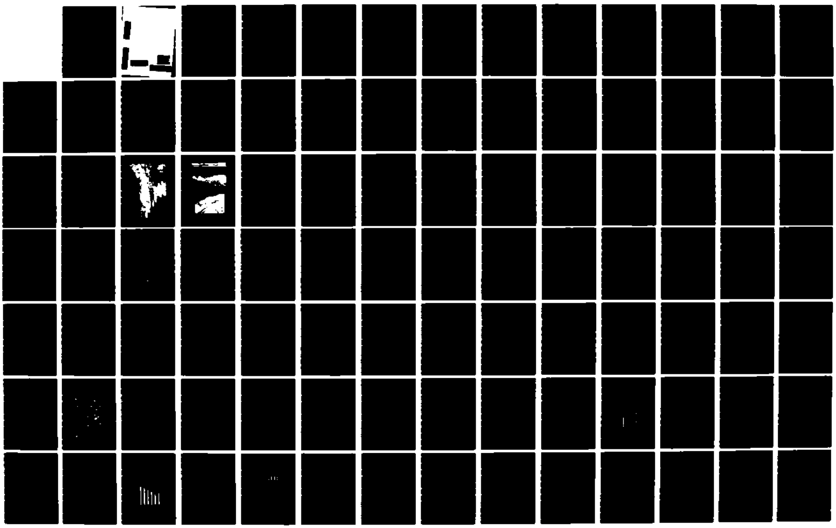
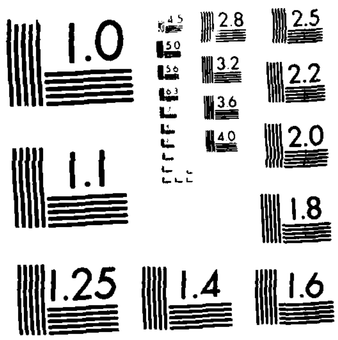
AD-A162 760 ARCHAEOLOGICAL INVESTIGATIONS AT SITES 45-OK-287 AND 45-OK-288 CHIEF JOSE (U) WASHINGTON UNIV SEATTLE OFFICE OF PUBLIC ARCHAEOLOGY C J MISS ET AL 1984 1/4

UNCLASSIFIED DACW67-78-C-0106 F/G 5/6 NL





MICROCOPY RESOLUTION TEST CHART

NATIONAL BUREAU OF STANDARDS

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

GOVT ACCESSION NO. [illegible]-A162 [illegible]

4. TITLE (and Subtitle): [illegible] investigations at sites [illegible]-OK-287 and [illegible]-OK-288, Chief Joseph Dam Project, [illegible]

5. TYPE OF REPORT & PERIOD COVERED: Final 1978-1984

6. PERFORMING ORG. REPORT NUMBER

7. AUTHOR(s): [illegible] J. [illegible], Sarah K. Campbell, Stephan [illegible], Dorothy Sammons-Lohse, Nancy A. [illegible]

8. CONTRACT OR GRANT NUMBER(s): DACW67-78-C-0106

9. PERFORMING ORGANIZATION NAME AND ADDRESS: Office of Public Archaeology, Institute for Environmental Studies, University of Washington

10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS

11. CONTROLLING OFFICE NAME AND ADDRESS: U.S. Army Corps of Engineers, Seattle District, P.O. Box C-3755, Seattle, WA 98124

12. REPORT DATE: [illegible]

13. NUMBER OF PAGES: [illegible]

14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)

15. SECURITY CLASS. (of this report)

15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

unlimited

This document has been approved for public release and sale; its distribution is unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Chief Joseph Dam, Washington
Columbia River, Washington
Rufus Woods Lake, Washington
Excavations (archaeology)
Antiquities
Artifacts

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

[illegible] sampling [illegible] 5990 BP, with little evidence of [illegible] throughout [illegible]. The site [illegible] for [illegible] deer, antelope [illegible] located on a narrow [illegible] [illegible]

DD FORM 1473 EDITION OF 1 NOV 65 IS OBSOLETE

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

INSTRUCTIONS FOR PREPARATION OF REPORT DOCUMENTATION PAGE

RESPONSIBILITY. The controlling DoD office will be responsible for completion of the Report Documentation Page, DD Form 1473, in all technical reports prepared by or for DoD organizations.

CLASSIFICATION. Since this Report Documentation Page, DD Form 1473, is used in preparing announcements, bibliographies, and data banks, it should be unclassified if possible. If a classification is required, identify the classified items on the page by the appropriate symbol.

COMPLETION GUIDE

General. Make Blocks 1, 4, 5, 6, 7, 11, 13, 15, and 16 agree with the corresponding information on the report cover. Leave Blocks 2 and 3 blank.

Block 1. Report Number. Enter the unique alphanumeric report number shown on the cover.

Block 2. Government Accession No. Leave Blank. This space is for use by the Defense Documentation Center.

Block 3. Recipient's Catalog Number. Leave blank. This space is for the use of the report recipient to assist in future retrieval of the document.

Block 4. Title and Subtitle. Enter the title in all capital letters exactly as it appears on the publication. Titles should be unclassified whenever possible. Write out the English equivalent for Greek letters and mathematical symbols in the title *(see "Abstracting Scientific and Technical Reports of Defense-sponsored RDT/E," AD-667 000)*. If the report has a subtitle, this subtitle should follow the main title, be separated by a comma or semicolon if appropriate, and be initially capitalized. If a publication has a title in a foreign language, translate the title into English and follow the English translation with the title in the original language. Make every effort to simplify the title before publication.

Block 5. Type of Report and Period Covered. Indicate here whether report is interim, final, etc., and, if applicable, inclusive dates of period covered, such as the life of a contract covered in a final contractor report.

Block 6. Performing Organization Report Number. Only numbers other than the official report number shown in Block 1, such as series numbers for in-house reports or a contractor/grantee number assigned by him, will be placed in this space. If no such numbers are used, leave this space blank.

Block 7. Author*(s)*. Include corresponding information from the report cover. Give the name*(s)* of the author*(s)* in conventional order *(for example, John R. Doe or, if author prefers, J. Robert Doe)*. In addition, list the affiliation of an author if it differs from that of the performing organization.

Block 8. Contract or Grant Number*(s)*. For a contractor or grantee report, enter the complete contract or grant number*(s)* under which the work reported was accomplished. Leave blank in in-house reports.

Block 9. Performing Organization Name and Address. For in-house reports enter the name and address, including office symbol, of the performing activity. For contractor or grantee reports enter the name and address of the contractor or grantee who prepared the report and identify the appropriate corporate division, school, laboratory, etc., of the author. List city, state, and ZIP Code.

Block 10. Program Element, Project, Task Area, and Work Unit Numbers. Enter here the number code from the applicable Department of Defense form, such as the DD Form 1498, "Research and Technology Work Unit Summary" or the DD Form 1634. "Research and Development Planning Summary," which identifies the program element, project, task area, and work unit or equivalent under which the work was authorized.

Block 11. Controlling Office Name and Address. Enter the full, official name and address, including office symbol, of the controlling office. *(Equates to funding/sponsoring agency. For definition see DoD Directive 5200.20, "Distribution Statements on Technical Documents.")*

Block 12. Report Date. Enter here the day, month, and year or month and year as shown on the cover.

Block 13. Number of Pages. Enter the total number of pages.

Block 14. Monitoring Agency Name and Address *(if different from Controlling Office)*. For use when the controlling or funding office does not directly administer a project, contract, or grant, but delegates the administrative responsibility to another organization.

Blocks 15 & 15a. Security Classification of the Report: Declassification/Downgrading Schedule of the Report. Enter in 15 the highest classification of the report. If appropriate, enter in 15a the declassification/downgrading schedule of the report, using the abbreviations for declassification/downgrading schedules listed in paragraph 4-207 of DoD 5200.1-R.

Block 16. Distribution Statement of the Report. Insert here the applicable distribution statement of the report from DoD Directive 5200.20, "Distribution Statements on Technical Documents."

Block 17. Distribution Statement *(of the abstract entered in Block 20, if different from the distribution statement of the report)*. Insert here the applicable distribution statement of the abstract from DoD Directive 5200.20, "Distribution Statements on Technical Documents."

Block 18. Supplementary Notes. Enter information not included elsewhere but useful, such as: Prepared in cooperation with . . Translation of *(or by)* . . . Presented at conference of . . . To be published in . . .

Block 19. Key Words. Select terms or short phrases that identify the principal subjects covered in the report, and are sufficiently specific and precise to be used as index entries for cataloging, conforming to standard terminology. The DoD "Thesaurus of Engineering and Scientific Terms" *(TEST)*, AD-672 000, can be helpful.

Block 20. Abstract. The abstract should be a brief *(not to exceed 200 words)* factual summary of the most significant information contained in the report. If possible, the abstract of a classified report should be unclassified and the abstract to an unclassified report should consist of publicly- releasable information. If the report contains a significant bibliography or literature survey, mention it here. For information on preparing abstracts see "Abstracting Scientific and Technical Reports of Defense-Sponsored RDT&E," AD-667 000.

☆ U.S. GPO: 1974-540-847/9052

ARCHAEOLOGICAL INVESTIGATIONS AT SITES 45-OK-287 AND 45-OK-288, CHIEF JOSEPH DAM PROJECT, WASHINGTON

by

Christian J. Miss

with

Sarah K. Campbell, Stephanie Livingston,
Dorothy Sammons-Lohse, Nancy A. Stenholm

Principal Investigators

R.C. Dunnell 1978-1984
D.K. Grayson 1978-1981
M.E.W. Jaehnig 1981-1984
J.V.Jermann 1978-1981

Final report submitted to the U.S. Army Corps of Engineers, Seattle District, in partial fulfillment of the conditions and specifications of Contract No. DACW67-78-C-0106.

Office of Public Archaeology
Institute for Environmental Studies
University of Washington

1984

ABSTRACT

Site 45-OK-287/288 is located on a narrow terrace at the foot of a steep slope on the right bank of Rufus Woods Lake (Columbia River) 110 m upstream from River Mile 568. The site lies in an Upper Sonoran life zone. In 1979 the University of Washington excavated 230 m^3 of site volume for the U.S. Army Corps of Engineers, Seattle District, as part of a mitigation program associated with adding 10 ft to the operating level behind Chief Joseph Dam. Systematic random sampling using 1 x 1 x 0.1-m collection units in 1 x 1, 1 x 2, or 2 x 2 m cells disclosed six prehistoric components contained in overbank, colluvial and aeolian deposits. The first occupation, dated prior to 4800 B.P., is represented primarily by a deflated artifact concentration located just above basal river cobbles. The second occupation found in sands and silts of early overbank deposits is dated by two radiocarbon age determinations to 4800-4400 B.P. These two zones represent Kartar Phase components comparable to late Vantage and Cascade Phase age occupations elsewhere on the Plateau. They are characterized by greater use of argillite, lanceolate and stemmed projectile point forms, and cobble derived artifacts manufactured from on-site river gravels. The site functioned as a central base camp for hunting during this period. The third component, found primarily in slope derived colluvial deposits, is dated from 4400 to 1500 B.P. by one radiocarbon date and the bracketing ages of the components above and below. There are few intact cultural deposits and the range of projectile point styles indicate an amalgam of mixed occupations.

The fourth and fifth components are also contained in overbank deposits. The earlier component is dated from 1500 to 850 B.P. on the basis of five radiocarbon age determinations. Broader resource exploitation is indicated by the botanical data and more sedentary occupation by the presence of a structure floor and the seasonality data. The structure was not a semi-subterranean housepit, but more analogous to the ethnographic mat lodge. The subsequent components represent intermittent, transitory use of the site from 850 B.P. to historic times. There is little evidence of Native American use after about 400 B.P. in the aeolian and colluvial deposits which cap the site. Besides the structure, these later Coyote Creek Phase components are distinguished by greater use of cryptocrystalline silicas and small corner-notched, stemmed and side-notched points. They represent occupation similar to those of the Cayuse Phase. Throughout its use, 45-OK-287/288 appears to have functioned primarily as a base camp for hunting deer, antelope and mountain sheep.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF PLATES

PREFACE

The Chief Joseph Dam Cultural Resources Project (CJDCRP) has been sponsored by the Seattle District, U.S. Army Corps of Engineers (the Corps) in order to salvage and preserve the cultural resources imperiled by a 10 foot pool raise resulting from modifications to Chief Joseph Dam.

From Fall 1977 to Summer 1978, under contract to the Corps, the University of Washington, Office of Public Archaeology (OPA) undertook detailed reconnaissance and testing along the banks of Rufus Woods Lake in the Chief Joseph Dam project area (Contract No. DACW67-77-C-0099). The project area extends from Chief Joseph Dam at Columbia River Mile (RM) 545 upstream to RM 590, about seven miles below Grand Coulee Dam, and includes 2,015 hectares (4,979 acres) of land within the guide-taking lines for the expected pool raise. Twenty-nine cultural resource sites were identified during reconnaissance, bringing the total number of recorded prehistoric sites in the area to 279. Test excavations at 79 of these provided information about prehistoric cultural variability in this region upon which to base further resource management recommendations (Jermann et al. 1978; Leeds et al. 1981).

Only a short time was available for testing and mitigation before the planned pool raise. Therefore, in mid-December 1977, the Corps asked OPA to review the 27 sites tested to date and identify those worthy of immediate investigation. A priority list of six sites was compiled. The Corps, in consultation with the Washington State Historic Preservation Officer and the Advisory Council on Historic Preservation, established an Interim Memorandum of Agreement under which full-scale excavations at those six sites could proceed. In August 1978, data recovery (Contract No. DACW67-78-C-0106) began at five of the six sites.

Concurrently, data from the 1977 and 1978 testing, as well as those from previous testing efforts (Osborne et al. 1952; Lyman 1976), were synthesized into a management plan recommending ways to minimize loss of significant resources. This document calls for excavations at 34 prehistoric habitation sites, including the six already selected (Jermann et al. 1978). The final Memorandum of Agreement includes 20 of these. Data recovery began in May 1979 and continued until late August 1980.

Full-scale excavation could be undertaken at only a limited number of sites. The testing program data allowed identification of sites in good condition that were directly threatened with inundation or severe erosion by the projected pool raise. To aid in selecting a representative sample of prehistoric habitation sites for excavation, site "components" defined during testing were characterized according to (1) probable age, (2) probable type of occupation, (3) general site topography, and (4) geographic location along the river (Jermann et al. 1978:Table 18). Sites were selected to attain as wide a diversity as possible while keeping the total number of sites as low as possible.

The Project's investigations are documented in four report series. Reports describing archaeological reconnaissance and testing include (1) a management plan for cultural resources in the project area (Jermann et al. 1978), (2) a report of testing at 79 prehistoric habitation sites (Leeds et al. 1981), and (3) an inventory of data derived from testing. Series I of the mitigation reports includes (1) the project's research design (Campbell 1984d) and (2) a preliminary report (Jaehnig 1983b). Series II consists of 14 descriptive reports on prehistoric habitation sites excavated as part of the project (Campbell 1984b; Jaehnig 1983a, 1984a,b; Lohse 1984a-f; Miss 1984a-d), reports on prehistoric nonhabitation sites (Campbell 1984a) and burial relocation projects (Campbell 1984c), and a report on the survey and excavation of historic sites (Thomas et al. 1984). A summary of results is presented in Jaehnig and Campbell (1984).

