington, edited by S.K. Campbell, pp. 421-453. University of Washington Office of Public Archaeology.

1987 Analysis of Botanical Samples. In Archaeology of the Morris Site (35GM91) on the John Day River, Gilliam County, Oregon, edited by Randall F. Schalk, Chapter 8. Office of Public Archaeology, University of Washington. On File at Portland District, U.S. Army Corps of Engineers.

1990 The Botanical Assemblage. In Archaeology of the Dunn Site (35HA1261), Harney County, Oregon, by Robert R. Musil, pp. 81-85. Heritage Research Associates Report No. 95, Eugene.

1991 The Botanical Assemblage of Feature 3, 35TI57 (Nehalem Bay) and Additional Spot or Special Samples from Site 35TI57. Report prepared for Oregon State Museum of Anthropology, University of Oregon, Eugene. MS. on file Botana Labs.

1992a Botanical Analysis of Site 35-JE-49. Report prepared for Infotec Research, Inc., Eugene. MS. on file, Botana Labs.

1992b Analysis of Flotation Samples from Site, 35-JE-51b. Report prepared for Infotec Research, Inc., Eugene. MS. on file, Botana Labs.

1993a Botanical Analysis of Newberry Caldera Sites, 35DS219, 35DS220, and 35DS486. Report prepared for the University Museum, University of Oregon, Eugene. MS. on file, Botana Labs.

1993b Botanical Analysis of Heath Cliffs Hills Site, 35JE319. Report prepared for University Museum, University of Oregon, Eugene. MS. on file, Botana Labs.

1993c Appendix B: Botanical Analysis of Mitchell Cave. In Archaeology of Mitchell Cave (35WH122): A Late Period Hunting Camp in the Ochoco Mountains, Wheeler County, Oregon. Edited by Thomas

J. Connolly, Dennis L. Jenkins, and Jane Benjamin. University of Oregon Anthropological Papers 46, Eugene.

1993d Paleoethnobotanical Analysis of Samples Recovered in the Fort Rock Basin. In Aikens and Jenkins (eds.), _Archaeological Researches in the Northern Great Basin: Fort Rock Archaeology Since Cressman_. University of Oregon (In Preparation).

1993e Botanical Analysis of the Paulina Lake Site, 35DS34. Report prepared for the Oregon State Museum of Anthropology, Eugene. MS. on file, Botana Labs.

Turner, Nancy
1978 _Food Plants of British Columbia Indians. Part 2: Interior Peoples_. British Columbia Provincial Museum, Handbook 36.

1979 _Plants in British Columbia Indian Technology_. British Columbia Provincial Museum, Handbook 38.

Turner, N., Randy Bouchard, and Dorothy Kennedy
1980 _Ethnobotany of the Okanagan-Colville Indians of British Columbia and Washington_. British Columbia Provincial Museum, Occasional Paper No. 21.

Endnotes

1. Green flakes have been found in flotation samples from three other Oregon sites: a coastal site, 35TI57 (Stenholm 1991a), a Rogue River site, 35JA189 (Stenholm 1991b), and the Heath Cliffs Site, 35JE319 (Stenholm 1993b). A single green flake appears in 35WH21. It is hoped a source may be found for these striking flakes.

2. Three years at Nespelem during the Chief Joseph Dam Project convince me that hackberries are not eagerly sought by most animals (and not at all by human beings) when ripe. They become more attractive after frost, which seems to enhance their texture and flavor. They could be considered edible by humans then, and perhaps might function as a starvation food.

3. Much the same way hackberries or juniper berries might become incorporated in cultural deposits. This is one reason why flots are checked for fresh or modern seeds. In this case, the samples have a few modern uncharred chenopodium (and hackberry) seeds in them, and not much economic importance is placed on their presence here.

But other finds are not so easy to dismiss as fortuitous. Three thousand year old large chenopodium seeds (C. fremontii) were found with other edible seeds in a hearth at the Dunn site, 35HA1261 and at village sites in the Fort Rock Basin (Stenholm, 1993d). Many seeds were popped open, a sign that fresh seeds were toasted together, a practice common throughout the Great Basin in the past.

4. This figure can give the reader an idea of the potential of housepit features flots. Housepits have protected areas in which small finds can survive in the soil.

APPENDIX E

REPORT ON THE X-RAY FLUORESCENCE ANALYSIS OF PINE CREEK BASIN OBSIDIAN ARTIFACTS,

BY RICHARD E. HUGHES

May 24, 1993

Ms. Pamela Endzweig
Department of Anthropology
University of Oregon
Eugene, OR 97403

Dear Pam:

Enclosed with this letter you will find six tables presenting x-ray fluorescence (xrf) data generated from the analysis of 90 obsidian artifacts from ten archaeological sites (35-WH-2, n=8; 35-WH-7, n=16; 35-WH-13, n=15; 35-WH-14, n= 31; 35-WH-21, n= 10; 35-WH42, n= 3; 35-WH-46, n= 2; 35-WH-164, n=1; 35-WH-166, n=3; and 35-WH-168, n=1) in the Pine Creek Basin of Wheeler County, Oregon.

Laboratory investigations were performed on a Spectrace™ 5000 (Tracor X-ray) energy dispersive x-ray fluorescence spectrometer equipped with a Rh x-ray tube, a 50 kV x-ray generator, with microprocessor controlled pulse processor (amplifier) and bias/protection module, a 100 mHz analog to digital converter (ADC) with automated energy calibration, and a Si(Li) solid state detector with 150 eV resolution (FWHM) at 5.9 keV in a 30 mm^2 area. The x-ray tube was operated at 35.0 kV, .28 mA, using a .127 mm Rh primary beam filter in an air path at 200 seconds livetime to generate x-ray intensity data for elements zinc (Zn $K\alpha$), gallium (Ga $K\alpha$), rubidium (Rb $K\alpha$), strontium (Sr $K\alpha$), yttrium (Y $K\alpha$), zirconium (Zr $K\alpha$), and niobium (Nb $K\alpha$). Barium (Ba $K\alpha$) intensities were generated by operating the x-ray tube at 50.0 kV, .35 mA, with a .63 mm copper (Cu) filter at 300 seconds livetime, while titanium (Ti $K\alpha$) and manganese (Mn $K\alpha$) intensities were obtained by operating the x-ray tube at 15.0 kV, .30 mA with a .127 mm aluminum (Al) filter at 300 seconds livetime. Trace element intensities were converted to concentration estimates by employing a least-squares calibration line established for each element from analysis of up to 26 international rock standards certified by the U.S. Geological Survey, the U.S. National Institute of Standards and Technology (formerly National Bureau of Standards), the Geological Survey of Japan, and the Centre de Recherches Petrographiques et Geochimiques (France). Further details pertaining to x-ray tube operating conditions and calibration appear in Hughes (1988a).

Trace element values on the enclosed tables are expressed in quantitative units (i.e. parts per million [ppm] by weight), and these were compared directly to values for known obsidian sources that appear in Hughes (1986a-d; 1989; 1993), Jack and Carmichael (1969), Skinner (1983), and unpublished data in my possession on certain other Oregon and Idaho obsidians (e.g. data presented in Hughes 1988b, 1989). Artifacts were matched to the profiles of different geochemical types of obsidian on the basis of correspondences (at the 2-sigma level) in diagnostic trace element concentration values (i.e., ppm values for Rb, Sr, Y, Zr and, when necessary, Ba, Ti, and Mn). I consider artifact-to-obsidian source (geochemical type) correspondences reliable if diagnostic mean measurements for artifacts fall within 2 standard deviations of mean values for source standards. The term "diagnostic" is used to specify those trace elements that are well-measured by x-ray fluorescence, and whose concentrations show low intra-source variability and marked variability across sources. Diagnostic elements, then, are those whose concentration values allow one to draw the clearest geochemical distinctions between sources (see Hughes 1990, 1993; Hughes and Lees 1991). Although Ga and Nb ppm concentrations also were measured and reported for each specimen, they are not considered "diagnostic" because they don't usually vary significantly across obsidian sources (see Hughes 1982, 1984). This is particularly true of Ga, which occurs in concentrations between 10-30 ppm in nearly all sources in the study area. Zn ppm values are infrequently diagnostic; they are always high in Zr-rich, Sr-poor peralkaline volcanic glasses, but otherwise they do not usually vary significantly between non-peralkaline sources.

Concentration values are reported to the nearest ppm in the accompanying tables to reflect, as closely as possible, the resolution capabilities of non-destructive energy dispersive x-ray fluorescence spectrometry. The resolution limits of the present x-ray fluorescence system for the determination of Zn is about 3 ppm; Ga about 2 ppm; for Rb about 5 ppm; for Sr about 3 ppm; Y about 2 ppm; Zr about 4 ppm; Nb about 3 ppm, and Ba about 13 ppm (see Hughes [1988a] for other elements). When counting and fitting error uncertainty estimates (the "±" value in the tables) for a sample are greater than calibration-imposed limits of resolution, the larger number is a more conservative indicator of composition variation and measurement error due to differences in sample size, surface and x-ray reflection geometry (Hughes 1988a).

As these tables shows, the vast majority of samples match the trace element signatures of newly characterized obsidians located about 20 km east of Seneca in Grant County, Oregon which I've provisionally named *Whitewater Ridge*, *Wolf Creek*, and *Little Bear Creek*. As I've discussed with you over the telephone, the geochemical contrasts between Whitewater Ridge and Wolf Creek are comparatively sharp but Whitewater Ridge and Little Bear Creek are considerably more similar to one another on the basis of the elements I measure by xrf. I cannot be sure at this juncture whether this apparent similarity monitors a geochemical gradient that may exist between these two superficially similar, yet subtly distinct, source types. I hope to get back to the area this summer to make more exhaustive collections to help resolve the issue. Although this geochemical problem may be remotely interesting to you, from a provenance standpoint it probably makes little substantive difference in terms of the direction of conveyance into the Pine Creek Basin sites. Other obsidians from sources much farther south (e.g., Glass Buttes, Brooks Canyon, Chickahominy, Delintment Creek) east (Obsidian Cliffs) and southeast (Newberry Volcano, Quartz Mountain) also are represented in the assemblage in fewer numbers. Several samples have trace element concentrations unlike any of the sources in my regional data file.

I hope this "sourcing" information will help, and complement,your analysis of other materials from these sites. It will be especially interesting to learn whether or not you can discern any temporal patterning in source-use when you stratify these artifacts by type. Please contact me at my laboratory (phone: [916] 364-1074) if I can provide further information or assistance.

Sincerely,

Richard Hughes

Richard E. Hughes, Ph.D.

encl.

References

Hughes, Richard E.

1982 Age and Exploitation of Obsidian from the Medicine Lake Highland, California. **Journal of Archaeological Science** 9: 173-185.

1984 Obsidian Sourcing Studies in the Great Basin: Problems and Prospects. *In* Richard E. Hughes (ed.) Obsidian Studies in the Great Basin. **Contributions of the University of California Archaeological Research Facility** No. 45: 1-19.

1986a Energy Dispersive X-ray Fluorescence Analysis of Obsidian from Dog Hill and Burns Butte, Oregon. **Northwest Science** 60: 73-80.

1986b Diachronic Variability in Obsidian Procurement Patterns in Northeastern California and Southcentral Oregon. **University of California Publications in Anthropology**, Vol. 17.

1986c X-ray Fluorescence Analysis of Artifacts from the Rigdon and Detroit Ranger Districts, Willamette National Forest, Oregon. Letter report submitted to James Heid, Forest Archaeologist, Willamette National Forest, November 25, 1986.

1986d X-ray Fluorescence Analysis of Obsidian Source Specimens and Artifacts from the Snow Mountain Ranger District, Ochoco National Forest, Oregon. Letter report submitted to Marge Dryden, District Archaeologist, Ochoco National Forest, August 27, 1986.

1988a The Coso Volcanic Field Reexamined: Implications for Obsidian Sourcing and Hydration Dating Research. **Geoarchaeology** 3: 253-265.

1988b X-ray Fluorescence Analysis of Artifacts from 10-BO-418 and 10-BO-419, Boise County, Idaho. Letter report submitted to James R. Benson, Olympia, WA, July 5, 1988.

1989 Results of Study Phase I of the Obsidian Sourcing Project, Buffalo Flat Archaeological Project, Christmas Valley, Oregon. Letter report submitted to Jerry V. Jermann, U.R.S. Consultants, Long Beach, CA, June 30, 1989.

1990 Obsidian Sources at James Creek Shelter, and Trace Element Geochemistry of Some Northeastern Nevada Volcanic Glasses. *In* Robert G. Elston and Elizabeth E. Budy (eds.), The Archaeology of James Creek Shelter. **University of Utah Anthropological Papers** No. 115: 297-305.

1993 Trace Element Geochemistry of Volcanic Glass from the Obsidian Cliffs Flow, Three Sisters Wilderness, Oregon. **Northwest Science** 67. In press.