This report is one of the Series II mitigation reports. Mitigation reports document the assumptions and contingencies under which data were collected, describe data collection and analysis, and organize and summarize data in a form useful to the widest possible archaeological audience.

ACKNOWLEDGEMENTS

This report is the result of the collaboration of many individuals and agencies. During the excavation and early reporting stages, Co-principal Investigators were Drs. Robert C. Dunnell and Donald K. Grayson, both of the Department of Anthropology, University of Washington, and Dr. Jerry V. Jermann, Director of the Office of Public Archaeology, University of Washington. Dr. Manfred E.W. Jaehnig served as Project Supervisor during this stage of the work. Since Fall of 1981, Dr. Jaehnig has served as Co-principal Investigator with Dr. Dunnell.

Several persons on the staff of the Corps of Engineers have made major contributions to the project. They are Dr. Steven F. Dice, Contracting Officer's Representative, and Corps archaeologists Lawr V. Salo and David A. Munsell. Both Mr. Munsell and Mr. Salo have worked to assure the success of the project from its initial organization through site selection, sampling, analysis, and report writing. Mr. Munsell provided much needed guidance in the initial stages of the project and developed the strong ties with the Colville Confederated Tribes essential for the undertaking. Mr. Salo gave generously of his time to guide the project through data collection and analysis. In his review of each report, he exercises that rare skill, an ability to criticize constructively.

We have been fortunate in having the generous support and cooperation of the Colville Confederated Tribes throughout the entire length of project. The Tribes' governing body, the Business Council, and the History and Archaeology Office have been invaluable. We owe special thanks to Andy Joseph, formerly a representative from the Nespelem District on the Business Council, and to Adeline Fredin, Tribal Historian and Director of the History and Archaeology Office. Mr. Joseph and the Business Council, and Mrs. Fredin, who acted as liaison between the Tribe and the project, did much to convince appropriate Federal and State agencies of the necessity of the investigation. They helped to secure the land and services needed for the project's field facilities as well as to establish a program which trained local people, including many tribal members, to be field excavators and laboratory technicians. Beyond all this, they have extended to us courtesy and kindness which have made our stay in the project area a pleasant one. In return, conscious of how much gratitude we wish to convey in a few brief words, we extend our sincere thanks to all the members of the Colville Confederated Tribes who have supported our efforts, and to Mrs. Fredin and Mr. Joseph, in particular.

Site 45-OK-287/288 is located on land owned by the Colville Confederated Tribes and leased by Timm Brothers, Inc. We thank the Colville Confederated Tribes for their cooperation and for granting us permission to excavate the

site. We also thank Fred Timm for his generous assistance during the excavation of the site.

As authors of this report, we take responsibility for the contents. What we have written, however, is only the final stage of a collaborative process which perhaps has its nearest, and most appropriate, analogue in the integrated community of the people whose physical traces we have studied here. Some, by dint of hard labor and archaeological training, salvaged those traces from the earth; others processed and analyzed those traces; some manipulated the data and some wrote, or edited and produced this report. Each is a member of the community essential to the life of the work we have done.

Jerry V. Jermann, Co-principal Investigator during the field excavation and artifact analysis phase of the project, developed site excavation sampling designs used to select data from each site. Hal Kennedy supervised the excavation.

S. Neal Crozier did the initial data summary for the stratigraphic analysis and the chemical and mechanical sort analyses. The laboratory staff did the technological and functional artifact analysis under the direction of Karen Whittlesey. Janice Jaehnig did keypunching and John Chapman and Duncan Mitchell manipulated the computerized data.

The writing of the report itself is a cooperative effort. Dr. Leon Leeds was the senior author of the first draft of the report (originally two separate reports). Christian J. Miss revised the report extensively and wrote the final drafts of Chapters 1, 3, and 7. Sarah K. Campbell wrote Chapter 2; Stephanie Livingston analyzed the faunal assemblage and wrote Chapter 4; Dr. Nancy A. Stenholm analyzed the botanical assemblage and wrote Chapter 5; and Dr. Nancy A. Stenholm and Dorothy Sammons-Lohse wrote Chapter 6.

Linda Leeds and Marc Hudson edited the text; Dawn Brislawn typed the text, and co-ordinated production. Melodie Tune and Bob Radek drafted the final versions of the figures. Larry Bullis photographed and printed the artifact plates and Bob Thomas prepared them for publication. Karen Whittlesey and Marilyn Hawkes printed the site overview and feature photos. Final production of camera-ready copies was accomplished by Natalie Cadoret, Charlotte Beck, and Trish Ruppe under the direction of Sarah Campbell.

The cover photograph, a view of the Douglas County bank from 45-OK-2A, was taken with infra-red film by Larry Bullis and also printed by him. the cover layout was done by Bob Radek.

1. INTRODUCTION

Site 45-OK-287 is on the right bank of the Columbia River, 140 meters upstream from River Mile 568 in the NW1/4 NW1/4 SE1/4, Section 9, T30, R28E, Willamette Meridian; U.T.M. Zone 11, N.5,331,330, E.328,375. Site 45-OK-288 is just south of 45-OK-287, 110 m upstream from River Mile 568 in the same section, township, and range as 45-OK-287, in U.T.M. Zone 11, N.5,331,254, E.328,287. The sites are approximately 289 m (975 ft) above m.s.l., 25 m above the pre-dam river level and 1 m above the 1978 operating pool level of Rufus Woods Lake (Figure 1-1). The sites were excavated separately but are considered together in this report because they are contiguous.

SITE SETTING

Sites 45-OK-287 and 45-OK-288 are located on a narrow terrace at the foot of a steep slope which forms the western boundary of the sites (Figure 1-2, Plates 1-1, 1-2 and 1-3). A large basalt erratic was selected as the southern boundary of 45-OK-287, arbitarily separating it from 45-OK-288. The latter site is wider than 45-OK-287, and includes deposits at the mouth of a small ephemeral drainage which bisects the steep slope to the west. Each site is bounded on the north and south by basalt erratics and on the east by the Columbia River.

Above the western slope lies the Omak Trench proper, an old Columbia River course that cuts through the western part of the Okanogan Highlands, and whose floor contains the prairies of Goose Flats as well as Omak Lake and Goose Lake. The nearest major mountains, Whitmore Mtn. (elevation 1056 meters m.s.l.) and Boot Mtn. (elevation 853 meters m.s.l.) lie to the north. To the southeast across the Columbia River, the land rises steeply to the top of the escarpment and the Columbia Plateau (ca. 790 meters m.s.l.)

Large granitic outcrops and basalt erratics mark the river course just downstream from the sites. These outcrops obstructed the river and formed Parson's Rapids. Above the rapids was a smooth stretch of river where historic Condon's Ferry was located. Remains of the north bank landing (45-OK-180H) immediately downstream from 45-OK-288 were investigated by the project (Thomas et al. 1984). Part of the ferry roadway passed over 45-OK-288 and was still visible at the time of excavation.

The Columbia Plateau has a semiarid climate characterized by hot summers and moderate winters (Daubenmire 1970:6). In summer, clear skies prevail; temperatures are warm during the day and cool at night. In winter and early spring, storm fronts from the north Pacific bring overcast skies. The marine air masses, however, lose most of their moisture in crossing the coastal

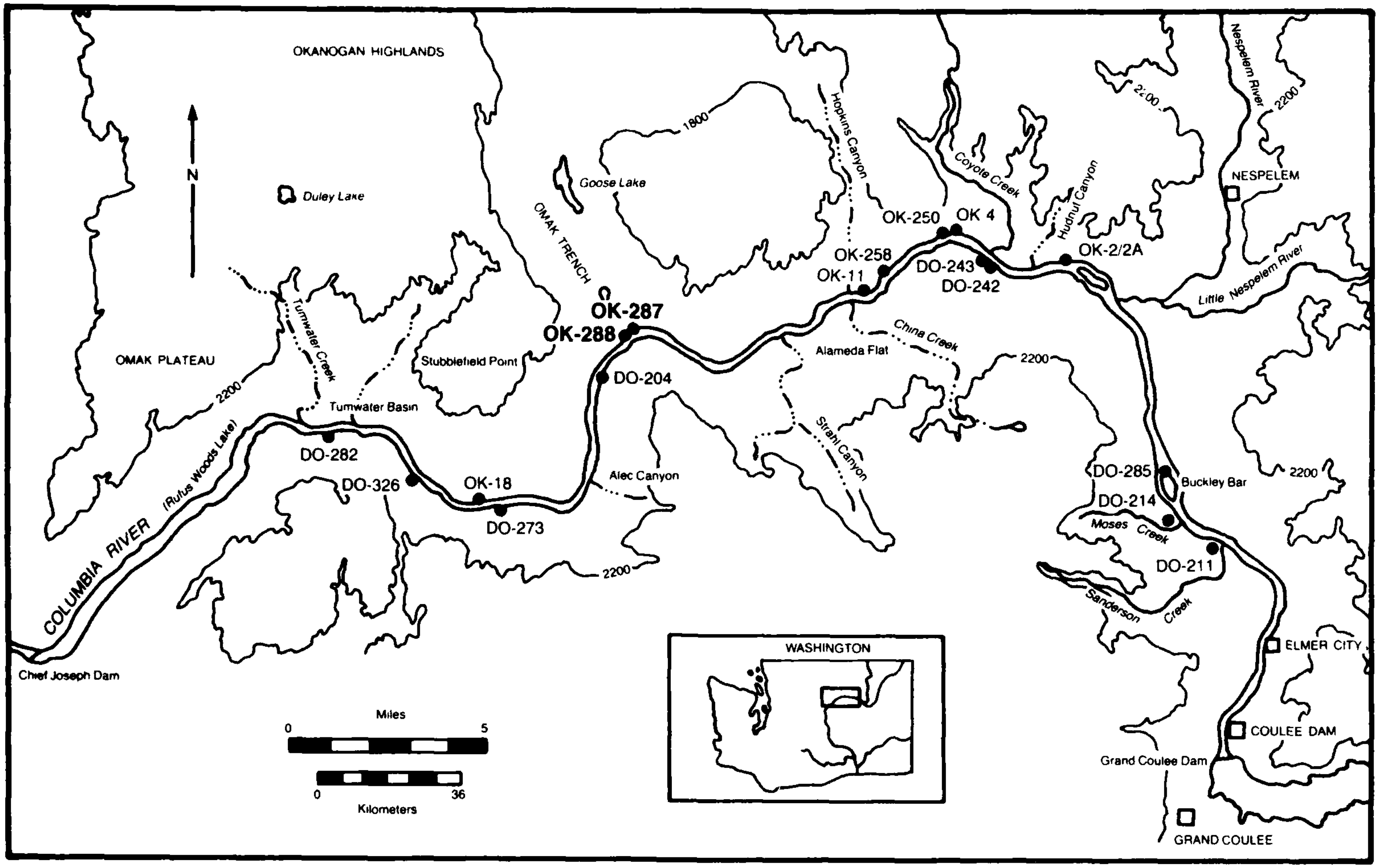


Figure 1-1. Map of project area showing location of 45-OK-287 and 45-OK-288.

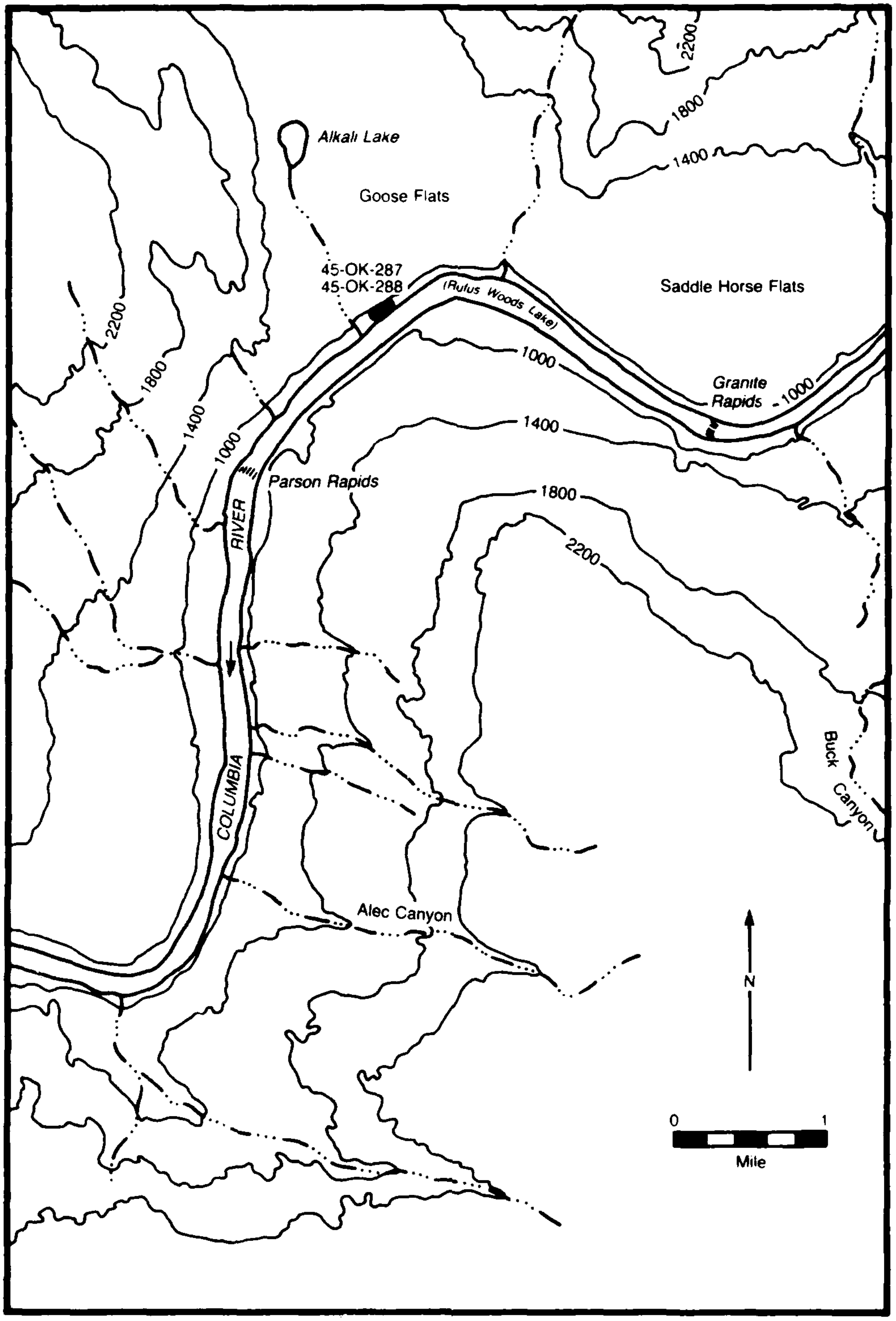


Figure 1-2. Map of site vicinity, 45-OK-287 and 45-OK-288.

Plate 1-1. 45-OK-287: view to the west.

Plate 1-2. 45-OK-288: view to the south.

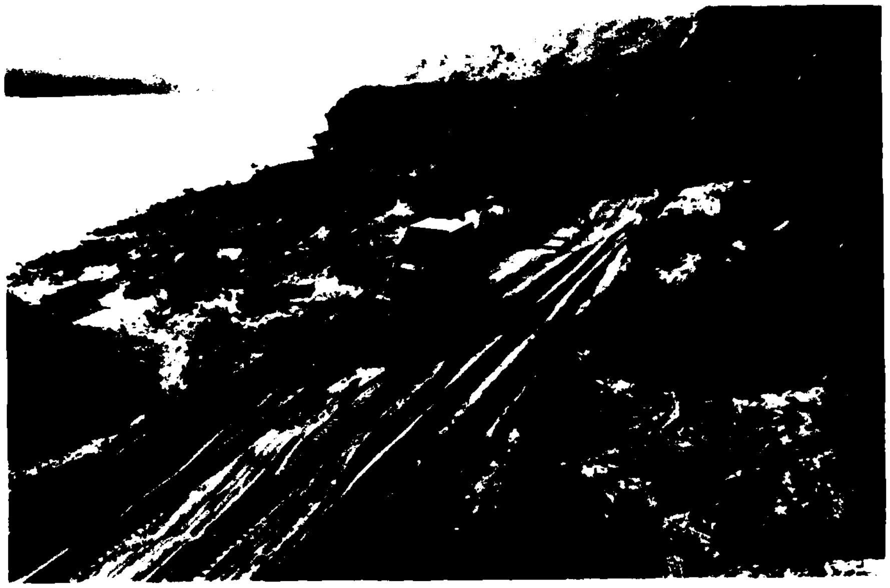


Plate 1-3. 45-OK-288: view to the west southwest.

mountain ranges so that overall precipitation in the project area is slight. Winter temperatures are mild, moderated by marine air flows.

A sagebrush-grass association (Artemisia tridentata-Agropyron) (Daubenmire 1970), which is typical of the Upper Sonoran life zone (Piper 1906), dominates the vegetation in the site area. Modern elements include several grasses (Agropyron spicatum dominant), cheatgrass (Bromus tectorum), and thistles (Salsola kali and thistle Cirsium spp.). Both cheatgrass and thistle were introduced in historic times. Before the introduction of grazing and farming, scattered sagebrush and a dense understory of grasses would have grown on the site (cf., Franklin and Dyrness 1973). Riparian plants, principally horsetail (Equisetum arvense), rushes (Equisetum hymale), tule (Scirpus acutus), and sedges (Carex spp.) grow in nearby drainages. Ponderosa pine are found in nearby drainages and along the river's course where they grow with broadleaf trees and shrubs.

Across the river, Artemisia rigida replaces big sagebrush in areas of thinner, rocky soils. Bitterbrush (Purshia tridentata) and isolated pines (Pinus ponderosa), with an understory of grasses, grow along the steep draws draining the slopes and terraces. Beyond the canyon rim, scattered pines give way to sagebrush covered uplands dotted with small lakes and springs.

INVESTIGATIONS AT 45-OK-287 and 45-OK-288

Two 1 x 2-m testing units were excavated at 45-OK-288 between the basalt erratics bounding the site. Stratified cultural deposits indicated at least three components. The second was radiocarbon dated to 923±77 B.P. and projectile point styles suggested the earliest might be as old as 3,500 years.

The sites were selected for excavation because they promised to yield data about late prehistoric camps representative of the small, special purpose sites noted in regional ethnographies. 45-OK-288 offered the additional opportunity to explore older components to determine the stability of site function through time. At both sites, the lack of evidence of subsurface dwellings led us to expect information about the structure and content of relatively uncomplicated occupations. Finally, 45-OK-287, 45-OK-288 and 45-DO-204 form a small cluster of sites near the center of the project area in a unique location with access to the Omak Trench (Figure 1-1).

EXCAVATION AT 45-OK-287

A two stage sampling design was used at the site. During the first stage, a probabilistic sample of units was selected for excavation. Five equal-sized sampling strata were established across the site surface, each consisting of 20 2-m^2 units. From each of them, five 2-m^2 sampling units were selected using a random number table. Figure 1-3 shows this stratified random sampling design: the numbers associated with each unit denote the order in which they were selected.

At the conclusion of probabistic sampling at 45-OK-287, four sample units from each of the five strata had been excavated (Figure 1-4). In the case of all but two strata the sample units were excavated in the order selected. In

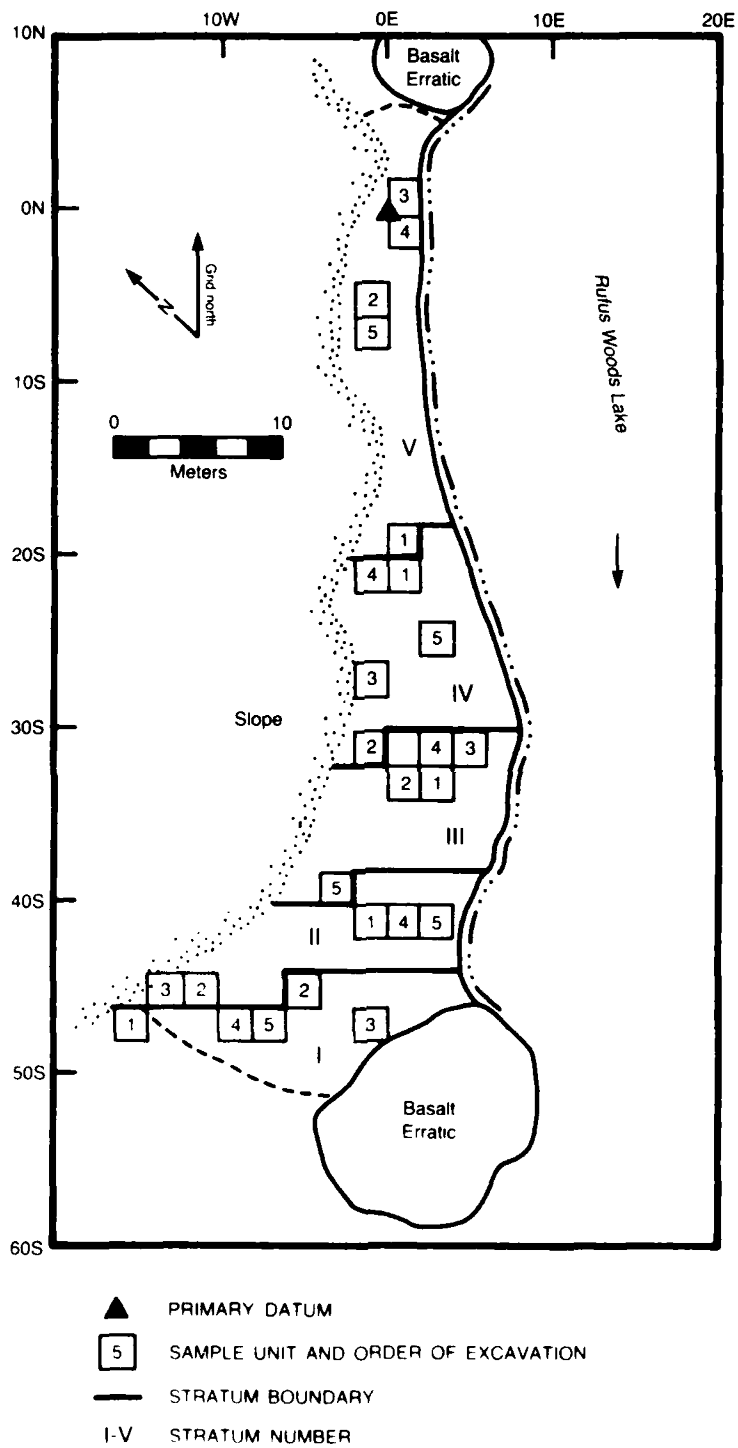


Figure 1-3. Stratified random sampling design, 45-OK-287.

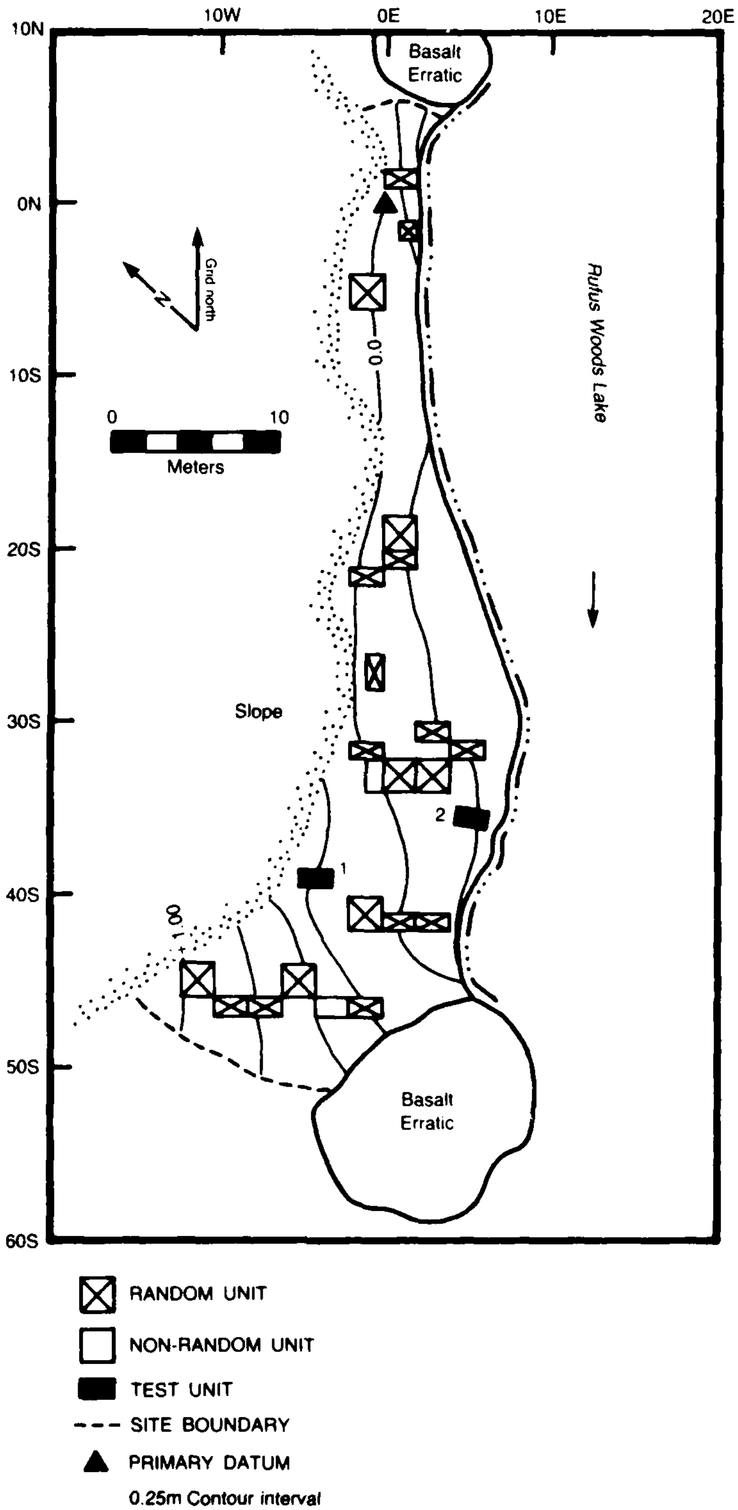


Figure 1-4. Units excavated, 45-OK-287.

Stratum I, however, the first unit could not be excavated because it was entirely covered by massive granite materials. For a similar reason, the third unit in Stratum II could not be excavated. As Figure 1-4 makes clear, we allowed considerable variation in the size and orientation of the excavation units sampling 7.8% of the approximately 400 m^2 of the site area.

Two purposefully placed 1 x 2-m units were also excavated (Figure 1-4). The first of these, 46S4W, we selected for two reasons: first, its excavation linked five previously excavated random units, creating a continuous 12-m long stratigraphic profile across the southern end of the site; and, second, it permitted us to explore further the high density of cultural material encountered in the the random unit immediately to the east, 46S2W. The second purposive sampling unit, 32S2W, was chosen to complete excavation of a pit feature encountered in the 2 x 2-m random unit at 32S0W.

Site 45-OK-287 was excavated during the 1979 field season, with work beginning on 31 July and concluding on 30 September. The field crew consisted of two to 13 excavators under the direction of a field supervisor. All told, 55 m^3 of matrix were excavated from 22 1 x 1-m units. An assemblage of 696 FMR, 746 lithic artifacts, 3,215 bone fragments, and 92 pieces of shell was collected. Soil samples for sediment and botanical analysis were taken, and carbon samples yielded four dates within the last 1500 years.

EXCAVATION AT 45-OK-288

Probabilistic sampling at 45-OK-288 was conducted within a stratified unaligned systematic design. Sampling strata were created by dividing the site into ten sets of grid units, each composed of 25 2 x 2-m units arranged in squares. Each 2 x 2-m unit within a stratum was designated by a Cartesian coordinate with a value of 1 to 5 assigned to points on the x and y axes. Beginning with the first stratum, two coordinates for the first unit were selected randomly. In the horizontal tier, the other three first order sample units were found by holding the original x coordinate constant and randomly choosing new y coordinates for the other strata. An identical procedure was used to determine the vertical tier units except the y coordinate was held constant and the x randomly varied. Following the selection of first order units, the same procedure was used to develop the second and third order units. The selected random units are shown in Figure 1-5.

Provisions were made for as many as three incremental sampling stages in excavations at the site. In practice, however, considerably fewer than the 30 proposed sampling units were excavated. First-stage sampling indicated that major cultural deposits were localized in the eastern third of the site, and excavation efforts were concentrated in this area. Consequently, only 5 of the 10 sampling strata (1, 4, 5, 7 and 9) were included in second-stage data recovery.

In all, 58 m^2 or 5.8% of the approximately 1000 m^2 site area was sampled by random units (Figure 1-6). Units in the northeastern site area encountered a deeply buried concentration of artifacts. Because of the depth of the cultural materials and the looseness of the loamy sand matrix, it was necessary to remove overburden from the area to ensure stability of the units.