Hughes, Richard E., and William B. Lees

1991 Provenance Analysis of Obsidian from Two Late Prehistoric Archaeological Sites in Kansas. **Transactions of the Kansas Academy of Science** 94 (1&2): 38-45.

References (continued)

Jack, R. N., and I.S.E. Carmichael
1969 The Chemical 'Fingerprinting' of Acid Volcanic Rocks. **California Division of Mines and Geology, Special Report** 100: 17-32. San Francisco.

Nelson, Fred W., Jr.
1984 X-ray Fluorescence Analysis of Some Western North American Obsidians. *In* Richard E. Hughes (ed.) Obsidian Studies in the Great Basin. **Contributions of the University of California Archaeological Research Facility**, No. 45: 27-62.

Skinner, Craig
1983 Obsidian Studies in Oregon: An Introduction to Obsidian and an Investigation of Selected Methods of Obsidian Characterization Utilizing Obsidian Collected at Prehistoric Quarry Sites in Oregon. M.A. Thesis in Interdisciplinary Studies, University of Oregon, Eugene.

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Trace Element Concentrations

Specimen Number	Zn	Ga	Rb	Sr	Y	Zr	Nb	Ba*	Ti	Mn	Obsidian Source (Chemical Group)
35 WH 2, WH2-16	46 ±7	13 ±4	115 ±5	59 ±3	30 ±2	110 ±5	10 ±3	nm	nm	nm	Little Bear Creek
35 WH 2, WH2-66	45 ±6	16 ±3	80 ±4	108 ±3	16 ±2	99 ±5	10 ±3	nm	nm	nm	Obsidian Cliffs
35 WH 2, WH2-112	53 ±6	19 ±3	124 ±4	56 ±3	41 ±2	258 ±5	16 ±3	nm	nm	nm	Newberry Volcano
35 WH 2, WH2-114	35 ±6	13 ±4	114 ±4	72 ±3	25 ±2	117 ±5	9 ±3	nm	800 ±29	330 ±20	Whitewater Ridge
35 WH 2, WH2-381	104 ±8	16 ±4	128 ±5	10 ±3	65 ±2	477 ±6	25 ±3	nm	nm	nm	Unknown
35 WH 2, WH2-932	39 ±6	15 ±3	91 ±4	58 ±3	29 ±2	98 ±5	5 ±3	nm	585 ±28	280 ±20	Little Bear Creek
35 WH 2, WH2-1046	60 ±7	9 ±5	105 ±5	75 ±3	28 ±2	105 ±5	6 ±3	nm	nm	nm	Whitewater Ridge
35 WH 2, WH2-1570	40 ±7	13 ±4	114 ±4	70 ±3	24 ±2	112 ±5	8 ±3	nm	nm	nm	Whitewater Ridge
35 WH 7, CC2-66	53 ±6	16 ±3	104 ±4	40 ±3	42 ±2	145 ±5	13 ±3	nm	nm	nm	Unknown
35 WH 7, CC2-79	45 ±6	12 ±4	116 ±4	81 ±3	23 ±2	124 ±5	7 ±3	nm	nm	nm	Whitewater Ridge
35 WH 7, CC2-95	48 ±7	46 ±4	123 ±5	85 ±3	24 ±2	128 ±5	10 ±3	nm	nm	nm	Whitewater Ridge
35 WH 7, CC2-109	35 ±7	16 ±3	124 ±4	39 ±3	27 ±2	91 ±5	10 ±3	nm	nm	nm	Wolf Creek
35 WH 7, CC2-199	36 ±6	19 ±3	99 ±4	78 ±3	26 ±2	116 ±5	6 ±3	nm	nm	nm	Whitewater Ridge
35 WH 7, CC2-274	46 ±5	20 ±3	78 ±4	22 ±3	48 ±2	90 ±5	9 ±3	nm	nm	nm	Glass Buttes
35 WH 7, CC2-333	46 ±7	17 ±4	122 ±5	88 ±3	25 ±2	133 ±5	8 ±3	nm	nm	nm	Whitewater Ridge
35 WH 7, CC2-406	37 ±6	12 ±3	111 ±4	79 ±3	24 ±2	122 ±5	8 ±3	nm	nm	nm	Whitewater Ridge
35 WH 7, CC2-494	42 ±8	19 ±4	107 ±5	72 ±4	27 ±2	111 ±5	6 ±3	nm	nm	nm	Whitewater Ridge

All trace element values in parts per million (ppm); ± = pooled estimate (in ppm) of x-ray counting uncertainty and regression fitting error at 200 and 300 (*) seconds livetime; nm = not measured.

Trace Element Concentrations

Specimen Number	Zn	Ga	Rb	Sr	Y	Zr	Nb	Ba*	Ti	Mn	Obsidian Source (Chemical Group)
35 WH 7, CC2-516	47 ±7	9 ±5	96 ±4	60 ±3	28 ±2	99 ±5	1 ±3	nm	nm	nm	Little Bear Creek
35 WH 7, CC2-601	31 ±6	12 ±3	110 ±4	84 ±3	23 ±2	122 ±5	6 ±3	nm	nm	nm	Whitewater Ridge
35 WH 7, CC2-825	41 ±6	12 ±3	94 ±4	56 ±3	24 ±2	100 ±5	8 ±3	nm	nm	nm	Little Bear Creek
35 WH 7, CC2-900	45 ±6	17 ±3	119 ±4	90 ±3	25 ±2	132 ±5	9 ±3	nm	nm	nm	Whitewater Ridge
35 WH 7, CC2-927	34 ±6	15 ±3	110 ±4	76 ±3	24 ±2	118 ±5	8 ±3	nm	nm	nm	Whitewater Ridge
35 WH 7, CC2-937	49 ±6	14 ±3	119 ±4	89 ±3	24 ±2	132 ±5	10 ±3	nm	nm	nm	Whitewater Ridge
35 WH 7, CC2-978	45 ±6	17 ±3	111 ±4	86 ±3	23 ±2	128 ±5	5 ±3	nm	nm	nm	Whitewater Ridge
35 WH 13, IC2-108	28 ±8	17 ±4	93 ±4	55 ±3	28 ±2	100 ±5	6 ±3	nm	nm	nm	Little Bear Creek
35 WH 13, IC2-197	39 ±8	11 ±5	112 ±5	59 ±3	24 ±2	97 ±5	10 ±3	nm	nm	nm	Little Bear Creek
35 WH 13, IC2-283	91 ±7	17 ±4	110 ±5	10 ±3	61 ±2	435 ±6	22 ±3	nm	nm	nm	Unknown
35 WH 13, IC2-366	61 ±6	14 ±4	116 ±4	56 ±3	40 ±2	258 ±5	16 ±3	nm	nm	nm	Newberry Volcano
35 WH 13, IC2-453	49 ±7	17 ±4	110 ±5	56 ±3	25 ±2	102 ±5	12 ±3	nm	nm	nm	Little Bear Creek
35 WH 13, IC2-463	33 ±6	12 ±4	112 ±4	57 ±3	25 ±2	100 ±5	6 ±3	nm	nm	nm	Little Bear Creek
35 WH 13, IC2-484	77 ±7	14 ±4	108 ±5	25 ±3	55 ±2	276 ±5	17 ±3	nm	nm	nm	Chickahominy
35 WH 13, IC2-500	38 ±7	13 ±4	110 ±5	59 ±3	27 ±2	104 ±5	8 ±3	nm	nm	nm	Little Bear Creek
35 WH 13, IC2-579	37 ±6	14 ±3	112 ±4	63 ±3	23 ±2	101 ±5	9 ±3	nm	nm	nm	Little Bear Creek
35 WH 13, IC2-1030	28 ±7	9 ±4	105 ±4	53 ±3	23 ±2	90 ±5	5 ±3	nm	nm	nm	Little Bear Creek

All trace element values in parts per million (ppm); ± = pooled estimate (in ppm) of x-ray counting uncertainty and regression fitting error at 200 and 300 (*) seconds livetime; nm = not measured.

5/25/93
R. E. Hughes

Pine Creek Basin, Oregon, Xrf Data

Trace Element Concentrations

Specimen Number	Zn	Ga	Rb	Sr	Y	Zr	Nb	Ba*	Ti	Mn	Obsidian Source (Chemical Group)
35 WH 13, IC2-1274	37 ±8	21 ±4	112 ±5	58 ±3	26 ±2	109 ±5	11 ±3	nm	nm	nm	Little Bear Creek
35 WH 13, IC2-6991	36 ±6	13 ±3	113 ±4	77 ±3	23 ±2	118 ±5	9 ±3	nm	nm	nm	Whitewater Ridge
35 WH 13, IC2-7442	67 ±7	17 ±4	120 ±5	94 ±4	24 ±2	135 ±5	8 ±3	nm	nm	nm	Whitewater Ridge
35 WH 13, IC2-7885	35 ±6	19 ±3	101 ±4	78 ±3	27 ±2	104 ±5	7 ±3	nm	nm	nm	Whitewater Ridge
35 WH 13, IC2-8088	52 ±6	18 ±3	128 ±4	57 ±3	39 ±2	262 ±5	15 ±3	nm	nm	nm	Newberry Volcano
35 WH 14, WH14-4	31 ±6	10 ±4	109 ±4	84 ±3	23 ±2	120 ±5	11 ±3	nm	nm	nm	Whitewater Ridge
35 WH 14, WH14-36	57 ±7	16 ±4	87 ±5	113 ±4	19 ±2	100 ±5	1 ±3	nm	nm	nm	Obsidian Cliffs
35 WH 14, WH14-77	37 ±6	13 ±3	80 ±4	23 ±3	50 ±2	84 ±5	8 ±3	nm	nm	nm	Glass Buttes
35 WH 14, WH14-122	40 ±5	17 ±3	112 ±4	54 ±3	24 ±2	101 ±5	7 ±3	nm	nm	nm	Little Bear Creek
35 WH 14, WH14-244	38 ±6	16 ±3	76 ±4	103 ±3	16 ±2	92 ±5	8 ±3	nm	nm	nm	Obsidian Cliffs
35 WH 14, WH14-252	31 ±6	16 ±3	108 ±4	84 ±3	25 ±2	123 ±5	8 ±3	nm	nm	nm	Whitewater Ridge
35 WH 14, WH14-261	34 ±6	16 ±3	103 ±4	78 ±3	20 ±2	118 ±5	7 ±3	nm	nm	nm	Whitewater Ridge
35 WH 14, WH14-328	41 ±5	14 ±3	116 ±4	84 ±3	24 ±2	124 ±5	10 ±3	nm	nm	nm	Whitewater Ridge
35 WH 14, WH14-344	31 ±6	18 ±3	113 ±4	62 ±3	26 ±2	108 ±5	8 ±3	nm	nm	nm	Little Bear Creek
35 WH 14, WH14-366	163 ±8	26 ±4	130 ±5	0 ±3	86 ±3	572 ±7	52 ±4	nm	nm	nm	Horse Mountain
35 WH 14, WH14-412	32 ±6	12 ±3	115 ±4	59 ±3	24 ±2	103 ±5	8 ±3	nm	nm	nm	Little Bear Creek
35 WH 14, WH14-413	41 ±5	16 ±3	110 ±4	91 ±3	23 ±2	137 ±5	7 ±3	nm	nm	nm	Whitewater Ridge

All trace element values in parts per million (ppm); ± = pooled estimate (in ppm) of x-ray counting uncertainty and regression fitting error at 200 and 300 (*) seconds livetime; nm = not measured.