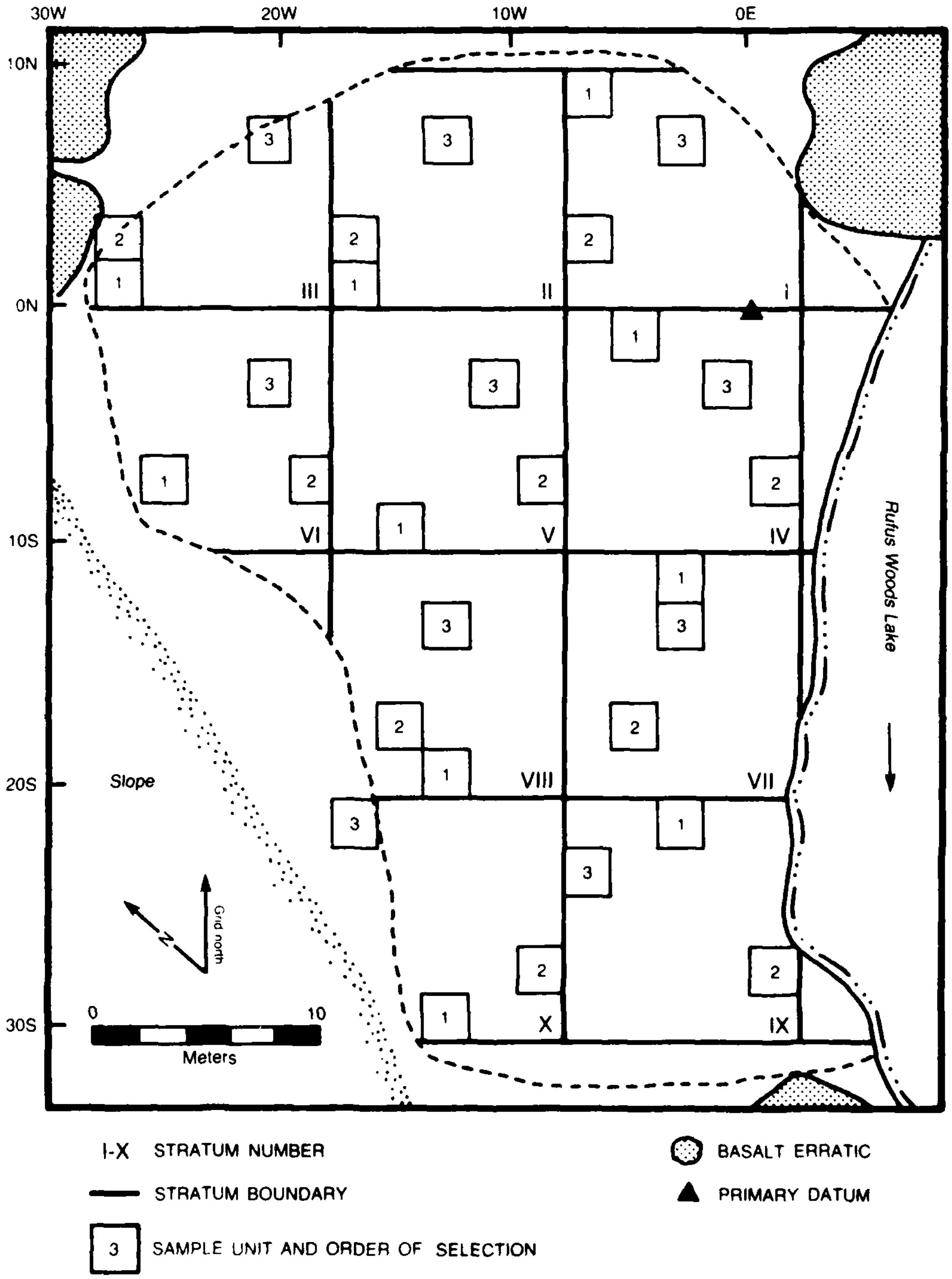


Figure 1-5. Stratified random sampling design, 45-OK-288.

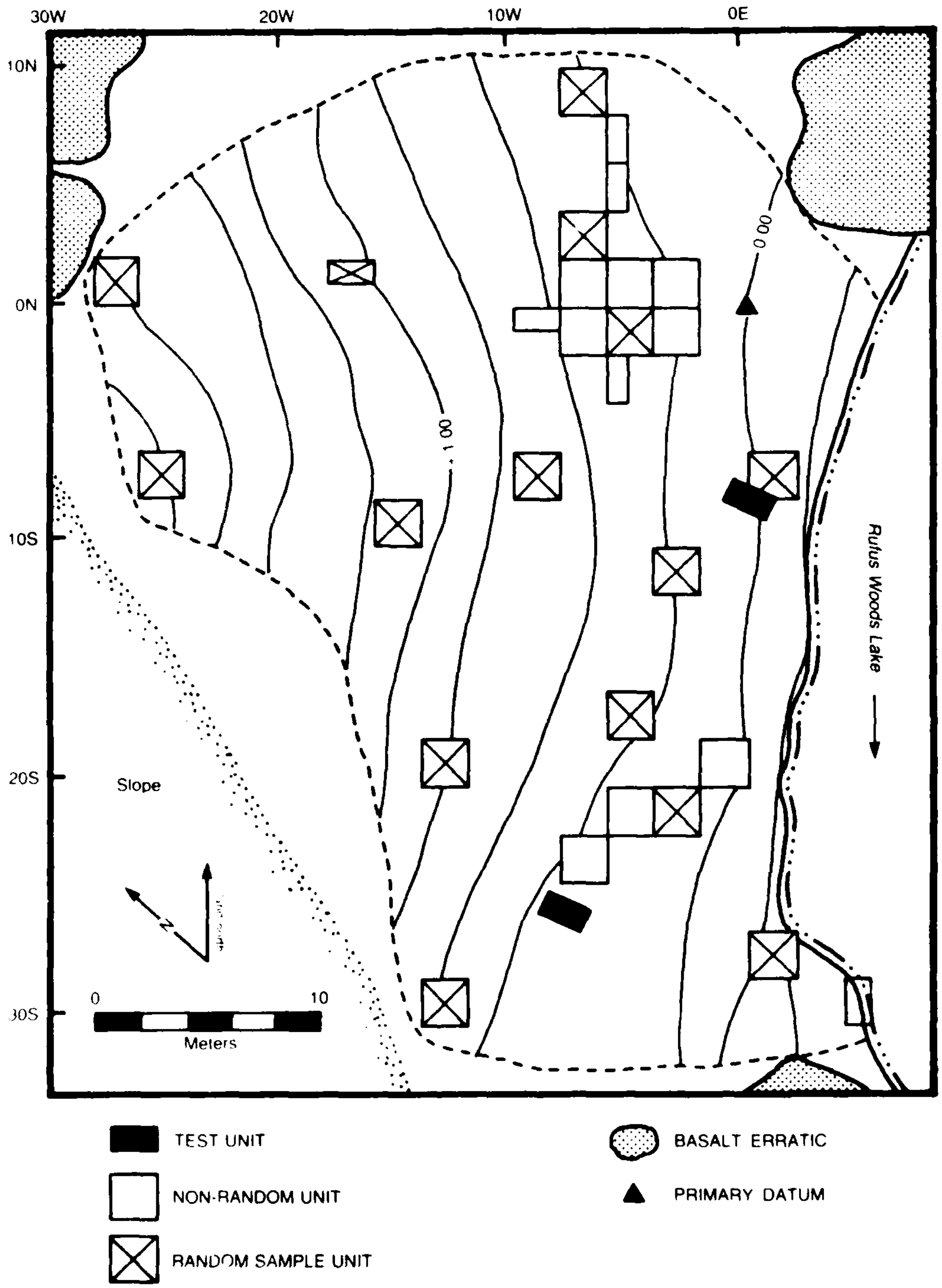


Figure 1-6. Units excavated, 45-OK-288.

After random units 10N8W, 4N8W, 0N6W, and 8S16W had been dug to depths of at least 150 cm, a bulldozer was used to remove a meter or so of overburden. We then continued excavating the units (except for 10N8W) until the deepest cultural materials had been recovered. Thirteen purposive units, encompassing 42 m^2 were excavated (Figure 1-6). Nine were placed to connect random units and form a block excavation in the area of the northeastern artifact concentration. Three were placed to form a block in the southeast where stratified artifact concentrations had been noted. One 1 x 2-m unit was placed along the river bank in the southeastern corner of the site to recover a small concentration of cultural remains eroding from the bank.

Site 45-OK-288 was excavated during the 1979 field season, with work beginning on 6 September 1979 and continuing until 26 November 1979. The crew consisted of from six to 11 excavators under the direction of a field supervisor.

All told, a volume of 175 m^3 was excavated at 45-OK-288. Excavators recovered 2,639 FMR, 9,186 lithic artifacts, 54,889 bone fragments, and 47 pieces of shell. Soil samples for sediment and botanical analysis were collected, and carbon samples yielded seven radiocarbon age ranges within the last 4,800 years.

REPORT FORMAT

The subsequent chapters present the results of the analyses of the cultural material from 45-OK-287 and 45-OK-288. Wherever practical, data from the two sites has been combined in a single presentation. Chapter 2 discusses the natural and cultural stratigraphy at each site and the rationale for the combined analyses. Chapters 3, 4 and 5 discuss the results of the artifact, faunal and botanical analyses. Chapter 6 examines cultural features and the final chapter provides a summary and synthesis of the data by discussing site chronology and function.

2. NATURAL AND CULTURAL STRATIGRAPHY

This chapter summarizes the natural and cultural stratigraphy of 45-OK-287/288. The geologic setting, briefly described with reference to regional geologic history, provides a background for interpreting sediments at the sites. The grouping of strata mapped during excavation into site-wide depositional units is discussed. These time-stratigraphic units provide a basis for interpretation of the depositional environment and for correlation of cultural materials between units. The cultural strata, or analytic zones, defined within this framework are discussed in the second half of the chapter.

GEOLOGIC SETTING

The project area lies entirely within the Columbia River canyon which is cut into Miocene and Cretaceous bedrock formations, and filled with unconsolidated sediments of Pleistocene and Holocene age. The older bedrock deposits are of interest to us primarily because they have constrained the movements of water and ice throughout the Quaternary. The bulk of the deposits are Pleistocene in age, laid down by glacial-related events such as ice movement, lake formation, and canyon downcutting, all of which affected vast areas. The Pleistocene history of the region has received considerable study. The less extensive Holocene deposits resulted from depositional agents with more localized effects: tributary streams, wind, downslope movement, and the Columbia River. These deposits, the most relevant to archaeological research, are the least studied by geologists. A detailed review of regional geologic history and interpretation can be found in the project's research design (Campbell 1984d). The following discussion emphasizes the immediate site vicinity and Holocene events affecting deposition at the sites.

Site 45-OK-287/288 occurs within the confluence of the Omak Trench and the Columbia Valley, the boundary between two segments of the river canyon with different geologic histories. The upper canyon--from Grand Coulee to the Omak Trench--follows the plateau-marginal course adopted by the river in the late Miocene. Pushed northward by the outpouring of the Columbia River Basalts, the river carved a channel between the Plateau and the granitic rocks of the Mesozoic Colville Batholith of the Okanogan Highlands. At the Omak Trench, the river turned northward, skirting the basalt flows forming the Omak Plateau. A Pleistocene ice advance sometime prior to 30,000 B.P. later forced the river southward, where it cut a canyon in the basalt, isolating the Omak Plateau from the Waterville Plateau. The lower canyon, from the Omak Trench downriver, is characterized by basalt bedrock on both rims, while in the upper canyon granitic rocks occur on the northern side of the canyon and basaltic rocks on the south rim. Granitic bedrock outcrops at river level just upstream from 45-OK-287/288 (Figure 2-1).

The late Pleistocene history of the upper and lower canyon also differ. During the mid-Pinedale advance, the Okanogan Lobe of the Cordilleran ice sheet overrode the Waterville Plateau and filled the river canyon as far south as the Grand Coulee, reaching its maximum extent between 13,000 and 14.500 years ago. By 12,000-13,000 B.P., the main body of ice had withdrawn to the Canadian border, leaving remnant ice in the canyons. Ice remained longer in the lower canyon, impounding meltwater to form glacial Lake Columbia in the upper canyon. A thick deposit of glaciolacustrine sediments, the Nespelem Silt, was laid down in the upper canyon. After breaching the lower ice dam, the Columbia River downcut rapidly through the lacustrine sediments, creating a deep narrow valley with a prominent terrace system which can be traced from just downriver of the mouth of the Nespelem River to beyond Grand Coulee dam upriver. Subsequent damming by ice or a landslide caused a second lake to form in the upper canyon. The river eventually breached this barrier as well and flowed in the lower canyon again, halting at 305 m to cut extensive terraces in lake fill, flood gravels, and till. Because more than one ice dam occurred in the vicinity of the Omak Trench, the lower canyon is characterized more by gravels of Spokane type floods, while lake sediments are more typical of the upper canyon. The Pleistocene deposits in the vicinity of 45-OK-287/288 (Figure 2-1) reflect the complex sequence of glacial ice advance, retreat, and damming in the vicinity of the Omak Trench. Till forms the terrace on which the site is located, and glaciolacustrine sediments of two ages exposed in the opposite bank.

The lowest major terrace the river cut in the glacial sediments is the 1000' terrace on which 45-OK-287/288 occurs (Figure 2-1). The presence of Mazama tephra in alluvial fans built onto the 1000' terrace indicates that the river had reached this elevation sometime before 7000 B.P., and probably reached historic elevations shortly thereafter (Hibbert 1984). These terraces are typically covered with Columbia River Gravels as is the terrace across the river from the site. The surface sediments of the 1000 ft terrace are not identified in the geologic map (Figure 2-1). Field observation suggests it is a combination of Columbia River Gravels which typically cap such terraces, and later loessic and colluvial deposits as shown for the area upriver.

With the exception of landslides, depositional and erosional processes operating in the Holocene have been less dramatic and more local in effect: lateral migration, point bar and overbank deposition of the river, alluvial fan development, colluvial deposition, and aeolian deposition. Lateral migrations of the channel are recorded by the shape of the river, point bar formation, and erosional episodes preserved in site profiles. Little floodplain has developed in this narrow valley but floodplain features such as natural levees and abandoned channels do occur on some of the lowest terraces. Colluvium and talus have accumulated along the slopes of canyon walls, and small alluvial fans have developed at the mouths of tributaries draining the steep slopes on either side of the river. A thin layer of aeolian sediment caps most stable surfaces.