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Pine Creek Basin, Oregon, Xrf Data
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Trace Element Concentrations

Specimen Number	Zn	Ga	Rb	Sr	Y	Zr	Nb	Ba*	Ti	Mn	Obsidian Source (Chemical Group)
35 WH 14, WH14-442	54 ±6	20 ±4	113 ±5	44 ±3	27 ±2	99 ±5	7 ±3	nm	nm	nm	Wolf Creek
35 WH 14, WH14-461	32 ±6	14 ±3	111 ±4	85 ±3	23 ±2	122 ±5	8 ±3	nm	nm	nm	Whitewater Ridge
35 WH 14, WH14-573	54 ±6	13 ±4	117 ±4	72 ±3	24 ±2	118 ±5	8 ±3	nm	nm	nm	Whitewater Ridge
35 WH 14, WH14-594	39 ±6	12 ±4	75 ±4	89 ±3	24 ±2	128 ±5	6 ±3	nm	nm	nm	Whitewater Ridge
35 WH 14, WH14-606	43 ±5	11 ±3	116 ±4	79 ±3	23 ±2	120 ±5	7 ±3	nm	nm	nm	Whitewater Ridge
35 WH 14, WH14-713	34 ±6	22 ±3	107 ±4	84 ±3	22 ±2	127 ±5	6 ±3	nm	nm	nm	Whitewater Ridge
35 WH 14, WH14-715	33 ±6	13 ±3	109 ±4	80 ±3	24 ±2	123 ±5	6 ±3	nm	nm	nm	Whitewater Ridge
35 WH 14, WH14-723	93 ±7	20 ±4	129 ±4	0 ±3	107 ±2	163 ±5	37 ±3	nm	nm	nm	Delintment Creek
35 WH 14, WH14-758	75 ±6	21 ±3	126 ±4	62 ±3	47 ±2	180 ±5	8 ±3	nm	580 ±27	377 ±20	Quartz Mountain
35 WH 14, WH14-779	44 ±6	14 ±3	128 ±4	38 ±3	28 ±2	100 ±5	8 ±3	nm	nm	nm	Wolf Creek
35 WH 14, WH14-785	35 ±5	16 ±3	119 ±4	58 ±3	26 ±2	104 ±5	7 ±3	nm	590 ±28	290 ±20	Little Bear Creek
35 WH 14, WH14-804	35 ±6	15 ±3	92 ±4	60 ±3	26 ±2	100 ±5	8 ±3	nm	nm	nm	Little Bear Creek
35 WH 14, WH14-823	31 ±6	15 ±3	95 ±4	61 ±3	26 ±2	95 ±5	6 ±3	nm	nm	nm	Little Bear Creek
35 WH 14, WH14-882	53 ±7	14 ±4	116 ±5	52 ±3	35 ±2	241 ±5	16 ±3	nm	nm	413 ±20	Bald Butte
35 WH 14, WH14-919	31 ±7	15 ±3	75 ±4	19 ±3	51 ±2	82 ±5	10 ±3	nm	nm	nm	Glass Buttes
35 WH 14, WH14-937	31 ±7	16 ±3	101 ±4	77 ±3	23 ±2	117 ±5	6 ±3	nm	nm	nm	Whitewater Ridge
35 WH 14, WH14-1086	34 ±6	13 ±3	117 ±4	60 ±3	22 ±2	102 ±5	7 ±3	nm	nm	nm	Little Bear Creek

All trace element values in parts per million (ppm); ± = pooled estimate (in ppm) of x-ray counting uncertainty and regression fitting error at 200 and 300 (*) seconds livetime; nm = not measured.

5/25/93
R. E. Hughes

Pine Creek Basin, Oregon, Xrf Data

Trace Element Concentrations

Specimen Number	Zn	Ga	Rb	Sr	Y	Zr	Nb	Ba*	Ti	Mn	Obsidian Source (Chemical Group)
35 WH 14, WH14-1167	46 ±6	15 ±4	108 ±5	60 ±3	26 ±2	100 ±5	7 ±3	nm	nm	nm	Little Bear Creek
35 WH 14, WH14-1181	39 ±6	14 ±3	97 ±4	97 ±3	24 ±2	132 ±5	4 ±3	nm	nm	nm	Whitewater Ridge
35 WH 21, JC-81	31 ±6	17 ±3	95 ±4	47 ±3	26 ±2	86 ±5	5 ±3	nm	nm	nm	Glass Buttes
35 WH 21, JC-113	52 ±7	14 ±4	126 ±5	56 ±3	44 ±2	265 ±5	16 ±3	nm	nm	nm	Newberry Volcano
35 WH 21, JC-119	31 ±7	14 ±4	104 ±4	78 ±3	25 ±2	110 ±5	5 ±3	nm	nm	nm	Whitewater Ridge
35 WH 21, JC-159	67 ±8	20 ±4	108 ±5	21 ±3	59 ±3	291 ±6	16 ±4	1350 ±15	nm	nm	Chickahominy
35 WH 21, JC-186	52 ±8	21 ±4	93 ±5	83 ±4	22 ±2	123 ±5	9 ±3	nm	nm	nm	Whitewater Ridge
35 WH 21, JC-289	35 ±6	13 ±4	75 ±4	95 ±3	16 ±2	88 ±5	7 ±3	nm	nm	nm	Obsidian Cliffs
35 WH 21, JC-1302	35 ±6	9 ±4	105 ±4	79 ±3	25 ±2	118 ±5	9 ±3	nm	nm	nm	Whitewater Ridge
35 WH 21, JC2-54	64 ±8	10 ±5	84 ±5	43 ±3	63 ±3	351 ±6	10 ±3	nm	nm	nm	Brooks Canyon
35 WH 21, JC2-66	36 ±7	12 ±4	89 ±4	47 ±3	26 ±2	84 ±5	8 ±3	nm	nm	nm	Glass Buttes
35 WH 21, JC2-228	64 ±6	24 ±3	121 ±4	54 ±3	42 ±2	172 ±5	8 ±3	nm	588 ±29	368 ±20	Quartz Mountain
35 WH 42, WH42-76E	26 ±7	15 ±4	85 ±4	55 ±3	24 ±2	94 ±5	4 ±3	nm	nm	nm	Glass Buttes
35 WH 42, WH42-B	45 ±7	16 ±4	96 ±4	56 ±3	28 ±2	100 ±5	8 ±3	nm	nm	nm	Little Bear Creek
35 WH 42, WH42-C	67 ±6	15 ±4	99 ±4	23 ±3	52 ±2	266 ±5	15 ±3	1400 ±16	nm	nm	Chickahominy
35 WH 46, WH46-A	53 ±7	16 ±4	113 ±5	39 ±3	30 ±2	91 ±5	9 ±3	nm	nm	nm	Wolf Creek
35 WH 46, WH46-B	44 ±7	16 ±4	85 ±4	95 ±3	26 ±2	130 ±5	3 ±3	nm	nm	nm	Whitewater Ridge

All trace element values in parts per million (ppm); ± = pooled estimate (in ppm) of x-ray counting uncertainty and regression fitting error at 200 and 300 (*) seconds livetime; nm = not measured.

5/25/93
R. E. Hughes

Pine Creek Basin, Oregon, Xrf Data

Trace Element Concentrations

Specimen Number	Zn	Ga	Rb	Sr	Y	Zr	Nb	Ba*	Ti	Mn	Obsidian Source (Chemical Group)
35 WH 164, C106-3A	38 ±6	11 ±4	94 ±4	73 ±3	26 ±2	108 ±5	9 ±3	nm	nm	nm	Whitewater Ridge
35 WH 166, C106-5C	41 ±6	15 ±3	70 ±4	90 ±3	16 ±2	85 ±5	7 ±3	nm	nm	nm	Obsidian Cliffs
35 WH 166, C106-5WW	32 ±8	16 ±4	110 ±5	79 ±3	21 ±2	122 ±5	8 ±3	nm	nm	nm	Whitewater Ridge
35 WH 166, C106-5XX	31 ±6	16 ±3	111 ±4	36 ±3	23 ±2	88 ±5	7 ±3	nm	nm	nm	Wolf Creek
35 WH 168, C106-7A	27 ±6	11 ±4	102 ±4	78 ±3	23 ±2	114 ±5	7 ±3	nm	nm	nm	Whitewater Ridge

All trace element values in parts per million (ppm); ± = pooled estimate (in ppm) of x-ray counting uncertainty and regression fitting error at 200 and 300 (*) seconds livetime; nm = not measured.

APPENDIX F

REPORT ON THE BLOOD RESIDUE ANALYSIS OF 35WH14,

BY SHIRLEY BARR WILLIAMS

Archaeological Investigations Northwest, Inc.

1034 S.E. 122nd Ave. • Portland, Oregon 97233
FAX (503) 252-5405
Phone (503) 252-5140

September 7, 1993

Pam Endzweig
Department of Anthropology
University of Oregon
Eugene, Oregon 97403

Re: Blood residue analysis of an artifact from site 35WH14
on the edge of Pine Creek, near Clarno, Oregon.
AINW-RAL Letter Report #93/119

Dear Ms. Endzweig,

Archaeological Investigations Northwest Inc. (AINW) conducted blood residue analysis for you on a single artifact (35WH14-1294) from a housepit floor from site 35WH14 on the edge of Pine Creek, a tributary of the John Day River near Clarno, Oregon. The artifact is a thin, somewhat crescent shaped biface made from a red cryptocrystalline silicate. The exact purpose of the artifact is unknown, although its use as a nosepiece has been postulated. At your request, and due to the unknown purpose of the artifact, we used a broad range of antisera for the blood residue analysis. The antisera used were: bear, bovine, cat, chicken, deer, dog, duck, goat, horse, human, rabbit, rat, sheep, trout, and pigeon. The cross-over electrophoresis tests were conducted during mid-August 1993, by laboratory technicians Shirley Barr Williams and Monique Cushing-Fournier. Positive results were checked with repeat analysis. Enclosed you will find a chart showing the results of our analysis and a brief report on our laboratory procedures.

The trout and goat antisera are whole-serum antisera from Sigma Chemical Corporation. Independent studies conducted by the AINW Residue Analysis Laboratory have shown that the trout antiserum reacts well with steelhead and chinook salmon, and that it does not cross-react with any of the non-fish species currently used by AINW as controls. The Sigma goat antiserum is very cross-reactive and our independent tests have shown that it will react with most artiodactyls.

The duck and pigeon antisera are from Nordic Immunological. They react well within the family groups represented, without significant cross-reactivity outside of those families.

The remaining eleven antisera: bear, bovine, cat, chicken, deer, dog, horse, human, rabbit, rat, and sheep, are Organon Teknika/ Cappel forensic antisera. None of these react outside of the family of animals represented, but do react well within those families. For example, the deer antiserum reacts

September 7, 1993
Pam Endzweig
University of Oregon

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with white-tail deer, mule deer, elk, and moose, but does not react with other artiodactyl groups.

Standard procedures for our analysis include first testing the specimens (residues in solution extracted from the artifacts) against a non-immune serum (NIS), in this case a solution prepared from goat serum and 5% ammonia solution, to determine if there are any contaminants or extraneous proteins which might give false positive results. The NIS is not an antiserum and the specimen should not react to it. If positives are detected at this step, the specimens then have an equal volume of a 1% solution of a non-ionic detergent (TWEEN 80, Sigma Chemical Corp.) added to them to increase specificity and break the non-specific bonds, and are run again. If the specimens still react to the NIS after the addition of the non-ionic detergent, any reactions of those specimens to the antisera must then be discounted. The specimen from the artifact sent to us tested negative to the NIS, and the additional steps were not required before testing with the antisera.

There were two positive reactions for this artifact, one to the human antiserum, and one to the rabbit antiserum. The human antiserum will only cross-react with other primate species, and testing in our laboratory have shown that the rabbit antiserum reacts only with domestic, cotton-tail, and jack rabbit blood proteins.

The liquid specimen obtained from this artifact has been frozen for storage, and will be retained for one year should you wish any additional tests. If you have any questions about the analysis or the enclosed report, please call me or Dr. John Fagan.

Sincerely,

Shirley Barr Williams

Shirley Barr Williams
Senior Blood Residue Technician

Enclosures

(RAL 2:RAL93119)

BLOOD RESIDUE ANALYSIS RESULTS

University of Oregon - Site 35WH14, Pine Creek

Site & Sample No.	AINW RAL #	bear	bovine	cat	chicken	deer	dog	duck	goat	horse	human	rabbit	rat	sheep	trout	pigeon	NIS
		TYPE OF ANTI-SERUM															
Specimen No.																	
35WH14-1294	1	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-
GEL NO.		795	795	795	795	795	795	796	795	795	795	795	795	795	795	795	791
GEL NO.									**797		**797	**797				**797	
GEL NO.												**804					

TECHNICIANS:
Shirley Williams, Monique Cushing-Fournier

Key: - = negative reaction; + = positive reaction; f+ = faint positive reaction;
v+ = very faint positive reaction; +++ = strong positive reaction; ** = repeats.
* = reactions were positive, however, positive reaction to NIS indicates
that these results are spurious.

REFERENCES CITED

Ahler, Stanley A.
1979 Functional Analysis of Nonobsidian Chipped Stone Artifacts: Terms, Variables, and Quantification. In Lithic Use-Wear Analysis, edited by B. Hayden, pp. 301-328. Academic Press, New York.

Aikens, C. Melvin
1978 Archaeology of the Great Basin. Annual Review of Anthropology 7:71-87.

1982 Archaeology of the Northern Great Basin: An Overview. In Man and Environment in the Great Basin, edited by D. B. Madsen and J. F. O'Connell, pp. 139-155. SAA Papers No. 2. Society for American Archaeology, Washington, D. C.

Aikens, C. Melvin, David L. Cole, and Robert Stuckenrath
1977 Excavations at Dirty Shame Rockshelter, Southeastern Oregon. Tebiwa No. 4. Miscellaneous Papers of the Idaho State University Museum of Natural History, Pocatello.

Allely, Steve
1992 Great Basin Atlatls: Notes from the N.W. Corner. Bulletin of Primitive Technology 1(4):48-56.

Ames, Kenneth M.
1988a Early Holocene Forager Mobility Strategies on the Southern Columbia Plateau. In Early Human Occupation in Far Western North America: The Clovis-Archaic Interface, edited by J. A. Willig, C. M. Aikens, and J. Fagan, pp. 325-360. Nevada State Museum Anthropological Papers No. 21. Carson City.

1988b Instability in Prehistoric Residential Patterns on the Intermontane Plateau. Paper presented at the 41st Annual Northwest Anthropological Conference, Tacoma, Washington.

Ames, Kenneth M., James P. Green, and Margaret Pfoertner
1981 Hatwai (10NP143): Interim Report. Archaeological Reports No. 9. Boise State University, Idaho.

Ames, Kenneth M. and Alan G. Marshall
1980 Villages, Demography and Subsistence Intensification on the Southern Columbia Plateau. North American Archaeologist 2(1):25-52.

Anastasio, Angelo
1975 The Southern Plateau: An Ecological Analysis of Intergroup Relations. University of Idaho Laboratory of Anthropology, Moscow.

Antevs, Ernst
1948 Climatic Changes and Pre-White Man. In The Great Basin, with Emphasis on Glacial and Postglacial Times. Bulletin of the University of Utah 38(20):168-191. Salt Lake City.

Arkush, Brooke S.
1990 The Protohistoric in the Western Great Basin. Journal of California and Great Basin Anthropology 12(1):28-36.

Armitage, Charles L. and Thomas L. Burge
1986 Archaeological Investigations in the Wind Creek Drainage, East-Central Oregon. Paper presented at the 39th Annual Northwest Anthropological Conference, Moscow, Idaho.

1988 An Archaeological Analysis of the Wind Creek Sites, East-Central Oregon. Paper Presented at the 41st Annual Northwest Anthropological Conference, Tacoma, Washington.

Ascher, Robert
1961 Analogy in Archaeological Interpretation. Southwestern Journal of Anthropology 17:317-325.

1968 Time's Arrow and the Archaeology of a Contemporary Community. In Settlement Archaeology, edited by K. C. Chang, pp. 43-52. National Press Books, Palo Alto.

Atherton, John H. and Michael C. Houck, eds.
1976 An Introduction to the Natural History of Camp Hancock and the Clarno Basin, North Central Oregon. Oregon Museum of Science and Industry Community Research Center, Portland. Report on file, Oregon State Museum of Anthropology, University of Oregon, Eugene.

Bailey, Vernon
1936 The Mammals and Life Zones of Oregon. North American Fauna No. 55. U.S. Department of Agriculture Bureau of Biological Survey, Washington, D. C.

Baldwin, Ewart M.
1976 Geology of Oregon. Kendall/Hunt Publishing Company, Dubuque.

Baldwin, Stephan J.
1993 Archaeological Investigation of the Proposed McClellan Mountain Trailhead Project, Sites 35GR572 and 35GR573, Grant County, Oregon. USDA Forest Service, Malheur National Forest, Bear Valley Ranger District, John Day.

Barnosky, Cathy W.
1985 Late Quaternary Vegetation in the Southwestern Columbia Basin, Washington. Quaternary Research 23:109-122.

Barr Williams, Shirley
1993 Blood Residue Analysis of an Artifact from Site 35WH14 on the Edge of Pine Creek, near Clarno, Oregon. AINW-RAL Letter Report #93/119. Archaeological Investigations Northwest, Inc., Portland, Oregon.

Bartholomew, Michael John
1982 Pollen and Sediment Analyses of Clear Lake, Whitman County, Washington. Unpublished Master's thesis, Department of Anthropology, Washington State University, Pullman.

Baumhoff, Martin A. and J. S. Byrne
1959 Desert Side-Notched Points as a Time Marker in California. University of California Archaeological Survey Reports 48:32-65. Berkeley.

Beck, Charlotte, and George T. Jones
1992 New Directions? Great Basin Archaeology in the 1990s. Journal of California and Great Basin Anthropology 14(1):23-36.

Beckham, Stephen Dow
1987 Historical Overview. In Prehistory and History of the Ochoco National Forest, Central Oregon, by R. Minor, S. D. Beckham, K. A. Toepel, and R. L. Greenspan pp. 99-150. Heritage Research Associates Report No. 51. Eugene.

Bedwell, Stephen F.
1970 Prehistory and Environment of the Pluvial Fort Rock Lake Area of Southcentral Oregon. Unpublished Ph.D. dissertation, Department of Anthropology, University of Oregon, Eugene.

1973 Fort Rock Basin: Prehistory and Environment. University of Oregon Books, Eugene.

Bennyhoff, James A. and Richahrd E. Hughes
1987 Shell Bead and Ornament Exchange Networks between California and the Western Great Basin. Anthropological Papers of the American Museum of Natural History, Volume 64:Part 2. New York.

Berreman, Joel V.
1937 Tribal Distribution in Oregon. American Anthropological Association Memoir 47. Washington, D.C.

Bettinger, Robert L. and Martin A. Baumhoff
1982 The Numic Spread: Great Basin Cultures in Competition. American Antiquity 47(3):485-503.

Binford, Lewis R.
1963 A Proposed Attribute List for the Description and Classification of Projectile Points. In Miscellaneous Studies in Typology and Classification, edited by A. M. White, et al., pp. 193-221. Museum of Anthropology, Anthropological Papers No. 19. University of Michigan, Ann Arbor.

1967 Smudge Pits and Hide Smoking: The Use of Analogy in Archaeological Reasoning. American Antiquity 32(1):1-12.

1980 Willow Smoke and Dogs' Tails: Hunter-Gatherer Settlement Systems and Archaeological Site Formation. American Antiquity 45(1):4-20.

Bleed, Peter
1986 The Optimal Design of Hunting Weapons: Maintainability or Reliability. American Antiquity 51(4):737-747.

Blyth, Beatrice
1938 Northern Paiute Bands in Oregon. American Anthropologist 40:402-405.

Bocek, Barbara
1986 Rodent Ecology and Burrowing Behavior: Predicted Effects on Archaeological Site Formation. American Antiquity 51(3):589-603.

Boyd, Robert Thomas
1985 The Introduction of Infectious Diseases among the Indians of the Pacific Northwest, 1774-1874. Unpublished Ph.D. dissertation, Department of Anthropology, University of Washington, Seattle.

Brauner, David R.
1976 Alpowai: The Culture History of the Alpowa Locality. Unpublished Ph.D. dissertation, Department of Anthropology, Washington State University, Pullman.

Brogan, Phil F.
1977 East of the Cascades. Fourth Edition. Binford and Mort, Portland.

Browman, David. L. and David L. Munsell
1969 Columbia Plateau Prehistory: Cultural Development and Impinging Influences. American Antiquity 34(3):249-264.

Brunton, Bill
1968 Ceremonial Integration in the Plateau of Northwestern North America. Northwest Anthropological Research Notes 2(1):1-28.

Buhl, Kathleen T.
1975a Sheep Ranching in Wheeler County. In Glimpses of Wheeler County's Past, edited by F. Smith Fussner, pp. 83-96. Binford and Mort, Portland.

1975b The Professions: Schools, Churches, Medicine, Law. In Glimpses of Wheeler County's Past, edited by F. Smith Fussner, pp. 70-82. Binford and Mort, Portland.

Burghardt, A. F.
1959 The Location of River Towns in the Central Lowland of the United States. Annals of the Association of American Geographers 49:305-323.

Butler, B. Robert
1959 Lower Columbia Valley Archaeology: A Survey and Appraisal of Some Major Archaeological Sources. Tebiwa 2(2):6-24.

1962 Additional Notes and Comments on Atlatl Weights in the Northwest. Utah Archaeology 9(2):10-14.

Butler, B. Robert and Douglas Osborne
1959 Archaeological Evidence for the Use of Atlatl Weights in the Northwest. American Antiquity 25(2):215-224.

Butler, Virginia L.
1987 A Review of Explanations for Salmonid Bone Scarcity in Pacific Northwest North America. Paper presented at the 52nd Annual Meeting of the Society for American Archaeology, Toronto, Canada.

Byram, R. Scott
1993 Cottonwood Creek (35GR1507), Determination of Eligibility. On file, Oregon Highway Division. Salem.

Caldwell, Joseph R.
1958 Trend and Tradition in the Prehistory of the Eastern United States. American Anthropologist 60(6), Part 2.

Callahan, Errett
1979 The Basics of Biface Knapping in the Eastern Fluted Point Tradition. A Manual for Flintknappers and Lithic Analysts. Archaeology of Eastern North America 7:1-180.

Campbell, Arthur H.
1990 Antelope - The Saga of a Western Town. Maverick Publications, Bend.

Campbell, Sarah K.
1990 PostColumbian Culture History in the Northern Columbia Plateau A.D. 1500-1900. Garland Publishing, New York.

Campbell, Sarah K. (editor)
1985 Summary of Results, Chief Joseph Dam Cultural Resources Project, Washington. Office of Public Archaeology, University of Washington, Seattle.

Cantwell, Anne-Marie, James B. Griffin, and Nan A. Rothschild, eds.
1981 The Research Potential of Anthropological Museum Collections. Annals of the New York Academy of Sciences 376. New York.

Chang, K. C.
1967 Major Aspects of the Interrelationship of Archaeology and Ethnology. Current Anthropology 8(3):227-234.

Chatters, James C.
1984 Human Adaptation along the Columbia River, 4700 - 1600 B.P. A Report of Test Excavation at River Mile 590, North Central Washington. Central Washington University Occasional Paper No. 1. Cheney.

1987 Hunter-Gatherer Adaptations and Assemblage Structure. Journal of Anthropological Archaeology 6:336-375.

1989 Resource Intensification and Sedentism on the Southern Plateau. Archaeology in Washington 1:3-19.

Chatters, James C. and Karin A. Hoover
1986 Changing Late Holocene Flooding Frequencies on the Columbia River, Washington. Quaternary Research 26:309-320.

1992 Response of the Columbia River Fluvial System to Holocene Climatic Change. Quaternary Research 37:42-59.

Chatters, Roy M.
1968 Washington State University Natural Radiocarbon Measurements I. Radiocarbon 10:479-498.

Cheatham, Richard D.
1991 Archaeological Investigations at the Williamson River Bridge Site (35KL677): A Riverside Fishing Camp in Klamath County, Oregon. Oregon State Museum of Anthropology Report 91-7. University of Oregon, Eugene.

Cleland, Charles E.
1976 The Focal-Diffuse Model: An Evolutionary Perspective on the Prehistoric Cultural Adaptations of the Eastern United States. Mid-Continental Journal of Archaeology 1(1):59-76.

Cleveland, Gregory C., J. Jeffrey Flenniken, David R. Huelsbeck, Robert Mierendorf, Stephan Samuels, and Fekri Hassan
1976 Preliminary Archaeological Investigations at the Miller Site, Strawberry Island, 1976, a Late Prehistoric Village near Burbank, Franklin County, Washington. Washington Archaeological Reseach Center, Project Report No. 46. Washington State University, Pullman.

Cochran, Bruce Duane
1978 Late Quaternary Stratigraphy and Chronology in Johnson Canyon, Central Washington. Unpublished Master's thesis, Department of Anthropology, Washington State University, Pullman.

Cochran, Bruce Duane and Frank C. Leonhardy
1981 Geochronology of the Stockhoff Basalt Quarry (35UN52), Marshmeadow (35UN95), and Ladd Canyon (35UN74) Archaeological Sites. In Archaeological Excavations in the Blue Mountains: Mitigation of Sites 35UN52, 35UN74, and 35UN95 in the Vicinity of Ladd Canyon, Union County, Oregon, Vol. 3, Pt. 1, by P.J. McPherson, D.M. Hall, V.J. McGlone, and N.J. Nachwey. Western Cultural Resource Management, Boulder.

Cole, David L.
1967 Archaeological Research of Site 35SH23, the Mack Canyon Site. Interim Report 1965-1966. University of Oregon Museum of Natural History. Submitted to the Bureau of Land Management, Oregon-Washington State Office, Portland. Report on file at the Oregon State Museum of Anthropology, University of Oregon, Eugene.

1969 1967 and 1968 Archaeological Excavations of the Mack Canyon Site. Interim Report 1968. University of Oregon Museum of Natural History. Submitted to the Bureau of Land Management, Oregon-Washington State Office, Portland. Report on file, Oregon State Museum of Anthropology, University of Oregon, Eugene.

1973 Excavations at Site 35 GM 25 and Adjacent Areas. University of Oregon Museum of Natural History. Report on file, Oregon State Museum of Anthropology, University of Oregon, Eugene.

Collins, Michael B.
1975 Lithic Technology as a Means of Processual Inference. In Lithic Technology: Making and Using Stone Tools, edited by E. H. Swanson, pp. 15-34. Aldine, Chicago.

Connolly, Thomas J.
1984 An Archaeological Study of Camas Valley, Oregon. Oregon State Museum of Anthropology. Submitted to the Oregon State Historic Preservation Office, Salem. University of Oregon, Eugene.

1986 Cultural Stability and Change in the Prehistory of Southwest Oregon and Northern California. Unpublished Ph.D. dissertation, Department of Anthropology, University of Oregon, Eugene.