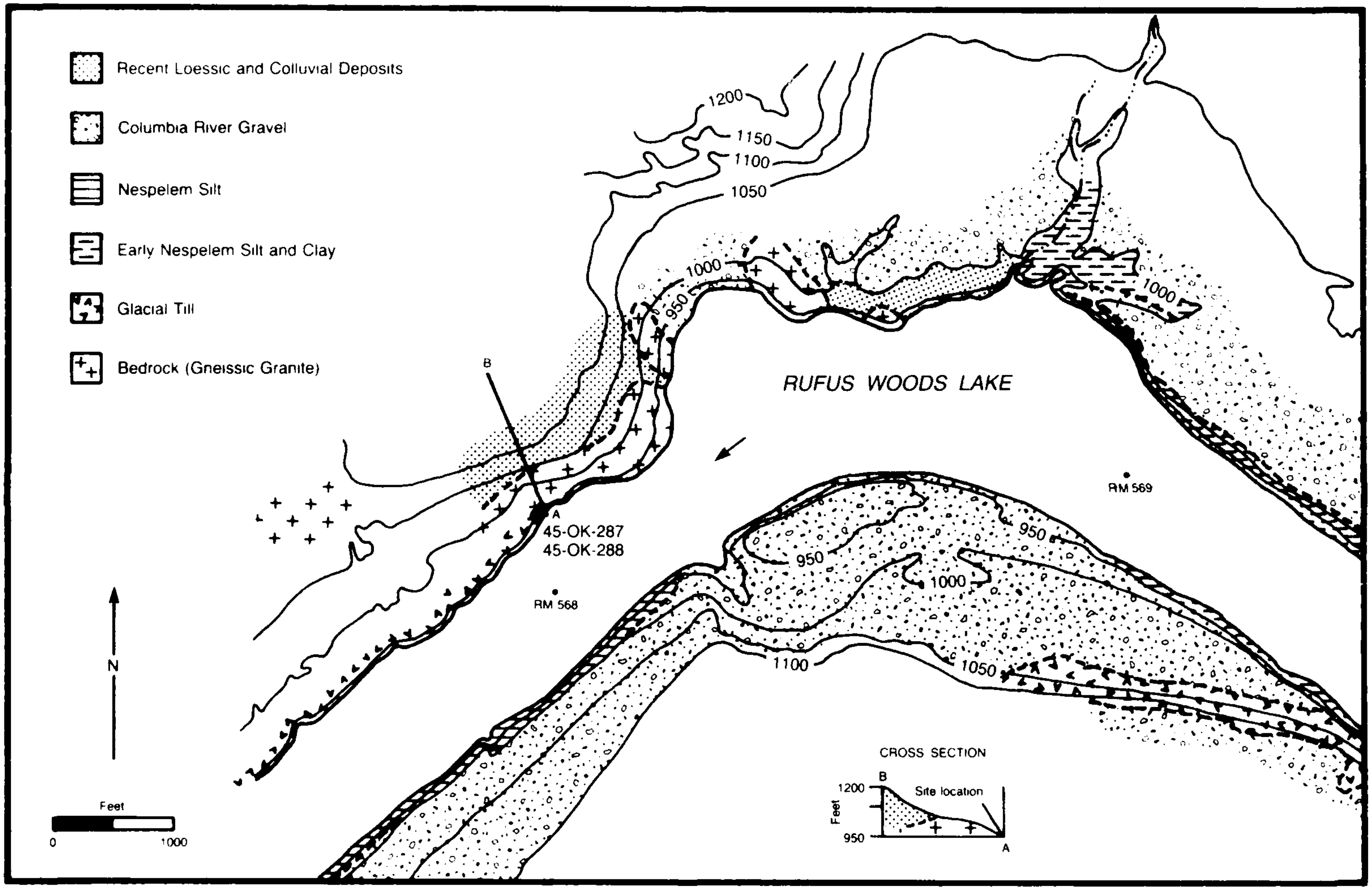


Figure 2-1. Geologic map of 45-OK-287 and 45-OK-288 vicinity.

As at most sites in the project area, the deposits at 45-OK-287/288 owe their origin to various agents, including the Columbia River, upslope streams, wind, and colluvial action. Because of its location, colluvial and aeolian deposition have been relatively more important at the site than at many other project sites. The sites are at the narrow, upstream end of a sloping terrace, adjacent to a granite bluff behind which is a steep slope. The granite bluffs slow the winds blowing up canyon so they drop their suspended load. The dune field found on the site when it was excavated indicates the importance of this aeolian activity. Channel deposits of stratified gravel lenses indicate that there was alluvial deposition from the slopes above the site. Although these channels were probably ephemeral and seasonal, the drainage apparently was increasingly integrated in the last 1000 years, when an alluvial fan began to develop at 45-OK-288. Owing to the proximity of the steep slope and bedrock outcrops, colluvial deposition also is important. Angular rock particles varying in size from sand to boulders are found throughout the site deposits, although they are most common in the north end of 45-OK-287, which is closest to the granitic outcrop, and in the vicinity of the basalt erratics. Vertical and lateral alluvial accretion deposits of the Columbia River interfinger with alluvial fan and colluvial deposits in 45-OK-288 and the southern end of 45-OK-287. At present, site 45-OK-287/288 is on the downstream end of the outside curve of a sharp bend of the Columbia River, but the river has changed course during the time the site sediments accumulated. The bedrock outcrop immediately upstream from the site has undoubtedly influenced the direction of flow of the river. As the river cut to the north, it uncovered the bedrock, and may have been deflected to the south, leaving the site area in the lee of the outcrop.

PROCEDURES

Profiles were drawn during excavation in August and September 1979 at 45-OK-287, and between September and November, 1979 at 45-OK-288. At least one wall was drawn from each excavated unit, totalling 73 linear meters in the 22 units at 45-OK-287 and 141 linear meters in the 27 units at 45-OK-288 (Figures 2-2 and 2-3). Walls collapsed in some of the deep units at 45-OK-288 before stratigraphic recording was completed; the weight of snow in November and December intensified this problem. Two column samples were collected at 45-OK-287 and three at 45-OK-288, at locations shown in Figures 2-2 and 2-3. Horizontal variability in 6S16W was so great that the Column 3 samples were collected from strata on all walls rather than in a column format. An additional 42 soil samples from excavation levels were collected from the two sites.

The natural depositional sequence discussed below is an interpretation based primarily on field profile descriptions. The results of microscopic examinations, and physical and chemical analyses are referred to where pertinent. Physical descriptions are given for each depositional unit; sediment sources, transport mechanisms, environment of deposition, and post-depositional alteration are discussed where applicable. We use these natural depositional units in the final section of the chapter to define cultural

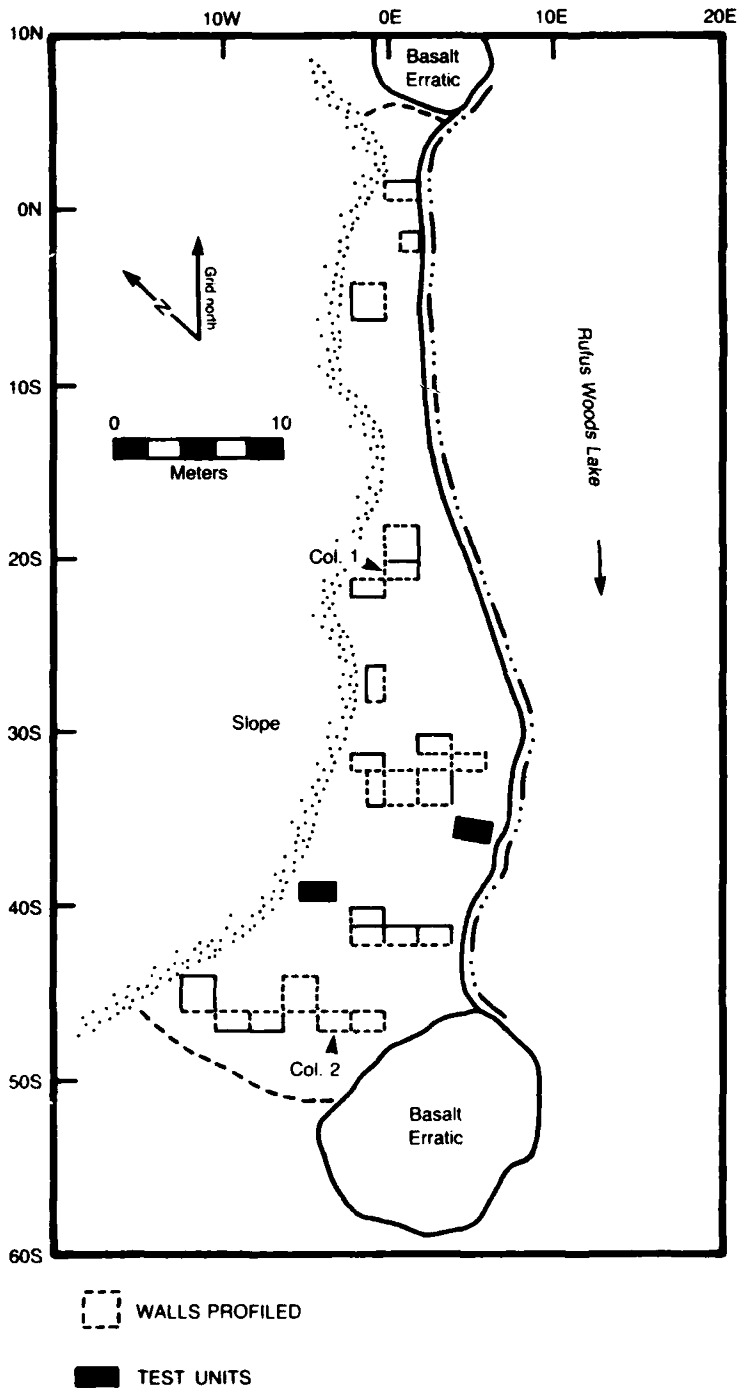


Figure 2-2. Location of column samples and profiled walls, 45-OK-287. Profiled walls are indicated by broken lines.

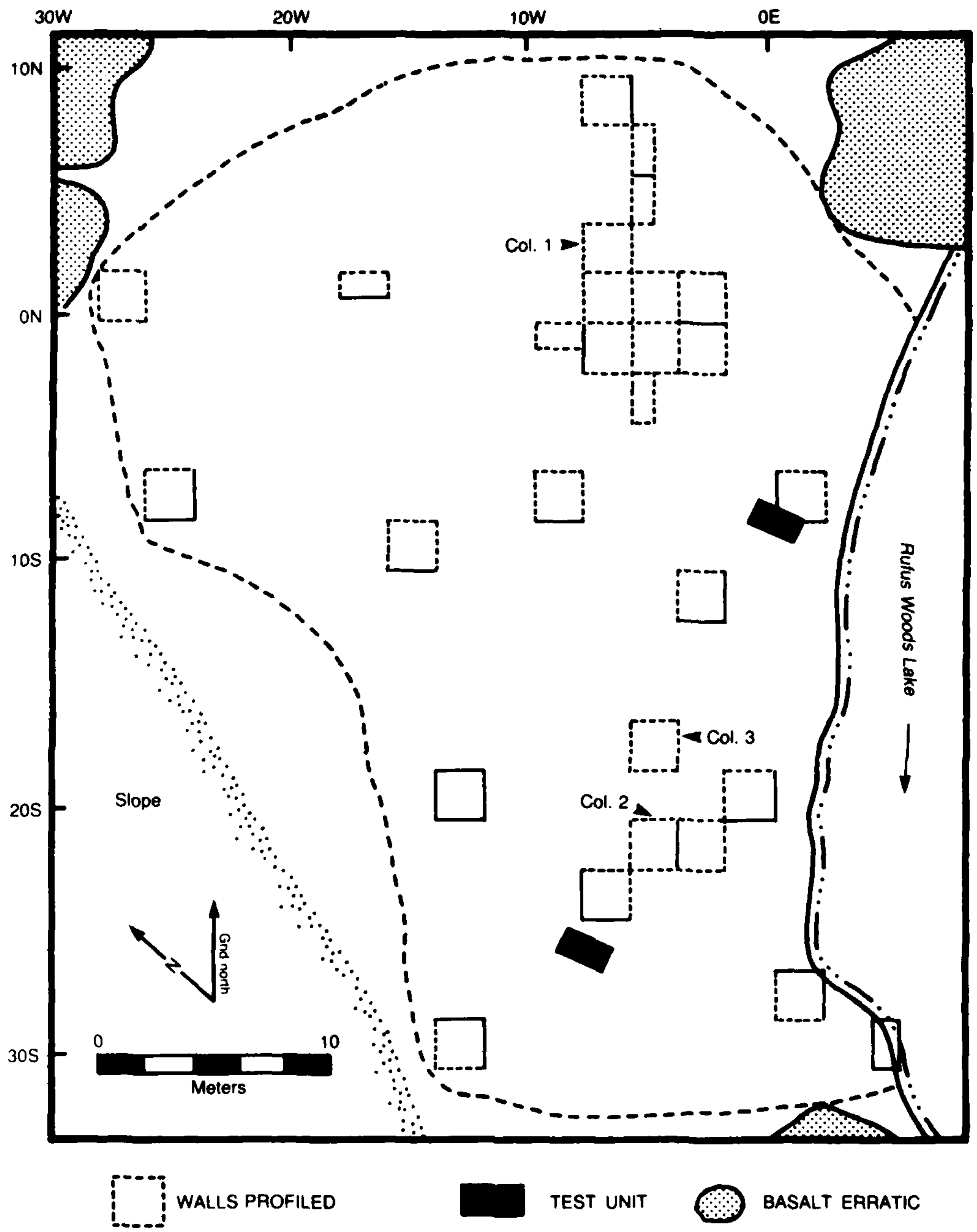


Figure 2-3. Location of profiled walls and column samples, 45-OK-288. Profiled walls are indicated by broken lines.

depositional episodes. Methods and procedures used in stratigraphic profiling, column sampling and sediment analysis, stratigraphic interpretation, and definition of analytic zones are described in more detail in the project's research design (Campbell 1984d).

Although excavated and profiled as separate sites, these contiguous sites share a similar depositional history. The exact sequence of deposits varies from north to south, but there are no abrupt differences coinciding with the boundary between the two sites. The sites were first analyzed as two separate sites, and the site-wide strata are independently labelled. An integrated depositional history has been formulated for the two sites, but they are kept separate in the tables.

DEPOSITIONAL HISTORY

Three stages of deposition, characterized by distinct mechanisms of sediment transport and environment of deposition, are defined as depositional units (Tables 2-1 and 2-2). North-south and east-west transects through 45-OK-287 are shown in Figures 2-4 and 2-5, and north-south and east-west transects through 45-OK-288 are shown in Figures 2-6 and 2-7.

DU I: ALLUVIAL GRAVEL BAR

A gravel bar deposit of the Columbia River underlies 45-OK-287 and the eastern portion of 45-OK-288. Once it was determined that it lacked cultural materials it was not further excavated. The well-bedded sediments are coarse and waterworn, generally pebbles and gravel with a coarse sand matrix (see Figure 2-8 for an example). Microscopic examination indicates that the sand grains are rounded to subrounded glossy water-worn quartz and very rounded basalt. The matrix was distinctly more yellow or whitish than the overlying layers. Several large granitic boulders scattered throughout the area are probably remnants of glacial outwash. This channel deposit indicates the position of the river in the early Holocene before it became entrenched in its present channel. It extends across all of 45-OK-287, and to at least the 16W grid line at 45-OK-288.

The underlying sterile materials at the western margin of the site were exposed in fewer excavation units, but they have a finer grain size and greater proportion of angular cobbles, deriving from the bedrock slopes above. Depositional processes were undoubtedly different in this area and the deposit may not be part of the gravel bar. However, the materials are included in this depositional unit because they are culturally sterile and correlative in age.

A topographic map of these deposits (Figures 2-9 and 2-10) shows the topography of the area when cultural occupation began. The contours at the river margin suggest a small cove or incurving beach at 45-OK-288, lying at the base of a draw which runs through the middle of the site approximately on the 10S grid line.