1991 The Standley Site (35DO182): Investigations into the Prehistory of Camas Valley, Southwest Oregon. University of Oregon Anthropological Papers No. 43. Eugene.

Connolly, Thomas, Dennis L. Jenkins, and Jane Benjamin
1993 Archaeology of Mitchell Cave (35WH122): A Late Period Hunting Camp in the Ochoco Mountains, Wheeler County, Oregon. University of Oregon Anthropological Papers No. 46. Eugene.

Connolly, Thomas J., Robert R. Musil, and Dorothy E. Freidel
1991 Archaeological Investigations along the Paulina-East Lake Highway within Newberry Crater, Central Oregon. Oregon State Museum of Anthropology Report 91-6. University of Oregon, Eugene.

Cook, S. F. and Robert F. Heizer
1965 The Quantitative Approach to the Relation Between Populations and Settlement Size. University of California Archaeological Survey Report No. 64. Berkeley.

Corliss, David W.
1972 Neck Width of Projectile Points: An Index of Cultural Continuity and Change. Occasional Papers of the Idaho State Museum No. 29. Pocatello.

Corson, Christopher
1979 The Desert Countryside in the Wake of the Beasts: Some Observations on the Quality of Environmental Data in the Northern Great Basin. Report on file with the Susanville District Office, Bureau of Land Management.

Couture, Marilyn D.
1978 Recent and Contemporary Foraging Practices of the Harney Valley Paiute. Unpublished Master's thesis, Department of Anthropology, Portland State University, Portland.

Crabtree, Don E.
1982 An Introduction to Flintworking. Occasional Papers of the Idaho Museum of Natural History, No. 28. Pocatello.

Cressman, Luther S.
1937 Petroglyphs of Oregon. University of Oregon Monographs, Studies in Anthropology No. 2. Eugene.

1940 Early Man in Oregon. University of Oregon, Eugene.

1942 Archaeological Researches in the Northern Great Basin. Publication 538, Carnegie Institution of Washington, Washington, D.C.

1950 Archaeological Research in the John Day Region of North Central Oregon. Proceedings of the American Philosophical Society 94(4):369-385.

1960 Cultural Sequences at The Dalles, Oregon. Transactions of the American Philosophical Society, Vol. 50, Pt. 10. Philadelphia.

Croft, Lisa Kuulei
1989 Holocene Vegetation Change in the Clarno Basin, Wheeler County, Oregon. Unpublished Master's thesis, Department of Botany, University of Washington, Seattle.

Crowley Thomas, Suzanne
1986 The Muddy Creek Archaeological Project. Current Archaeological Happenings in Oregon 11(2):8.

Culin, Stewart
1907 Games of the North American Indians. Bureau of American Ethnology, 24th Annual Report. U.S. Government Printing Office, Washington D.C.

Dalley, Gardiner F.
1970a Artifacts of Wood. In Hogup Cave, by C. Melvin Aikens, pp. 153-186. University of Utah Anthropological Papers No. 93. Salt Lake City.

1970b Worked Bone and Antler. In Median Village and Fremont Culture Regional Variation, by John P. Marwitt, pp. 96-127. University of Utah Anthropological Papers No. 95. Salt Lake City.

Daugherty, Richard D.
1962 The Intermontane Western Tradition. American Antiquity 28(2):144-150.

Davis, Jonathan O.
1982 Bits and Pieces: The Last 35,000 years in the Lahontan Area. In Man and Environment in the Great Basin, edited by D. B. Madsen and J. F. O'Connell, pp. 53-75. SAA Papers No. 2. Society for American Archaeology, Washington, D.C.

Davis, Owen K., John C. Sheppard, and Susan Robertson
1986 Contrasting Climatic Histories for the Snake River Plain, Idaho, Resulting from Multiple Thermal Maxima. Quaternary Research 26:321-339.

Davis, Wilbur A.
1977 Survey of Historic and Prehistoric Resources in the John Day Fossil Beds National Monument. Final Report to the National Park Service, Contract No. CX-9000-6-0058. Oregon State University, Corvallis.

Dobyns, Henry F.
1983 Their Number Become Thinned. University of Tennessee Press, Knoxville.

1992 Native American Trade Centers as Contagious Disease Foci. In Disease and Demography in the Americas, edited by J. W. Verano and D. H. Ubelaker, pp. 215-222. Smithsonian Institution Press, Washington, D.C.

Dumond, Don E. and Rick Minor
1983 Archaeology in the John Day Reservoir: The Wildcat Canyon Site, 35-GM-9. University of Oregon Anthropological Papers No. 30. Eugene.

Elliott, T. C.
1909 The Peter Skene Ogden Journals. The Quarterly of the Oregon Historical Society 10(4):331-365.

Endzweig, Pamela
1985 35 GM 22: Culture Contact on the Lower John Day River. Unpublished Master's paper, Department of Anthropology, University of Oregon, Eugene.

1989 Of Pots, Pipes, and People: Prehistoric Ceramics of Oregon. In Contributions to the Archaeology of Oregon 1987-1988, edited by R. Minor, pp. 157-177. Association of Oregon Archaeologists Occasional Papers No. 4. Eugene.

1990 Prehistoric Settlement, Subsistence, and Seasonality in the Pine Creek Basin, Southern Columbia Plateau. Dissertation Improvement Grant Proposal to the National Science Foundation. Department of Anthropology, University of Oregon.

1992 Canyons and Crests: An Archaeological Survey of the Pine Creek Basin, North-Central Oregon. Oregon State Museum of Anthropology Report 92-2. Eugene.

n.d. Housepits on the John Day and Deschutes Rivers: A Summary of the Evidence. In Association of Oregon Archaeologists Occasional Papers No.5, edited by P. Baxter. In preparation.

Erickson, Kevin
1990 Marine Shell Utilization in the Plateau Culture Area. Northwest Anthropological Research Notes 24(1):91-144.

Erlandson, Jon
1984 A Case in Faunalturbation: Delineating the Effects of the Burrowing Pocket Gopher on the Distribution of Archaeological Materials. American Antiquity 49(4):785-790.

Erlandson, Jon and Madonna Moss
1984 Investigations at Beaverdam Creek. Current Anthropological Happenings in Oregon 9(4):5-6.

Flannery, Kent V.
1976 Linear Stream Patterns and Riverside Settlement Rules. In The Early Mesoamerican Village, edited by K. V. Flannery, pp. 173-180. Academic Press, New York.

Flenniken, J. Jeffrey and Philip Wilke
1989 Typology, Technology, and Chronology of Great Basin Dart Points. American Anthropologist 91(1):149-158.

Flenniken, J. Jeffrey and Terry L. Ozbun
1988 Lithic Analysis of Artifacts from Site A461-0683, Bear Valley District, Malheur National Forest, Oregon. Lithic Analysts Research Report No. 3. Pullman.

Flenniken, J. Jeffrey, Terry L. Ozbun, and Jeffrey A. Markos
1992 Archaeological Testing and Evaluation of the Rough Site, 35CR616. Lithic Analysts Research Report No. 27. Pullman.

Ford, James A.
1962 A Quantitative Method for Deriving Cultural Chronology. Pan American Union, Technical Manual 1.

Fowler, Catherine S. and Sven Liljeblad
1986 Northern Paiute. In Great Basin, edited by W. L. D'Azevedo, pp. 435-465. Handbook of North American Indians, vol. 11, W. C. Sturtevant, general editor. Smithsonian Institution, Washington D. C.

Franklin, Jerry F. and C. T. Dyrness
1973 Natural Vegetation of Oregon and Washington. USDA Forest Service General Technical Report PNW-8. Portland.

Freeman, L. G., Jr.
1968 A Theoretical Framework for Interpreting Archeological Materials. In Man the Hunter, edited by R. B. Lee and I. DeVore, pp. 262-267. Aldine, New York.

Frison, George C. and Bruce A. Bradley
1980 Folsom Tools and Technology at the Hanson Site, Wyoming. University of New Mexico Press, Albuquerque.

Fulton, Leonard A.
1968 Spawning Areas and Abundance of Chinook Salmon (*Oncorhynchus tshawytscha*) in the Columbia River Basin - Past and Present. Special Scientific Report - Fisheries No. 571. United States Fish and Wildlife Service, Washington, D. C.

1970 Spawning Areas and Abundance of Steelhead Trout and Coho, Sockeye, and Chum Salmon in the Columbia River Basin - Past and Present. Special Scientific Report - Fisheries No. 618. National Marine Fisheries Service, Washington, D.C.

Fussner, F. Smith, ed.
1975 Glimpses of Wheeler County's Past. Binford and Mort, Portland.

Galm, Jerry R.
1990 A Review of Late Period Prehistory on the Columbia Plateau. Paper presented at the 55th Annual Meeting of the Society for American Archaeology, Las Vegas, Nevada.

Gamble, Clive
1991 An Introduction to the Living Spaces of Mobile Peoples. In Ethnoarchaeological Approaches to Mobile Campsites, edited by C. S. Gamble and W. A. Boismier, pp. 1-23. Ethnoarchaeological Series 1. International Monographs in Prehistory, Ann Arbor.

Gannon, Brian
1968 Preliminary Report on the Archaeology of Cove Creek-2 (WH7). Report of the Oregon Museum of Science and Industry, Portland. Ms. on file, Oregon State Museum of Anthropology, University of Oregon, Eugene.

1970 Preliminary Report on an Archaeological Site in the Clarno Basin of North-Central Oregon: 35 WH 7 (Cove Creek 2). Report of the Oregon Museum of Science and Industry, Portland. Ms. on file, Oregon State Museum of Anthropology, University of Oregon, Eugene.

1972 Archaeological Research on 35 WH 21 (Jones Canyon-2), Preliminary Report. Report of the Oregon Museum of Science and Industry, Portland. Ms. on file, Oregon State Museum of Anthropology, University of Oregon, Eugene.

1975 Archaeological Research in the Clarno Basin of North Central Oregon. Report of the Oregon Museum of Science and Industry, Portland. Ms. on file, Oregon State Museum of Anthropology, University of Oregon, Eugene.

1977 Synopsis of Archaeological Research in the Clarno Basin, North-Central Oregon: 35WH13 and 35WH21. Report of the Oregon Museum of Science and Industry Community Research Center, Portland. Ms. on file, Oregon State Museum of Anthropology, University of Oregon, Eugene.

1978 Synopsis of Archaeological Research in the Clarno Basin, North-Central Oregon: 1970-1977. Technical Report, National Science Foundation: Student Science Training Program from the Oregon Museum of Science and Industry, Portland. Report on file, Oregon State Museum of Anthropology, University of Oregon, Eugene.

1979 Archaeological Studies in the Clarno Basin of North Central Oregon: Major Developments of the 1978 Field Season. Technical Report to the National Science Foundation from the Oregon Museum of Science and Industry, Portland. Report on file, Oregon State Museum of Anthropology, University of Oregon, Eugene.

Gard, Hal
1991 Aboriginal Columbia River Fisheries: A Predictive Tool for assessing Site Function and Location Based upon Fish Behavior and River Morphology. Paper presented at the 44th Annual Northwest Anthropological Conference, Missoula, Montana.

Gilbert, B. Miles
1980 Mammalian Osteology. B. Miles Gilbert, Publisher, Laramie.

Gould, Richard A. and Patty Jo Watson
1982 A Dialogue on the Meaning and Use of Analogy in Archaeological Reasoning. Journal of Anthropological Archaeology 1(4):355-381.

Gould, Richard A., Dorothy A. Koster, and Ann H. L. Sontz
1971 The Lithic Assemblage of the Western Desert Aborigines of Australia. American Antiquity 36(2):149-169.

Grayson, Donald K.
1984 Quantitative Zooarchaeology. Academic Press, Orlando.

1993 The Desert's Past. A Natural Prehistory of the Great Basin. Smithsonian Institution Press, Washington, D.C.

Griswold, Gillett
1970 Aboriginal Patterns of Trade between the Columbia Basin and the Northern Plains. Archaeology in Montana 11(2-3).

Haines, Francis
1938 The Northward Spread of Horses Among the Plains Indians. American Anthropologist 40:429-437.

Hammatt, Hallett H.
1977 Late Quaternary Stratigraphy and Archaeological Chronology in the Lower Granite Reservoir Area, Lower Snake River, Washington. Unpublished Ph.D. dissertation, Department of Anthropology, Washington State University, Pullman.

Hanes, Richard C.
1977 Lithic Tools of the Dirty Shame Rockshelter: Typology and Distribution. Tebiwa No. 6. Miscellaneous Papers of the Idaho State University Museum of Natural History, Pocatello.

Hanson, C. Bruce
1977 Geological History of Camp Hancock Area. In The Natural History of Camp Hancock and the Clarno Basin, North-Central Oregon, edited by M. H. Houck and J. H. Atherton, pp.46-47. Oregon Museum of Science and Industry, Portland. Report on file, Oregon State Museum of Anthropology, University of Oregon, Eugene.

Harrington, Mark R.
1933 Gypsum Cave, Nevada. Southwest Museum Papers 8. Los Angeles.