Table 2-1. Description of depositional units, 45-OK-287.

Depositional Unit	Description	Strata	Description
		0	Organic litter mat. Grayish brown (10YR5/2) organic material, roots, grasses. Some sand matrix, some angular gravel. Boundary abrupt, wavy.
III	Recent slope wash	100	Laminated sands. Brown to pale brown (10YR5/3) loamy sand. Sand moderately well sorted, predominantly medium, with some coarse and fine sand and 5-10% angular gravel clasts. Compact to structureless, high amount of iron staining. More compact and weathered toward north end of site, where boundary is smooth, gradual. Toward end of site boundary is abrupt, smooth, possibly unconformable. May be inundation deposit of the Columbia at this end.
		150	Brown (10YR5/3) fine to medium sand, some fine pebbles, some angular granitic gravel. Poorly sorted, soft but compact. Boundary clear, wavy. Does not occur in northern area of site.
II	Mixed alluvium and colluvium	200, 210, 250, 251	These strata are facies of one another, separable in some areas, but not in others. Grayish brown to brown to dark brown (10YR5/2, 5/3, 4/3) sand with angular gravel and some water-rounded pebbles. Poorly to very poorly sorted. Boundary gradual to clear, irregular to wavy. Considerably thicker towards the south.
		310, 325	Brown to dark brown (10YR4/3) sand, fine to coarse, with water-rounded pebbles and angular gravel. Boundary clear to gradual, wavy.
I	Alluvial gravel bar.	300, 350	Sand and gravel strata, 60% coarse sand, 20% small pebbles, and 20% coarse sand. Very loose, structureless. Dip upriver.

Table 2-2. Description of depositional units, 45-OK-288.

Depositional Unit	Description	Strata	Description
		100	Organic litter mat
III	Recent slope wash	200's,300 400's	Laminated sands
		500	Fine to medium sand, occasional rounded pebbles, some fine angular gravel, angular cobbles and boulders rare, moderately compact, moderately well sorted. 10YR5/3, boundaries gradual, smooth.
		600	Fine to medium, some coarse sand, rounded pebbles, angular gravel and cobbles more common than 500, less compacted than 500, moderately to poorly sorted. 10YR5.5/3, boundaries gradual, smooth.
II	Columbia alluvium: massively bedded sands, grading from coarse to fine upwards. Boundaries gradual, diffuse. With intervening colluvial event.	700	Medium to coarse sand, rounded pebbles and angular gravel and cobbles more common than 600. 10YR5/3-5/4. Less compacted than 600, poorly sorted, boundaries generally gradual, smooth, may be abrupt, nonconformable in area of draw.
		720, 721, 740	Coarse sand, rounded pebbles common, angular gravel, cobbles and boulders abundant. 10YR5/2, loose, very poorly sorted. Boundaries abrupt, irregular.
		800	Medium to coarse sand, rounded pebbles, angular gravel, cobbles, and boulders common. 10YR6/3-6/4, soft and loose, poorly sorted, boundaries, gradual, smooth.
		900	Coarse sand, rounded pebbles, angular gravel, cobbles and boulders less common than 800. 10YR6/3-6/4, very loose, better sorted than 800. Boundaries gradual, smooth.
I	Alluvial gravel bar.	1000's	Well sorted, finely stratified coarse, rounded materials ranging from sands to gravels. Dipping slightly downriver.

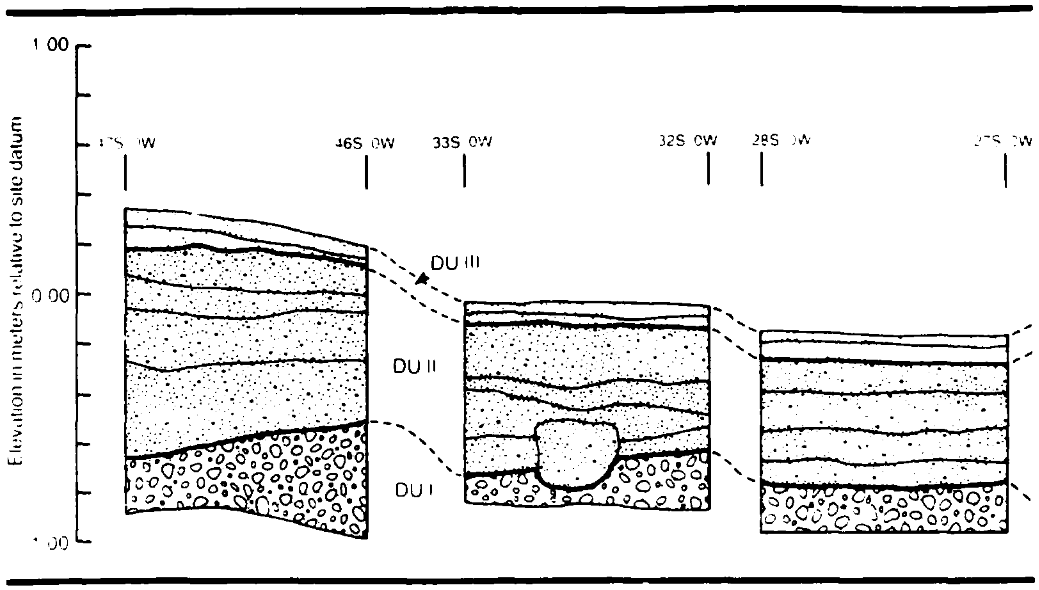


Figure 2-4. North-south stratigraphic transect of 45-OK-287 at 0W.

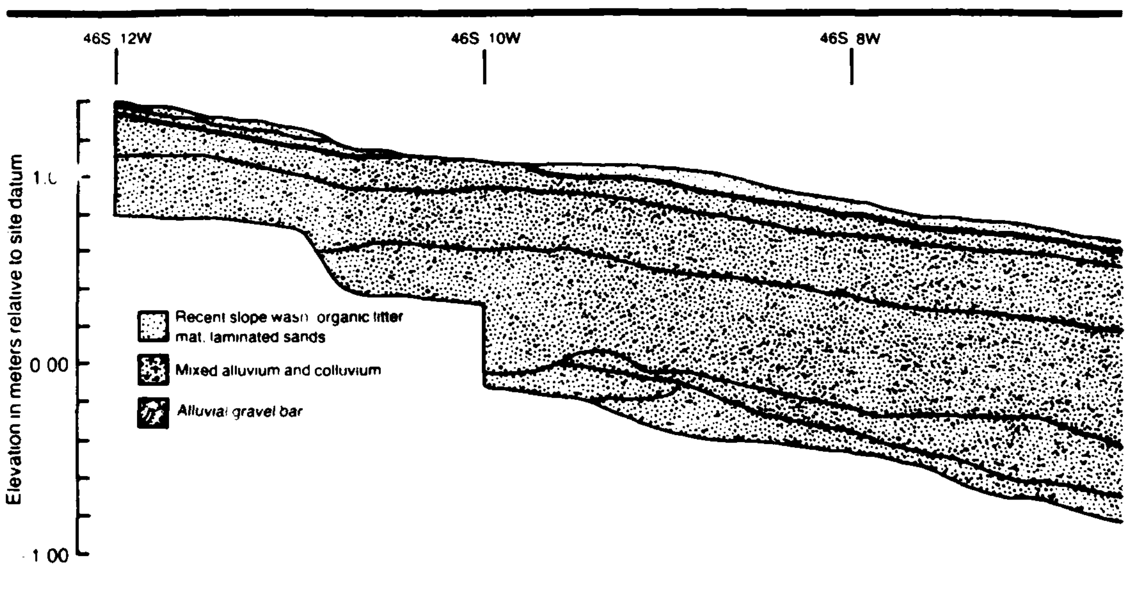
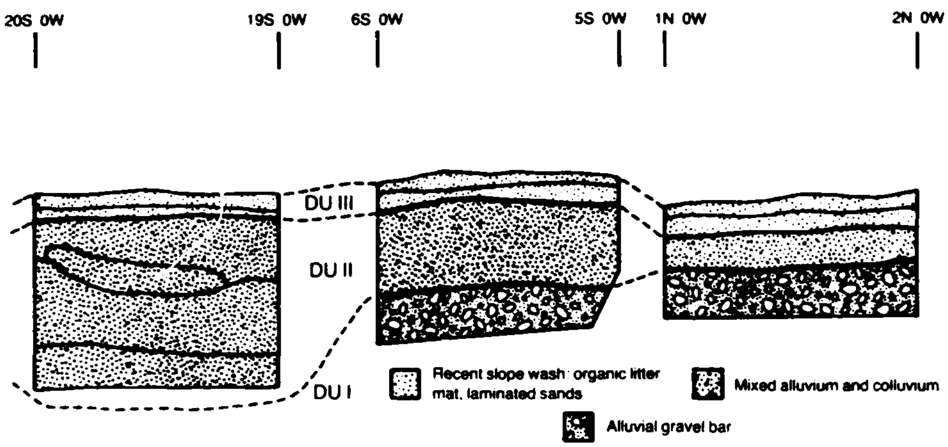
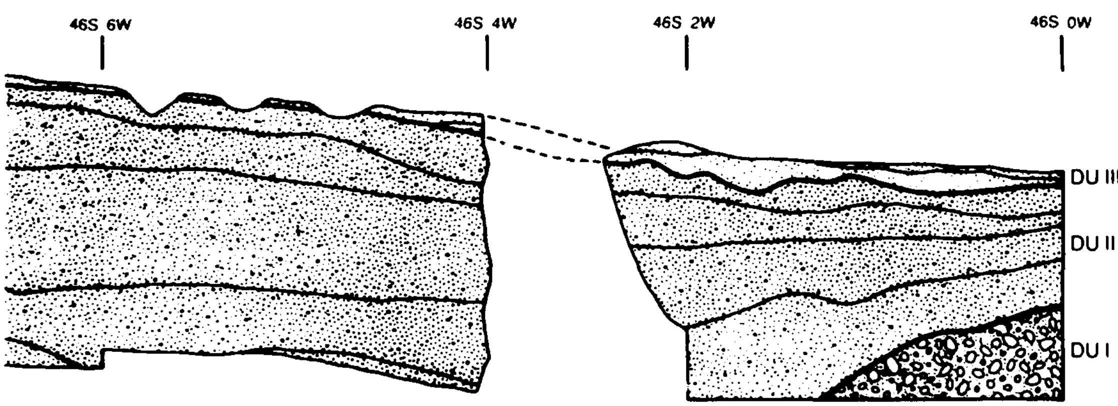


Figure 2-5. East-west stratigraphic transect of 45-Ok-287 at 46S.


20S 0W
19S 0W
6S 0W
5S 0W
1N 0W
2N 0W
DU III
DU II
DU I
Recent slope wash: organic litter mat, laminated sands
Mixed alluvium and colluvium
Alluvial gravel bar


46S 6W
46S 4W
46S 2W
46S 0W
DU III
DU II
DU I

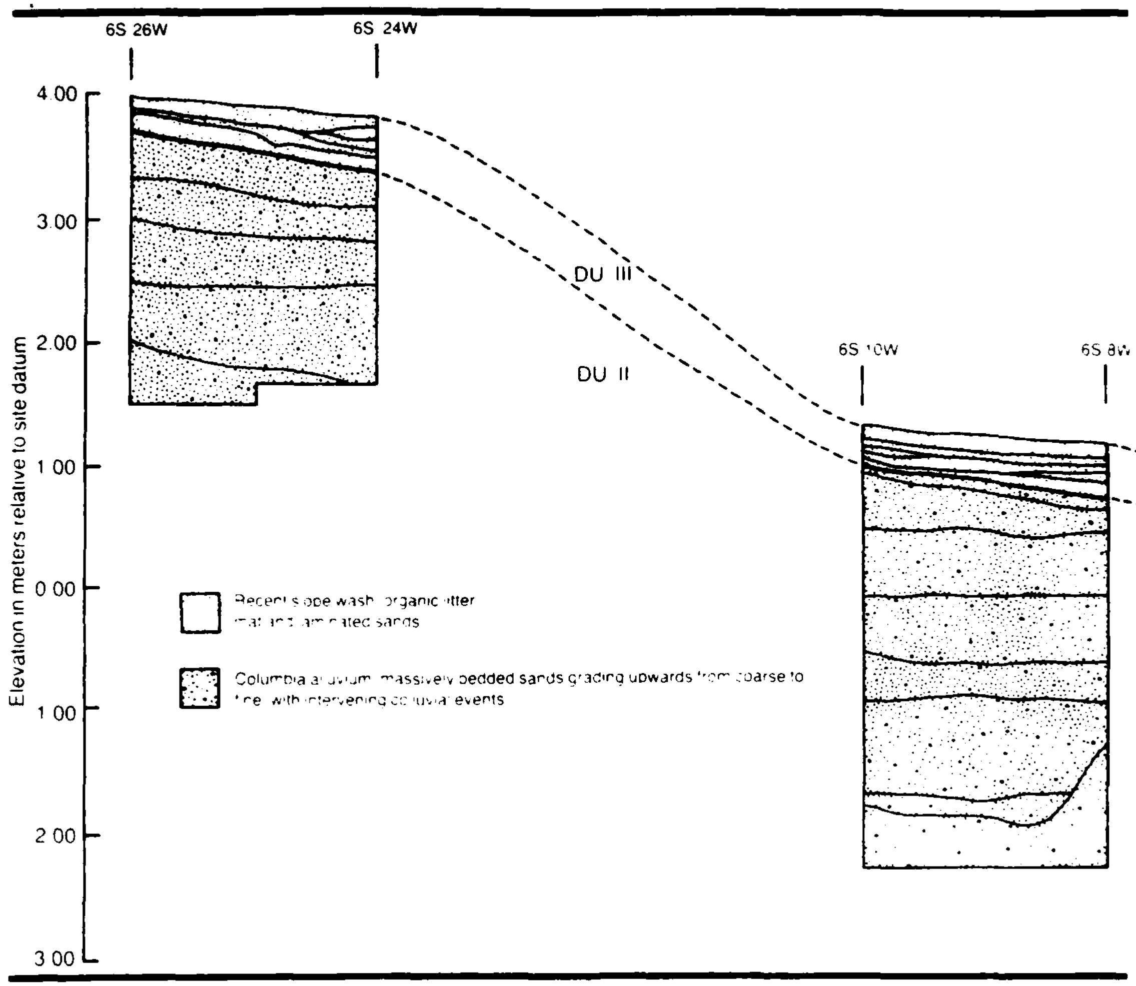
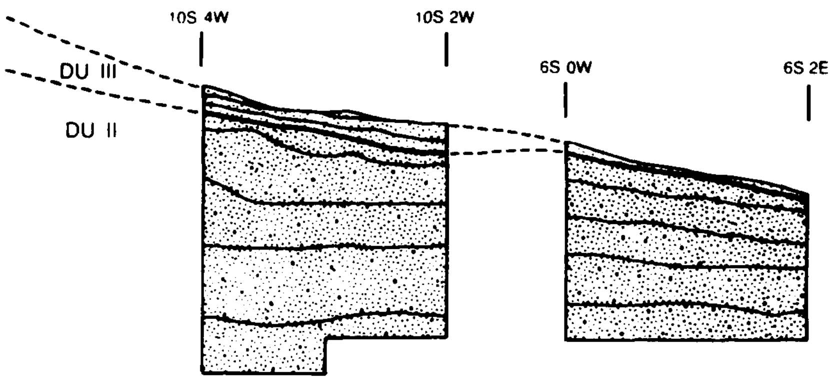


Figure 2-6. East-west stratigraphic transect, 45-OK-288 at 6S and 10S.


10S 4W
10S 2W
6S 0W
6S 2E
DU III
DU II

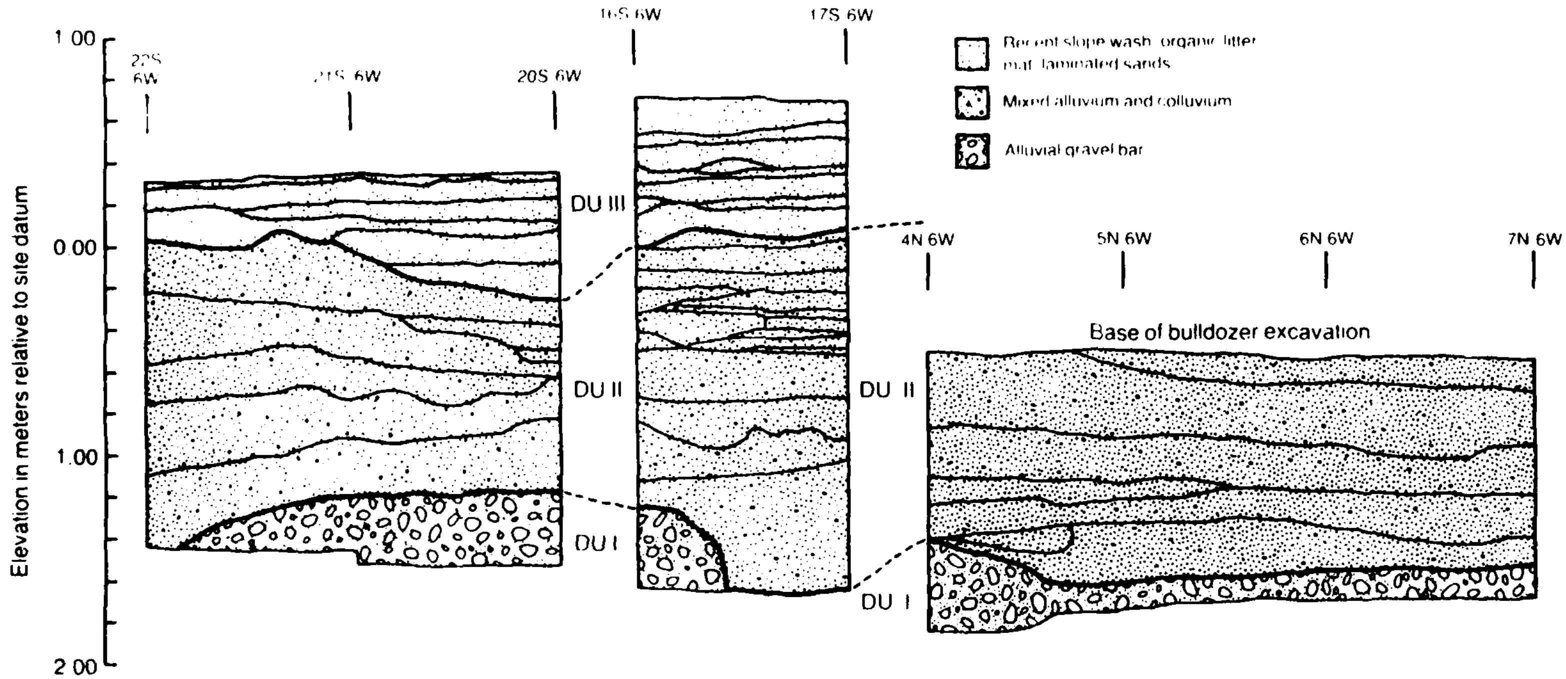


Figure 2-7. North-south stratigraphic transect of 45-OK-288 at 6W.

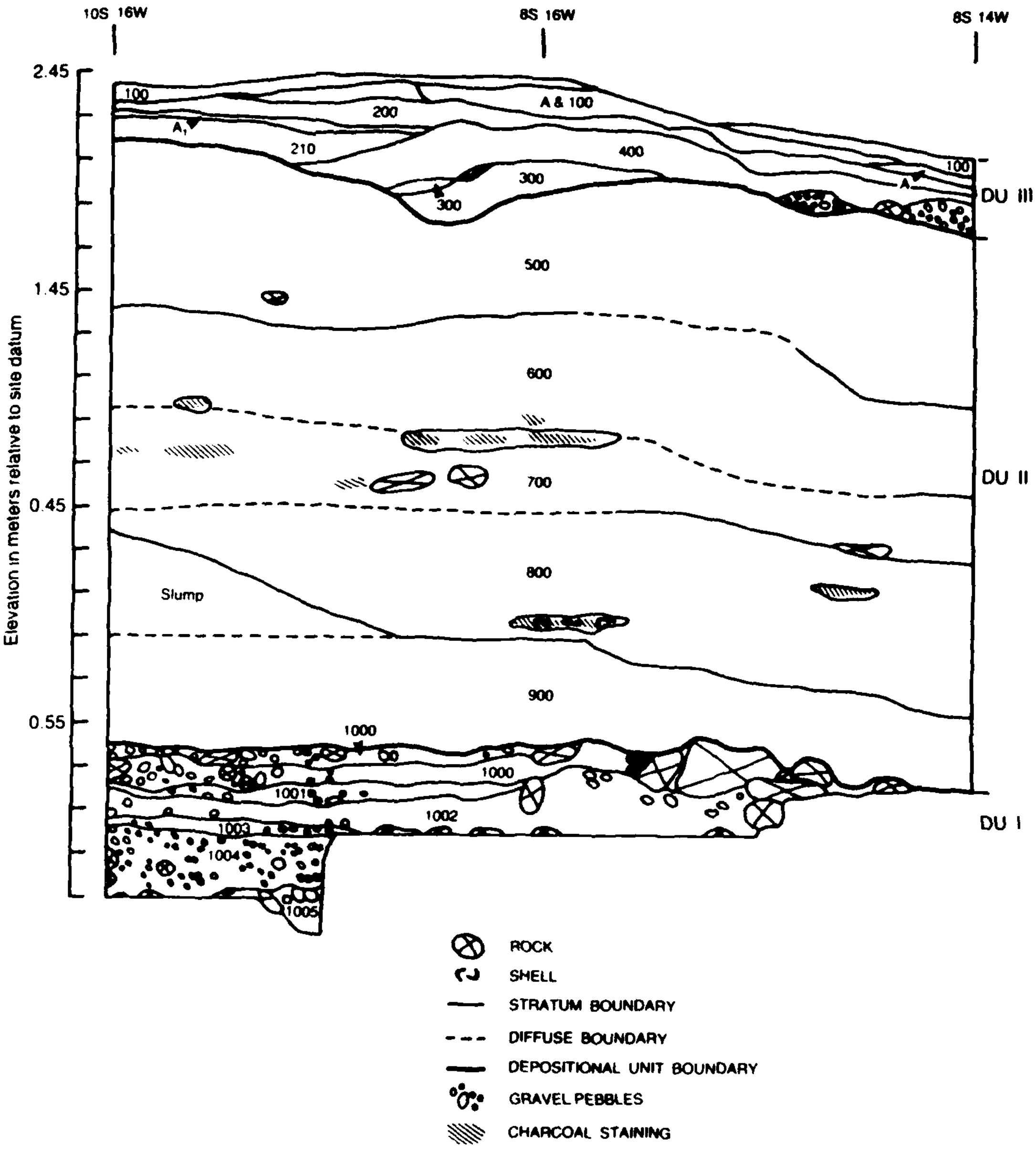


Figure 2-8. Profile of north and west walls, 8S16W, 45-OK-288. Elevations given in meters above site datum, ONOW.

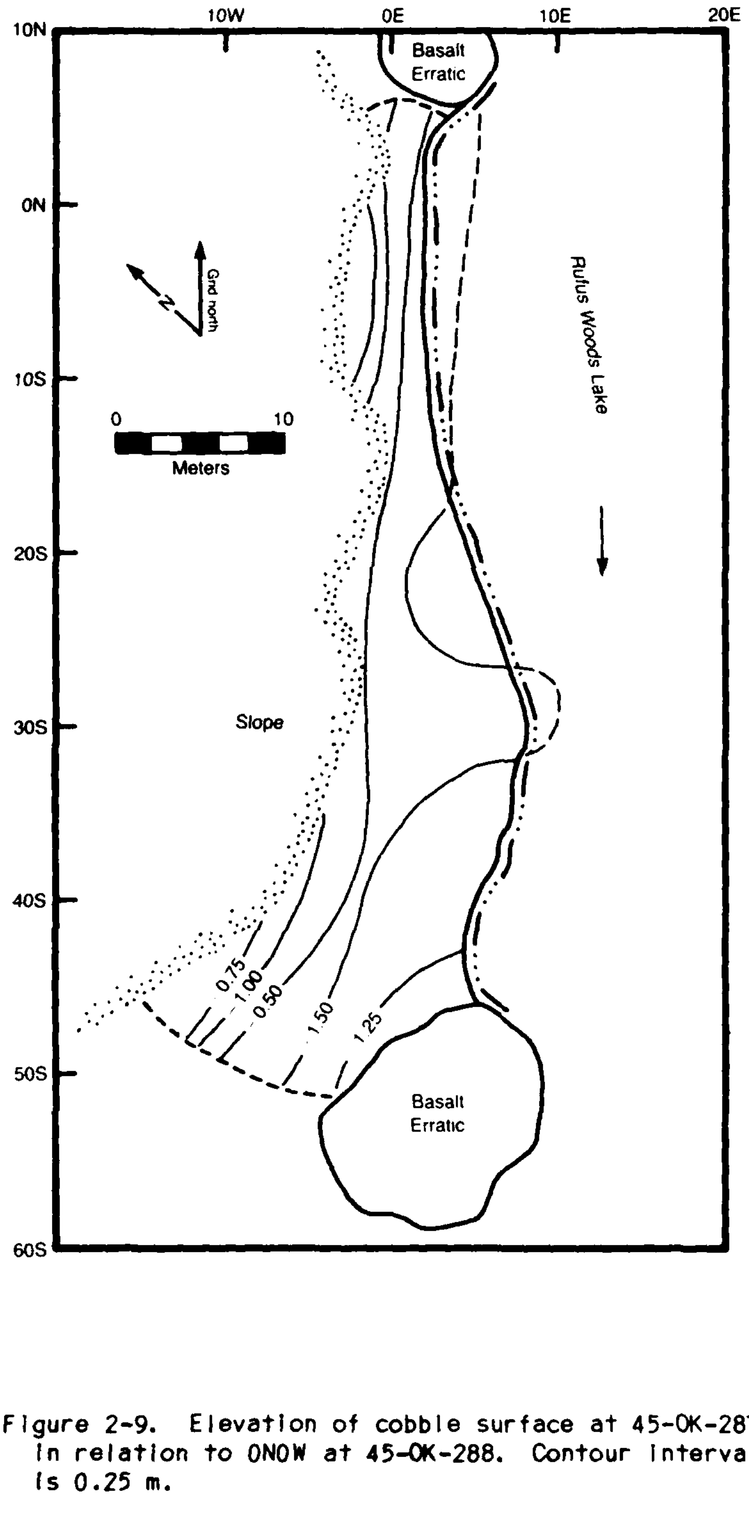


Figure 2-9. Elevation of cobble surface at 45-OK-287 in relation to ONOW at 45-OK-288. Contour interval is 0.25 m.

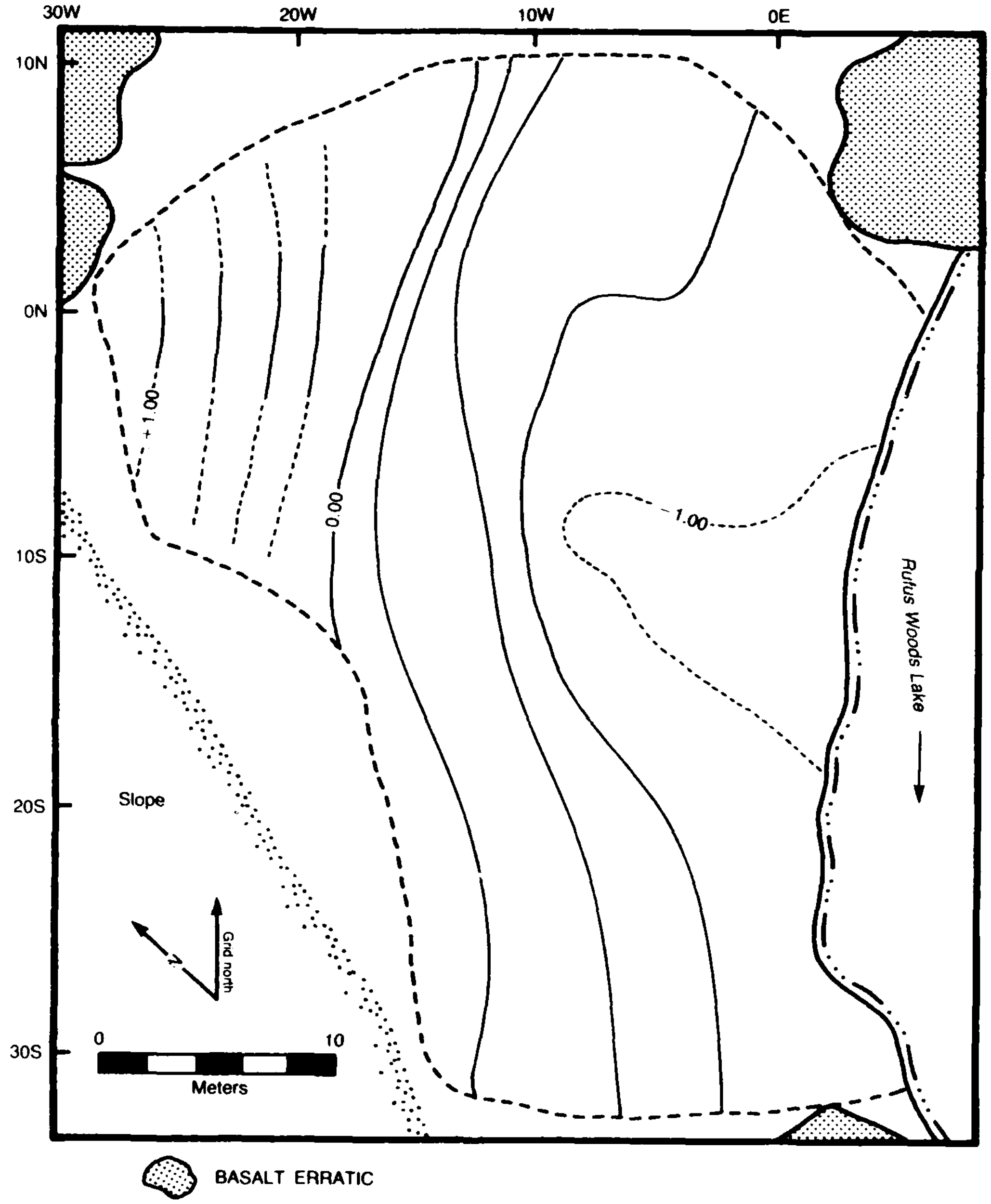


Figure 2-10. Elevation of cobble surface at 45-OK-288 in relation to 0N0W at 45-OK-288. Contour interval is 0.25m. Fine dashed line indicates approximate contour.