Hattori, Eugene M.
1982 The Archaeology of Falcon Hill, Winnemucca Lake, Washoe County, Nevada. Nevada State Museum Anthropological Papers No. 18. Carson City.

Helm, June
1965 Bilaterality in the Socio-Territorial Organization of the Arctic Drainage Dene. Ethnology 4:361-385.

1968 The Nature of Dogrib Socioterritorial Groups. In _Man the Hunter_, edited by R. B. Lee and I. DeVore, pp. 118-125. Aldine, Chicago.

Heizer, Robert F.
1938 A Complete Atlatl Dart from Pershing County, Nevada. _New Mexico Anthropologist_ 2(4-5):68-71.

1951 Preliminary Report on the Leonard Rockshelter Site, Pershing County, Nevada. _American Antiquity_ 17(2):89-98.

Heizer, Robert F. and Thomas R. Hester,
1978 _Great Basin Projectile Points: Forms and Chronology_. Ballena Press, Socorro, New Mexico.

Hemphill, Brian E.
1990 An Analysis of the Human Remains from the Crate's Point Site (35-WS-228), Wasco County, Oregon. Paper presented at the 43rd Annual Northwest Anthropological Conference, Eugene, Oregon.

Hess, Sean C.
1989 _An Analysis of Ethnic Group Distribution on the Southern Edge of the Columbia Plateau: A Report of Two Archaeological Assemblages from the Deschutes River Region_. Unpublished Master's paper, Department of Anthropology, University of Oregon, Eugene.

Hibbs, Charles H., Brian L. Gannon, and Cynthia H. Willard
1976 _Lower Deschutes River Cultural Resources Survey: Warm Springs Bridge to Macks Canyon, Sherman, Wasco, and Jefferson Counties_. Report on file with the Bureau of Land Management, Prineville District. Prineville, Oregon.

Hilty, Ivy E., Jean H. Peters, Eva M. Benson, Margaret A. Edwards, and Lorraine T. Miller
1980 _Nutritive Values of Native Foods of Warms Springs Indians_. Extension Circular 809. Oregon State University Extension Service, Corvallis.

Hitchcock, C. Leo, et al.
1961 _Vascular Plants of the Pacific Northwest_. Part 3: Saxifragaceae to Ericaceae. University of Washington Press, Seattle.

1969 _Vascular Plants of the Pacific Northwest_. Part 1: Vascular Cryptogams, Gymnosperms, and Monocotylodons.

Hofer, R. D.
1975 Transportation and Communication. In Glimpses of Wheeler County's Past edited by F. Smith Fussner, pp. 106-109. Binford and Mort, Portland.

Holmer, Richard N.
1986 Common Projectile Points of the Intermountain West. In Anthropology of the Desert West: Essays in Honor of Jesse D. Jennings, edited by C. J. Condie and Don D. Fowler, pp. 89-115. University of Utah Anthropological Papers No. 110. Salt Lake City.

Houck, Michael H. and John H. Atherton, eds.
1977 The Natural History of Camp Hancock and the Clarno Basin, North-Central Oregon. Report of the Oregon Museum of Science and Industry, Portland. Report on file, Oregon State Museum of Anthropology, University of Oregon, Eugene.

Hughes, Richard E.
1994 X-ray Fluorescence Analysis of Artifacts from 35GR572 and 35GR573 near Fields Peak on the Bear Valley Ranger District, Malheur National Forest, Oregon. Letter report submitted to Stephen J. Baldwin, Bear Valley Ranger District, January 6, 1994.

Hughes, Richard E. and James A. Bennyhoff
1986 Early Trade. In Great Basin, edited by W. L. D'Azevedo, pp. 238-255. Handbook of North American Indians, vol. 11, W. C. Sturtevant, general editor. Smithsonian Institution, Washington D.C.

Hunn, Eugene S. with James Salam and Family
1990 Nch'i-Wána: "The Big River" - Mid-Columbia Indians and Their Land. University of Washington Press, Seattle.

Huntington, J. W. P.
1865 Report of the Commissioner of Indian Affairs for the Year 1865. Appendix 1E, pp. 461-474. Government Printing Office, Washington, D. C.

1867 Report of the Commissioner of Indian Affairs 1866. Appendix 1E, pp. 472-474. Government Printing Office, Washington, D. C.

1868 Oregon Superintendency. In Report on Indian Affairs by the Acting Commissioner for the Year 1867, pp. 61-103. Government Printing Office, Washington, D. C.

Jackson, Thomas L., Michael J. Moratto, Richard M. Pettigrew, C. Kristina Roper, and Randall F. Schalk, eds.
1990 Final Cultural Resources Assessment Report PGT-PG&E Pipeline Expansion Project, Idaho, Washington, Oregon, and California. INFOTEC Research. Submitted to Pacific Gas Transmission Co., San Francisco, California. Report on file at the Oregon State Museum of Anthropology, University of Oregon, Eugene.

Jaehnig, Manfred E. W.
1985 The Cannon Site: A Grant County TAG Program Test Excavation. Preliminary Report of Test Excavation and Project Evaluation. Museum of Anthropology, Eastern Oregon State College, La Grande. Report on file at the Oregon State Museum of Anthropology, University of Oregon, Eugene.

1989 Lithic Analysis of Artifacts from Site 35GR750, Malheur National Forest No. A641-1120, Grant County, Oregon. Museum of Anthropology, Eastern Oregon State College, La Grange. Submitted to Bear Valley District, Malheur National Forest.

Janes, Stewart
1977 Raptor Breeding Ecology of the Clarno Basin and Antelope Valley, Oregon. In The Natural History of Camp Hancock and the Clarno Basin, North-Central Oregon, edited by M. H. Houck and J. H. Atherton, pp. 48-68. Oregon Museum of Science and Industry, Portland. Report on file, Oregon State Museum of Anthropology, University of Oregon, Eugene.

Jenkins, Dennis L.
1988 Testing and Evaluation of Mitchell Cave (35WH122), Wheeler County, Oregon. Oregon State Museum of Anthropology Report 88-5. Eugene.

Jenkins, Dennis L. and Thomas J. Connolly
1990 Archaeology of Indian Grade Spring: A Special Function Site on Stinkingwater Mountain, Harney County, Oregon. University of Oregon Anthropological Papers No. 42. Eugene.

Jennings, Jesse D.
1957 Danger Cave. University of Utah Anthropological Papers No. 27. Salt Lake City.

1964 The Desert West. In Prehistoric Man in the New World, edited by J. D. Jennings and E. Norbeck, pp. 149-174. University of Chicago Press, Chicago.

Jennings, Jesse D. and Edward Norbeck
1955 Great Basin Prehistory: A Review. American Antiquity 21(1):1-11.

Johnson, Isabelle
1972? Archaeology Research on 35 WH 21 (Jones Canyon 2): Preliminary Report for the Summer of 1972. Report of the Oregon Museum of Science and Industry, Portland. Ms on file, Oregon State Museum of Anthropology, University of Oregon, Eugene.

Keeley, Lawrence H.
1980 Experimental Determination of Stone Tool Uses. University of Chicago Press, Chicago.

Kehoe, Thomas F.
1966 The Small Side-Notched Point System in the Northern Plains. American Antiquity 31(6):827-841.

Kelly, Robert L.
1988 The Three Sides of a Biface. American Antiquity 53(4):717-734.

Keyser, James D.
1992 Indian Rock Art of the Columbia Plateau. University of Washington Press, Seattle.

Kiver, Eugene P.
1974 Holocene Glaciation in the Wallowa Mountains, Oregon. In Quaternary Environments: Proceedings of a Symposium, edited by W. C. Mahaney, pp. 169-195. Geographical Monographs No. 5. Department of Geography, Atkinson College, York University. Toronto, Canada.

Knapp, Andy
1979 Synopsis of 1979 Archaeological Team Research. Technical Report for National Science Foundation Grant #SPI-7827786. Oregon Museum of Science and Industry, Portland. Report on file, Oregon State Museum of Anthropology, University of Oregon, Eugene.

Knox, J. C.
1983 Responses of River Systems to Holocene Climates. In The Holocene, edited by H. E. Wright, Jr., pp. 26-41. Late-Quaternary Environments of the United States, Vol. 2. University of Minnesota Press, Minneapolis.

Krieger, Alex
1938 University of Oregon Archaeological Reconnaissance North-Central Oregon, June 1938. Ms. on file, Oregon State Museum of Anthropology, University of Oregon, Eugene.

Lanning, Edward P.
1963 Archaeology of the Rose Spring Site Iny-372. University of California Publications in American Archaeology and Ethnology 49(3):237-336. Berkeley.

Layton, Thomas N.
1981 Traders and Raiders: Aspects of Trans-Basin and California-Plateau Commerce, 1800-1830. Journal of California and Great Basin Anthropology 3(1):127-137.

Lebow, Clayton G., Richard M. Pettigrew, Jon M. Silvermoon, David H. Chance, Robert Boyd, Yvonne Hajda, and Henry Zenk
1990 A Cultural Resource Overview for the 1990's, BLM Prineville District, Oregon. Bureau of Land Management Cultural Resource Series No. 5. Portland.

Lee, Richard B.
1968 What Hunters Do for a Living, or How to Make Out on Scarce Resources. In Man the Hunter, edited by R. B. Lee and I. DeVore, pp. 30-48. Aldine, Chicago.

Leonhardy, Frank C. and David G. Rice
1970 A Proposed Culture Typology for the Lower Snake River Region, Southeastern Washington. Northwest Anthropological Research Notes 4(1):1-29.

Lohse, Ernest S.
1984 Archaeological Investigations at Site 45OK11, Chief Joseph Dam Project. Office of Public Archaeology, University of Washington, Seattle.

1985 Rufus Woods Lake Projectile Point Typology. In Summary of Results, Chief Joseph Dam Cultural Resources Project, Washington, edited by S. K. Campbell, pp. 317-364. Office of Public Archaeology, University of Washington, Seattle.

Loy, William G., et al.
1976 Atlas of Oregon. University of Oregon Books, Eugene.

Luedtke, Barbara E.
1992 An Archaeologist's Guide to Chert and Flint. Archaeological Research Tools 7. Institute of Archaeology, University of California, Los Angeles.

Lyman, R. Lee
1980 Freshwater Bivalve Molluscs and Southern Plateau Prehistory: a Discussion and Description of Three Genera. Northwest Science 54(2):121-136.

Mack, Joanne M.
1983 Archaeological Investigations in the Salt Cave Locality. University of Oregon Anthropological Papers No. 29. Eugene.

Mackay, Donald K.
1938 Geological Report on the Clarno Basin, Wheeler and Wasco Counties, Oregon. State Department of Oregon Geology and Mineral Industries, Portland.

Madsen, David. B.
1982 Great Basin Paleoenvironments: Summary and Integration. In Man and Environment in the Great Basin, edited by D. B. Madsen and J. F. O'Connell, pp. 102-104. SAA Papers No. 2. Society for American Archaeology, Washington, D.C.

Manchester, Steve
1977 Geology of the Camp Hancock Area. In The Natural History of Camp Hancock and the Clarno Basin, North-Central Oregon, edited by M. H. Houck and J. H. Atherton, pp. 41-44. Oregon Museum of Science and Industry, Portland. Report on file, Oregon State Museum of Anthropology, University of Oregon, Eugene.

Mazany, Terry (editor)
1980 Contributions to Oregon Archaeology. Technical Report, National Science Foundation. Oregon Museum of Science and Industry, Portland. Report on file, Oregon State Museum of Anthropology, University of Oregon, Eugene.

McClure, Richard H., Jr.
1980 Anthropomorphic Motifs and Style in Plateau Rock Art. Paper presented at the 33rd Northwest Anthropological Conference, Bellingham, Washington.

1984 Rock Art of the Dalles-Deschutes Region: A Chronological Perspective. Unpublished Master's thesis, Department of Anthropology, Washington State University, Pullman.

McDonald, Stan
1986 Aboriginal Procurement of Dooley Mountain Obsidian: A Chronological Perspective. In Contributions to the Archaeology of Oregon 1983-1986, edited by Kenneth M. Ames, pp. 165-189. Association of Oregon Archaeologists Occasional Papers No. 3.

Mehringer, Peter J., Jr.
1985 Late-Quaternary Pollen Records from the Interior Pacific Northwest and Northern Great Basin of the United States. In Pollen Records of Late-Quaternary North American Sediments, edited by Vaughn M. Bryant, Jr. and Richard G. Holloway, pp. 167-189. American Association of Stratigraphic Palynologists Foundation, Dallas.

1986 Prehistoric Environments. In Great Basin, edited by W. L. d'Azevedo, pp. 31-50. Handbook of North American Indians, vol. 11, W. C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

1987 Late Holocene Environments on the Northern Periphery of the Great Basin. Departments of Anthropology and Geology, Washington State University. Submitted to the Bureau of Land Management, Oregon State Office, Portland.

Mildner, Michael P.
1974 Descriptive and Distributional Notes on Atlatls and Atlatl Weights in the Great Basin. In Great Basin Atlatl Studies, edited by T. R. Hester, M. P. Mildner, and L. Spencer, pp. 7-27. Publications in Archaeology and History No. 2. Ballena Press, Ramona.

Miller, E. H., ed.
1985 Museum Collections: Their Roles and Future in Biological Research. Occasional Papers of the British Columbia Provincial Museum No. 25. Victoria.

Miller, Wick R.
1986 Numic Languages. In Great Basin, edited by W. L. D'Azevedo, pp. 98-106. Handbook of North American Indians, vol. 11, W. C. Sturtevant, general editor. Smithsonian Institution, Washington D. C.

Minor, Rick
1984 Dating the Bonneville Landslide in the Columbia River Gorge. Heritage Research Associates Report No. 31. Eugene.

Minor, Rick, Stephen Dow Beckham, Kathryn Anne Toepel, and Ruth L. Greenspan
1987 Prehistory and History of the Ochoco National Forest, Central Oregon. Heritage Research Associates Report No. 51. Eugene.

Minor, Rick and Brian E. Hemphill
1990 Archaeological Assessment of the Crates Point Site (35WS221), Wasco County, Oregon. Heritage Research Associates Report No. 90. Eugene.

Minor, Rick, Kathryn A. Toepel, and Stephen Dow Beckham
1989 An Overview of Investigations at 45SA11: Archeology in the Columbia River Gorge. Heritage Research Associates Report No. 83. Eugene.

Minor, Rick, and Lynda L. Walker
1993 Late Prehistoric Cultural Dynamics in the Columbia River Gorge, Oregon and Washington. Paper presented at the 58th Annual Meeting of the Society for American Archaeology, St. Louis, Missouri.

Moratto, Michael J., Thomas L. Jackson, Richard M. Pettigrew, and Barry A. Price
1991 Archaeological Testing and Evaluation Report 1990 Field Season and Historic Properties Treatment Plan for 1991 Field Season PGT-PG&E Pipeline Expansion Project. INFOTEC Research. Submitted to Pacific Gas Transmission Co., San Francisco. Report on file, Oregon State Museum of Anthropology, University of Oregon, Eugene.

Morris, Andrew J. and Andrew M. Goheen
1981 Test Excavations at Big Baldy #1 (CR-OR-02-796), Grant County, Oregon. Report on file, Bureau of Land Management, Burns District.

Mullineaux, Donald
1986 Summary of Pre-1980 Tephra-Fall Deposits Erupted from Mount St. Helens, Washington State, USA. Bulletin of Volcanology 48:17-26.

Murdock, George Peter
1938 Notes on the Tenino, Molala, and Paiute of Oregon. American Anthropologist 40:395-402.

1958 Social Organization of the Tenino. Miscellanea Paul Rivet: Octogenaria Dicata, pp. 299-315. Mexico City.

1980 The Tenino Indians. Ethnology 19(2):129-149.

Musil, Robert R.
1984 Ashes to Ashes, Windust to Dust: A Windust Site in the Northern Great Basin. Paper Presented at the 19th Great Basin Anthropological Conference, Boise, Idaho.

1990 Archaeology of the Dunn Site (35HA1261), Harney County, Oregon. Heritage Research Associates Report No. 95. Eugene.

1992 Adaptive Transitions and Environmental Change in the Northern Great Basin: A View from Diamond Swamp. Unpublished Ph.D. dissertation, Department of Anthroplogy, University of Oregon, Eugene.

Nabokov, Peter and Robert Easton
1989 Native American Architecture. Oxford University Press, New York.

Nedry, H. S.
1952 Notes on the Early History of Grant County. Oregon Historical Quarterly 53(4):235-254.

Neitzel, D. A., M. J. Scott, S.A. Shankle, and J. C. Chatters
1991 The Effect of Climate Change on Stream Environments: The Salmonid Resource of the Columbia River Basin. The Northwest Environmental Journal 7(2):271-293.

Nelson, Charles M.
1969 The Sunset Creek Site (45-KT-28) and Its Place in Plateau Prehistory. Washington State University, Laboratory of Anthropology, Report of Investigations 47. Pullman.

1973 Prehistoric Culture Change in the Intermontane Plateau of Western North America. In The Explanation of Culture Change: Models in Prehistory, edited by C. Renfrew, pp. 371-390. Duckworth, London.

Nielsen, Lawrence E., Doug Newman, and George McCart
1985 Pioneer Roads in Central Oregon. Maverick Publications, Bend, Oregon.

Nussbaum, Ronald A., Edmund D. Brodie, Jr., and Robert M. Storm
1983 Amphibians and Reptiles of the Pacific Northwest. University Press of Idaho, Moscow.

Oetting, Albert C.
1986a Archaeological Investigations at Area 3 of the Alderdale Site, 45KL5. Ms. on file, Oregon State Museum of Anthropology, University of Oregon, Eugene.

1986b Prehistory and History of the Ochoco National Forest, Central Oregon. Volume II: Site Inventory. Heritage Research Associates Report No. 51(2). Eugene.

1989 Villages and Wetlands Adaptations in the Northern Great Basin: Chronology and Land Use in the Lake Abert-Chewaucan Marsh Basin, Lake County, Oregon. University of Oregon Anthropological Papers No. 41. Eugene.

1990a An Archaeological Survey on the Recently Flooded Shores of Malheur Lake, Harney County, Oregon. Heritage Research Associates Report No. 97. Eugene.

1990b The Malheur Lake Survey: Lacustrine Archaeology in the Harney Basin, Central Oregon. Heritage Research Associates Report No. 96. Eugene.

1992 Lake and Marsh-Edge Settlements on Malheur Lake, Harney County, Oregon. Journal of California and Great Basin Anthropology 14(1):110-129.

1993a Archaeological Test Excavations at Site 35GM119, Gilliam County, Oregon. Heritage Research Associates Report No. 147. Eugene.

1993b The Archaeology of Buffalo Flat: Cultural Resources Investigations for the CONUS OTH-B Buffalo Flat Radar Transmitter Site, Christmas Lake Valley, Oregon. Heritage Research Associates Report No. 151. Eugene.

Oetting, Albert C. and Richard M. Pettigrew
1985 An Archaeological Survey in the Lake Abert Basin Lowlands, Lake County, Oregon. Oregon State Museum of Anthropology Report 85-5. Eugene.

Osborne, Douglas
1957 Excavations in the McNary Reservoir Basin near Umatilla, Oregon. River Basin Surveys Paper 8:1-258. Bureau of American Ethnology Bulletin 166. Government Printing Office, Washington, D.C.

Owsley, Douglas W.
1992 Demography of Prehistoric and Early Historic Northern Plains Populations. In Disease and Demography in the Americas, edited by J. W. Verano and D. H. Ubelaker, pp. 75-86. Smithsonian Institution Press, Washington, D.C.

Patterson, G. James, L. R. Steeves, and Phyllis Lancefield-Steeves
1982 The Oregon Range and Related Resources Evaluation Project: An Archaeological Survey and Social Impact Assessment. Vol. 1. Eastern Oregon State College, La Grande. Submitted to Pacific Northwest Range and Wildlife Habitat Laboratory, USDA Forest Service.

Perkins, William R.
1993 Atlatl Weights: Function and Classification. Bulletin of Primitive Technology 1(5):58-61.

Peterson, Roger Tory
1961 A Field Guide to Western Birds. Houghton Mifflin Company, Boston.

Pettigrew, Richard M.
1985 Archaeological Investigations on the East Shore of Lake Abert, Lake County, Oregon. Vol. 1. University of Oregon Anthropological Papers No. 32. Eugene.

1981 A Prehistoric Cultural Sequence in the Portland Basin of the Lower Columbia Valley. University of Oregon Anthropological Papers No. 22. Eugene.

Pettigrew, Richard M. and Clayton G. Lebow
1989 An Archaeological Survey of the Trout Creek-Oregon Canyon Uplands, Harney and Malheur County, Oregon. Cultural Resource Series No. 2. Bureau of Land Management, Portland.

Plew, Mark G.
1983 Implications of Nutritional Potential of Anadromous Fish Resources of the Western Snake River Plain. Journal of California and Great Basin Anthropology 5(1-2):58-65.

Polk, Michael R.
1976 Cultural Resource Inventory of the John Day River Canyon. Report on file at the Bureau of Land Management, Prineville District, Prineville.

Ramenofsky, Ann F.
1987 Vectors of Death: The Archaeology of European Contact. University of New Mexico Press, Albuquerque.

Ray, Verne F.
1936 Native Villages and Groupings of the Columbia Basin. Pacific Northwest Quarterly 27:99-151.

1939 Cultural Relations in the Plateau of Northwestern America. Publications of the Frederick Webb Hodge Anniversary Fund, Vol. III. The Southwest Museum, Los Angeles.

1942 Culture Element Distributions: XXII, Plateau. University of California Anthropological Records 8(2). Berkeley.

n.d. Villages of the Watlala, Dog River, Dalles Wasco and Wayampam Indians. Petitioner's Exhibit No. 403A, Confederated Tribes of the Warm Springs Reservation of Oregon V. United States, Indian Claims Commission, Docket No. 198. On file, National Archives and Records Administration, Washington, D.C.

Ray, Verne F. and Others
1938 Tribal Distribution in Eastern Oregon and Adjacent Regions. American Anthropologist 40:384-415.

Redman, Charles L.
1974 Archaeological Sampling Strategies. Addison-Wesley Module in Anthropology No. 55. Reading, Massachusetts.

Reid, Dwight W.
1975 Regional Sampling. In Sampling in Archaeology, edited by J. W. Mueller, pp. 45-60. University of Arizona Press, Tucson.

Reid, Kenneth C. (editor)
1991 Prehistory and Paleoenvironments at Pittsburg Landing: Data Recovery and Test Excavations at Six Sites in Hells Canyon National Recreation Area, West Central Idaho. Center for Northwest Anthropology Project Report Number 15. Washington State University, Pullman.

Reid, Kenneth C., John A. Draper, and Peter E. Wigand
1989 Prehistory and Paleoenvironments of the Silvies Plateau, Harney Basin, Southeastern Oregon. Center for Northwest Anthropology, Washington State University, Pullman.

Reid, Kenneth C. and James D. Gallison
1992 Site Testing and Data Recovery Plan, Crane Flats Site (FS 8-35.5-10/1), North Fork John Day District, Umatilla National Forest, Grant County, Oregon. Rain Shadow Research Project Report No. 2. Pullman.

Reinhart, Lester
1975 Business and Banking: Fossil Mercantile Company and Banking in Wheeler County. In Glimpses of Wheeler County's Past, edited by F. Smith Fussner, pp. 66-69. Binford and Mort, Portland.

Renfrew, Colin
1975 Trade as Action at a Distance: Questions of Integration and Communication. In Ancient Civilization and Trade, edited by J. A. Sabloff and C.C. Lamberg-Karlovsky, pp. 3-59. University of New Mexico Press, Albuquerque.

Rice, David G.
1972 The Windust Phase in Lower Snake River Region Prehistory. Laboratory of Anthropology, Report of Investigations No. 50. Washington State University, Pullman.

Rice, Harvey S.
1985 Native American Dwellings and Attendant Structures of the Southern Plateau. Eastern Washington University Reports in Archaeology and History 100-44. Cheney.

Richards, Thomas H. and Michael K. Rousseau
1987 Late Prehistoric Cultural Horizons on the Canadian Plateau. Publication No. 16, Department of Archaeology, Simon Fraser University, Burnaby.

Riggs, Jim
1968 Archaeology of the Pine Creek Watershed - A Preliminary Report, 1967. Oregon State University, Corvallis. Report on file, Oregon State Museum of Anthropology, University of Oregon, Eugene.

1977 Summary of the Amphibians and Reptiles of the Camp Hancock Area. In The Natural History of Camp Hancock and the Clarno Basin, North-Central Oregon, edited by M. H. Houck and J. H. Atherton, pp. 68-73. Oregon Museum of Science and Industry, Portland. Report on file, Oregon State Museum of Anthropology, University of Oregon, Eugene.

Rigsby, Bruce Joseph
1965 Linguistic Relations in the Southern Plateau. Unpublished Ph.D. dissertation, Department of Anthropology, University of Oregon, Eugene.

Roberts, Barbara
1989 Bluebook 89-90. Print-Tek West, Salem.

Ross, Lester
1976 Fort Vancouver, 1829 - 1860. A Historical Archaeological Investigation of the Goods Imported and Manufactured by the Hudson's Bay Company. Four parts. U.S. Department of Commerce, National Technical Information Service.

Ross, Richard
1963 Prehistory of the Round Butte Area, Jefferson County, Oregon. Unpublished Master's thesis, Department of Anthropology, University of Oregon, Eugene.

Sanger, David
1967 Prehistory of the Pacific Northwest Plateau as Seen from the Interior of British Columbia. Amercian Antiquity 32(2):186-197.

Sarna-Wojicki, Andrei M., Duane E. Champion, and Jonathan O. Davis
1983 Holocene Volcanism in the Coterminous United States and the Role of Silicic Volcanic Ash Layers in Correlation of Latest-Pleistocene and Holocene Deposits. In The Holocene, edited by H. E. Wright, Jr, pp. 52-76. Late-Quaternary Environments of the United States, Vol. 2. University of Minnesota Press, Minneapolis.

Schalk, Randall
1986 Estimating Salmon and Steelhead Usage in the Columbia Basin before 1850: The Anthropological Perspective. Northwest Environmental Journal 2(2):1-29.

Schalk, Randall (editor)
1983a Cultural Resource Investigations for the Lyons Ferry Fish Hatchery Project, near Lyons Ferry, Washington. Laboratory of Archaeology and History, Project Report No. 8. Washington State University, Pullman.

1983b The 1978 and 1979 Excavations at Strawberry Island in the McNary Reservoir. Laboratory of Archaeology and History, Project Report No. 19. Washington State University, Pullman.

1987 Archaeology of the Morris Site (35 GM 91) on the John Day River, Gilliam County, Oregon. University of Washington Office of Public Archaeology. Submitted to the U. S. Army Corps of Engineers, Portland District.

Schalk, Randall and Gregory C. Cleveland
1983 A Sequence of Adaptations in the Columbia Plateau. In Cultural Resource Investigations for the Lyons Ferry Fish Hatchery, Lyons Ferry, Washington, edited by R. F. Schalk. Laboratory of Archaeology and History, Project Report No. 8. Washington State University, Pullman.

Schiffer, Michael B.
1972 Archaeological Context and Systemic Context. American Antquity 37:156-165.

1983 Toward the Identification of Formation Processes. American Antiquity 48(4):675-706.

Schmitt, Dave N.
1990 Bone Artifacts and Human Remains. In The Archaeology of James Creek Shelter, edited by R. G. Elston and E. E. Budy, pp. 117-127. University of Utah Anthropological Papers 115. Salt Lake City.

Schroedl, Gerald F.
1973 The Archaeological Occurrence of Bison in the Southern Plateau. Laboratory of Anthropology, Report of Investigations, No. 51. Washington State University, Pullman.

Semenov, S.A.
1976 Prehistoric Technology. Harper and Row Publishers, Inc., New York.

Shane, Ralph M.
1950 Early Explorations through Warm Springs Reservation Area. Oregon Historical Quarterly 51:273-309.

Sheldon, Graham
1981 The Use of Data Processing in the Interpretation of an Archaeological Site. Unpublished paper submitted to Science Talent Search. Ms. on file, Oregon State Museum of Anthropology, University of Oregon, Eugene.

Shiner, Joel L.
1950 An Appraisal of the Archaeological Resources of the John Day Reservoir on the Columbia River, Oregon and Washington. Report of the Columbia Basin Project, River Basin Surveys, Smithsonian Institution, Washington, D. C.

Skinner, Elizabeth and Peter Ainsworth
1990 Problems at the Casa Diablo Quarry: Challenging the Biface Reduction Paradigm. Paper presented at the 22nd Great Basin Anthropological Conference, Reno, Nevada.

Sokal, Robert R.
1974 Classification: Purposes, Principles, Progress, Prospects. Science 185(4157):1115-1123.

South, Stanley
1964 Analysis of the Buttons from Brunswick Town and Fort Fisher. Florida Anthropologist 17 (2):113-133.

Southard, Michael
1973 A Study of Two Northwest Housepit Populations. Northwest Anthropological Research Notes 7(1):61-83.

Spencer, Lee
1974 Replicative Experiments in the Manufacture and Use of a Great Basin Atlatl. In Great Basin Atlatl Studies, edited by T. R. Hester, M. P. Mildner, and L. Spencer, pp. 37-60. Publications in Archaeology and History No. 2. Ballena Press, Ramona.

Spinden, Herbert Joseph
1908 The Nez Perce Indians. American Anthropological Association Memoirs 2:165-274.

State of Oregon Water Resources Department
1986 John Day River Basin Report. State Water Resources Department, Salem.

Stebbins, Robert C.
1985 Western Reptiles and Amphibians. Houghton Mifflin Company, Boston, Mass.

Steggell, Norm
1982 An East-Central Oregon Forested Highland Occupation from ca. 10000 B.P. to Historic Times. Paper presented at the Great Basin Anthropological Conference, Reno, Nevada.

Stewart, Omer C.
1939 The Northern Paiute Bands. University of California Anthropological Records 2(3). Berkeley.

1941 Culture Element Distributions: XIV, Northern Paiute. University of California Anthropological Records 2(3):361-446. Berkeley.

Strong, Emory
1958 Evidence of the Atlatl in the Pacific Northwest. Screenings 7(4). Oregon Archaeological Society, Portland.

1959 Stone Age on the Columbia River. Binford & Mort, Portland.

1969 Stone Age in the Great Basin. Binford & Mort, Portland.

Strong, W. Duncan, W. Egbert Schenck, and Julian Steward
1930 Archaeology of the Dalles-Deschutes Region. University of California Publications in American Archaeology and Ethnology 29(1). University of California, Berkeley.

Stuiver, M. and G.W. Pearson
1993 High-precision Bidecadal Calibration of the Radiocarbon Time Scale, AD 1950-500 BC and 2500-6000 BC. Radiocarbon 35:1-23.

Suphan, Robert J.
1974 Oregon Indians II. Garland Series in American Indian Ethnohistory, New York.

Sutton, Mark Q.
1986 Warfare and Expansion: An Ethnohistoric Perspective on the Numic Spread. Journal of California and Great Basin Anthropology 8(1):65-82.

Swagerty, William R.
1988 Indian Trade in the Trans-Mississippi West to 1870. In History of Indian-White Relations, edited by W. E. Washburn, pp. 351-374. Handbook of North American Indians, Vol. 4, W. C. Sturtevant, general editor. Smithsonian Institution, Washington D.C.

Swanson, Earl H.
1962 The Emergence of Plateau Culture. Occasional Papers of the Idaho State College Museum No. 8. Pocatello.

Taylor, Edward Morgan
1960 Geology of the Clarno Basin, Mitchell Quadrangle, Oregon. Unpublished Master's thesis, Oregon State College, Corvallis.

Teit, James A.
1928 The Middle Columbia Salish. University of Washington Publications in Anthropology 2(4):83-128.

Thomas, David Hurst
1969 Great Basin Hunting Patterns: A Quantitative Method for Treating Faunal Remains. American Antiquity 34:393-401.

1981 How to Classify the Projectile Points from Monitor Valley, Nevada. Journal of California and Great Anthropology 3(1):7-43.

1983 The Archaeology of Monitor Valley, 1. Epistemology. Anthropological Papers of the American Museum of Natural History 58, Part 1. New York.

1986 Refiguring Anthropology. Waveland Press, Inc., Prospect Heights, Illinois.

Thompson, R. R.
1855 Annual Report. In Report of the Commissioner of Indian Affairs 1854. Senate Documents, 2nd session, 33rd Congress, Vol 1(1):489-493. Government Printing Office, Washington, D. C.

Thoms, Alston V.
1989 The Northern Roots of Hunter-Gatherer Intensification: Camas and the Pacific Northwest. Unpublished Ph.D. dissertation, Department of Anthropology, Washington State University, Pullman.

Toepel, Kathryn Anne, Rick Minor, and William F. Willingham
1980 Human Adaptation in the Fort Rock Basin. Department of Anthropology, University of Oregon, Eugene.

Towner, Ronald H. and Miranda Warburton
1990 Projectile Point Rejuvenation: A Technological Analysis. Journal of Field Archaeology 17:311-321.

Tringham, Ruth, Glenn Cooper, George Odell, Barbara Voytek, and Anne Whitman
1974 Experimentation in the Formation of Edge Damage: A New Approach to Lithic Analysis. Journal of Field Archaeology 1:171-195.

United States Forest Service
1953 Forest Type Map of Wheeler County. On file, Map Library, University of Oregon. Eugene.

Van Dyke, Walter A., Alan Sands, Jim Yoakum, Allan Polenz, and James Blaisdell
1983 Wildlife Habitats in Managed Rangelands -- The Great Basin of Southeastern Oregon: Bighorn Sheep. General Technical Report PNW-159, U.S. Forest Service and Bureau of Land Management.

Verano, John W. and Douglas H. Ubelaker (editors)
1992 Disease and Demography in the Americas. Smithsonian Institution Press, Washington, D.C.

Villa, Paola
1982 Conjoinable Pieces and Site Formation Processes. American Antiquity 47(2):276-290.

Walker, Deward E., Jr.
1967 Mutual Cross-Utilization of Economic Resources in the Plateau: An Example from Aboriginal Nez Perce Fishing Practices. Laboratory of Anthropology, Report of Investigations No. 41. Washington State University, Pullman.

Walker, George W.
1977 Geologic Map of Oregon East of the 121st Meridian. Miscellaneous Investigations Series, U.S. Geological Survey.

Walters, L. V. W.
1938 Social Structure. In The Sinkaietk or Southern Okanogan, edited by L. Spier, pp. 71-101. General Studies in Anthropology No 6. Menasha.

Warren, Claude N.
1968 The View from Wenas: A Study in Plateau Prehistory. Occasional Papers of the Idaho State University Museum No. 24. Pocatello.

Weide, Margaret L.
1968 Cultural Ecology of Lakeside Adaptation in the Western Great Basin. Unpublished Ph.D. dissertation, Department of Anthropology, University of California, Los Angeles.

Wells, Mike
1975 Chronology. In Glimpses of Wheeler County's Past, edited by F. Smith Fussner, pp. 123-132. Binford and Mort, Portland.

White, Anta M.
1963 Analytic Description of the Chipped-Stone Industry from Snyders Site, Calhoun County, Illinois. Museum of Anthropology, Anthropological Papers No. 19. University of Michigan, Ann Arbor.

Whiting, Beatrice Blyth
1950 Paiute Sorcery. Viking Fund Publications in Anthropology, No. 15. New York.

Wigand, Peter Earnest
1985 Diamond Pond, Harney County, Oregon: Man and Marsh in the Eastern Oregon Desert. Unpublished Ph.D. dissertation, Department of Anthropology, Washington State University, Pullman.

1987 Diamond Pond, Harney County, Oregon: Vegetation History and Water Table in the Eastern Oregon Desert. Great Basin Naturalist 47(3):427-458.

1989 Vegetation, Vegetation History, and Stratigraphy. In Prehistory and Paleoenvironments of the Silvies Plateau, Harney Basin, Southeastern Oregon, by K. C. Reid, J. A. Draper, and P. E. Wigand, pp. 37-85. Center for Northwest Anthropology, Project Report No. 8. Washington State University, Pullman.

Wilde, James D., Rinita Dalan, Steve Wilke, Ralph Keuler, and John Foss
1983 Cultural Resource Survey and Evaluations of Select Parcels in the Joh Day Reservoir, Oregon. Geo-Recon International, Seattle. Submitted to the U. S. Army Corps of Engineers, Portland District.

Wilde, James D.
1985 Prehistoric Settlements in the Northern Great Basin: Excavations and Collections Analysis in the Steens Mountain Area, Southeastern Oregon. Unpublished Ph.D. dissertation, Department of Anthropology, University of Oregon, Eugene.

Willey, Gordon R. and Philip Phillips
1958 Method and Theory in American Archaeology. University of Chicago Press, Chicago.

Willig, Judith A. and C. Melvin Aikens
1988 The Clovis-Archaic Interface in Far Western North America. In Early Human Occupation in Far Western North America: The Clovis-Archaic Interface, edited by J. A. Willig, C. M. Aikens, and John Fagan, pp. 1-40. Nevada State Museum Anthropological Papers No. 21. Carson City.

Wobst, H. Martin
1978 The Archaeo-Ethnology of Hunter-Gatherers or The Tyranny of the Ethnographic Record in Archaeology. American Antiquity 43(2):303-309.

Wood, W. Raymond
1972 Contrastive Features of Native North American Trade Systems. In For the Chief, Essays in Honor of Luther S. Cressman, edited by F. W. Voget and R. L. Stephenson, pp. 153-169. University of Oregon Anthropological Papers No. 4. Eugene.

Wylie, Alison
1985 The Reaction against Analogy. In Advances in Archaeological Method and Theory, Vol. 8, edited by Michael B. Schiffer, pp. 63-111. Academic Press, Orlando.

Yellen, John E.
1977 Archaeological Approaches to the Present: Models for Reconstructing the Past. Academic Press, New York.

Zilverberg, Grace M.
1983 Building Subsistence Models in the Blue Mountain Region of Northeastern Oregon. Contributions to the Archaeology of Oregon, 1981-1982, edited by D. E. Dumond, pp. 123-136. Occasional Papers 2. Association of Oregon Archaeologists, Eugene.