DU II: STRATIFIED COLUMBIA RIVER ALLUVIUM WITH COLLUVIUM

A series of massively bedded strata of mixed alluvial/colluvial origin overlies the alluvial bar. These strata constitute a single sequence of deposition, exhibiting only gradual change, with the exception of a colluvial event discussed below. Boundaries between the strata are gradual and conformable. The fine matrix varies regularly from coarse in the lowest stratum to fine/medium in the uppermost stratum, and the frequency of rounded pebbles decreases upwards. Compaction increases upwards, and color becomes gradually darker. These strata are interpreted as overbank or channel bank deposits of the Columbia River. No other depositional agent active in the site vicinity could produce massive beds which fine regularly upwards in texture over a period of 5000 years. The geometry of the deposits also is more consistent with Columbia River deposition than with an alluvial fan or other type of deposit. The strata are thickest in the draw, but continue across it, rather than being confined to it.

However, other depositional processes affected these deposits. Colluvial activity is indicated by angular basalt and granite cobbles and pebbles, and alluvial deposits from upslope. The frequency of these types of deposits varies independently of variation in the matrix deposited by the Columbia River. The frequency of colluvial materials increases upwards from the bottom, peaking in gravel lenses and strata found on the boundary between Strata 800 and 700. This intermittent layer is poorly sorted and has an extremely high proportion of angular basalt and granite pebbles and cobbles. The lenses and strata have abrupt, irregular boundaries, indicating that the surface is erosional. The boundary between the alluvium and the colluvial debris is clear to abrupt in the northern and western parts of the site, where cobble-sized angular rocks are included in the deposit. The boundaries are more gradual toward the river margin, where this depositional episode can be traced only by an increase in angular gravels and decrease in sorting.

Some small gravel lenses indicating deposition and erosion by small stream channels from up slope occur occasionally in the units lower strata but are most common in Strata 600 and 500, as illustrated by the profile of 16S6W (Figure 2-11). The channel deposits occur only in the middle of the site, over the topographic low, or draw, in the gravel bar surface. They fall within the more extensive area of active channel deposition in DU I (Figure 2-12).

A temporally correlative depositional unit can be defined at 45-OK-287, bracketed by the alluvial bar and the radiocarbon dates in upper sediments. However, the internal divisions which can be recognized and traced across the site do not correlate exactly at 45-OK-288. In general, the deposits at 45-OK-287 are more poorly sorted and contain more angular cobbles and smaller fragments. Overlying the alluvial gravels is a poorly sorted deposit of sand and gravel (Strata 310 and 325) which occurs only south of the 40S line. The fine matrix may be alluvial material. The dark color suggests that this relatively thin deposit was exposed for some time and weathered more than any deposit at 45-OK-288. It may be the same age as Strata 800 or 900, or may correspond to the period of increased colluvial deposition at 45-OK-288.

Projectile points recovered from it suggest correlation with the latter.

Above this unit are poorly sorted deposits of sands and gravels, which are lighter in color and contain more alluvium (Strata 200's). In the area south of 40S, this sequence may be as much as a meter thick, contains little of the coarser material so common elsewhere, and resembles the Strata 700, 600, 500 sequence at 45-OK-288. North of the 40S line, it is characteristically a 20-50 cm thick layer of sand with dense angular gravel and cobbles.

The uppermost stratum in this depositional unit (Stratum 150) is a massive sand deposit relatively free of pebbles and gravels, and extending across the entire site. On the basis of radiocarbon dates it seems to correlate with Stratum 500 at 45-OK-288.

DU III: AEOLIAN AND SLOPE WASH SEDIMENTS

Across most of the site area, a thin layer of laminated sands and silts, capped by a surface organic litter layer, conformably overlie the uppermost massive deposit of DU II. Aeolian action combined with periodic slope wash formed this deposit. The surface attributes (e.g., pitting) of the moderately well sorted sandy loam to loamy sand grains resemble those collected in a wind trap at 45-OK-258. Sloping sand lenses with intervening thin dark bands observed at 45-OK-287 (Strata 101-107, Figure 2-13) may be dune foreset beds. If so, the strata are only reworked or partially deposited by wind, as they contain fine gravels. An organic litter mat 10-20 cm thick with abundant grass and rootlets occurs at the upper surface of this deposit. Thin, buried organic-fibric layers were common, probably resulting from blowing sand that buried the surface vegetation. Other finely laminated bands of organic material were observed and identified as a result of slope wash. In some of the eastern units of 45-OK-287, the litter mat, and occasionally, the entire depositional unit, was absent due to river erosion. At the northern end of 45-OK-287, this depositional unit is represented by the sand matrix filling the granitic talus.

An alluvial fan began to develop in the draw area at 45-OK-288, still somewhat lower than the rest of the site. Figure 2-12 shows the area of active alluvial fan deposition. Here DU III is much thicker than elsewhere, consisting of multiple lenses, as many as 50 being recorded in one profile. The lenses are thin and of little horizontal extent, with extremely variable textures, including silts and gravels. Some are clearly channel deposits, with internal stratification from coarse to fine sediments. The boundaries between lenses are abrupt and distinct, indicating that most of the surfaces are erosional, rather than conformable. The profiles of 8S16W (Figure 2-8) and 16S6W (Figure 2-11) show the lensing in DU III which is typical of units within the active channel area. A typical profile from outside the channel area is shown in Figure 2-14.

STRATA DESCRIPTIONS

A. Pale brown (10YR6/3) organic litter mat, 75% medium sand, 25% fine/very fine sand, numerous twigs and organic fibers, well sorted, loose, held together by root mat, boundary abrupt.

100. Pale brown (10YR6/3), 35% coarse sand, 60% medium sand, 5% fine sand, well sorted, loose, boundary abrupt. Deposited after heavy storms, September, 1979.

200. Pale brown (10YR6/3) sand, 5% fine/very fine subrounded gravel, 10% coarse sand, 60% medium sand, 25% fine sand, moderately well sorted, loose, boundary clear to abrupt.

211. Pale brown (10YR6/3) sand, 5% fine rounded gravel, 5% coarse sand, 40% medium sand, 50% fine sand, moderately well sorted, soft, boundary abrupt.

214. Pale brown (10YR6/3) sand, occasional fine gravel clasts and a few angular/subangular pebbles, 15% coarse sand, 70% medium sand, 15% fine sand, well sorted, soft, boundary abrupt.

215. Brown/pale brwon (10YR5/3-6/3) sand, 10% coarse sand, 75% medium sand, 15% fine sand, well sorted, soft to loose, boundary abrupt. A channel bottom deposit, grading into finer, siltier bank deposits on other walls.

500. Pale brown (10YR6/3) sand, 20% coarse sand, 60% medium sand, 20% fine sand, moderately well sorted, soft, boundary clear.

501. Pale brown (10YR6/3) sand, 15% fine gravel, 25% coarse sand, 50% medium sand, 10% fine sand, moderately well sorted, soft, boundary abrupt.

502. Pale brown (10YR6/3) gravel/pebble layer, 30% subangular/subrounded medium/coarse gravel, 15% subangular granitic pebbles, 10% coarse sand, 30% medium sand, 15% fine sand, poorly sorted, soft, boundary abrupt. Contains occasional bone fragments, rock types include basalt and quartzite.

503. Light yellowish brown (10YR6/4) sand, 10% coarse sand, 50 % medium sand, 40% fine sand, moderately well sorted, soft, boundary clear.

504. Pale brown (10YR6/3) sand, 25% coarse sand, 45% medium sand, 20% fine sand, 10% very fine sand, moderately sorted, soft, boundary clear.

505. Pale brown/light yellowish brown (10YR6/3-6/4) sand, 10% coarse sand, 40% medium sand, 50% fine sand, moderately well sorted, soft, boundary clear. Slightly finer texture than 503.

600. Brown (10YR5/3) sand, 5% fine well rounded gravel, 10% coarse sand, 35% medium sand, 50% fine sand, moderately well sorted, soft, boundary clear to gradual.

601. Yellowish brown/light yellowish brown (10YR6/4-5/4) sand, 5% fine gravel, 30% coarse sand, 55% medium sand, 10% fine sand, moderately well sorted, soft, boundary abrupt. Cultural layer, Features 36, contains numerous large bone fragments and occasional charcoal flecks.

602. Pale brown (10YR6/3) sand, 7% fine gravel, 35% coarse sand, 53% medium sand, 5% fine sand, moderately well sorted, soft, boundary clear. Slightly coarser grained than 601.

603. Pale brown (10YR6/3) sand, 5% very fine gravel, 25% coarse sand, 50% medium sand, 20% fine sand, moderately well sorted, very soft, boundary clear.

604. Pale brown (10YR6/3) sand, 5% fine subrounded gravel, 25% coarse sand, 30% medium sand, 40% fine sand, moderately well sorted, soft, boundary clear.

605. Pale brown (10YR6/3) 15% coarse sand, 40% medium sand, 45% fine sand, moderately well sorted, soft, boundary clear. Facies of same deposit as 606 although much coarser.

606. Light yellowish brown (10YR6/4) loamy sand/sandy loam, 5% medium sand, 20% fine sand, 55% very fine sand, 15-20% silt, moderately well sorted, slightly hard, boundary abrupt.

607. Brown/pale brown (10YR6/3) sand, 10% coarse sand, 20% medium sand, 70% fine sand, moderately well sorted, soft, boundary clear. Contains occasional charcoal flecks, lighter in color than 700.

700. Brown (10YR5/3) sand, occasional subrounded/angular granitic pebbles, 5% coarse sand, 35% medium sand, 60% fine sand, moderately well sorted, soft, boundary gradual. Contains cultural layer with bone and charcoal staining, slightly darker than 600.

800. Pale brown (10YR6/3) sand, occasional subangular granitic cobbles and pebbles, 10% coarse sand, 40% medium sand, 50% fine sand, moderately well sorted, soft, boundary gradual with 900. Slightly coarser than 700.

900. Pale brown (10YR6/3) sand, 5% coarse sand, 50% medium sand, 45% fine sand, moderately well sorted, soft, boundary clear/abrupt. Similar to 800 but slightly coarser grained and lighter in color.

901. Gravel layer, fine and medium gravel, no cobbles, few rounded pebbles, in medium and coarse sand matrix, poorly sorted, loose by compact. Too coarse to obtain Munsell color.

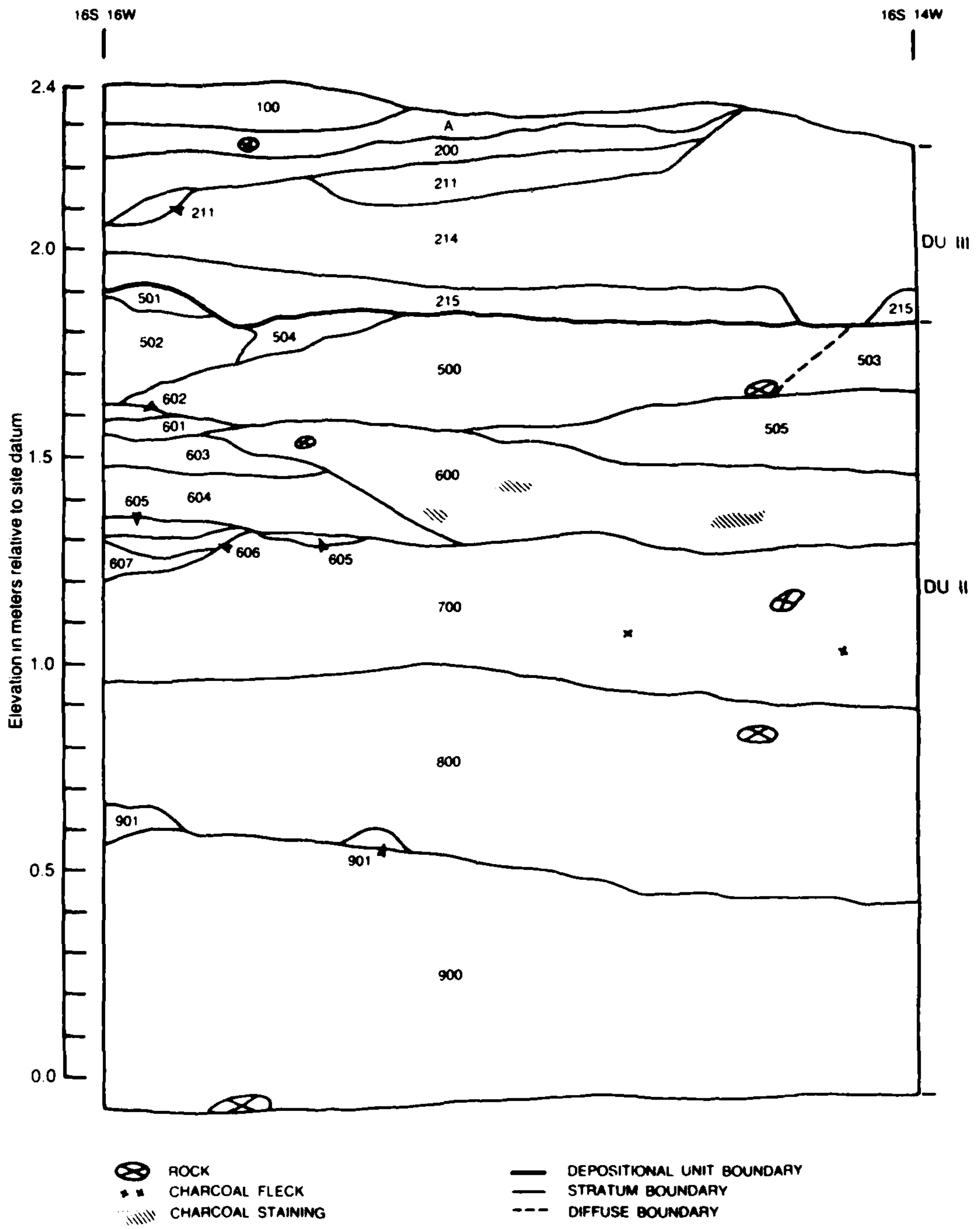


Figure 2-11. Profile of north wall, 16S6W, 45-OK-288. Elevation in meters relative to site datum ONOW.

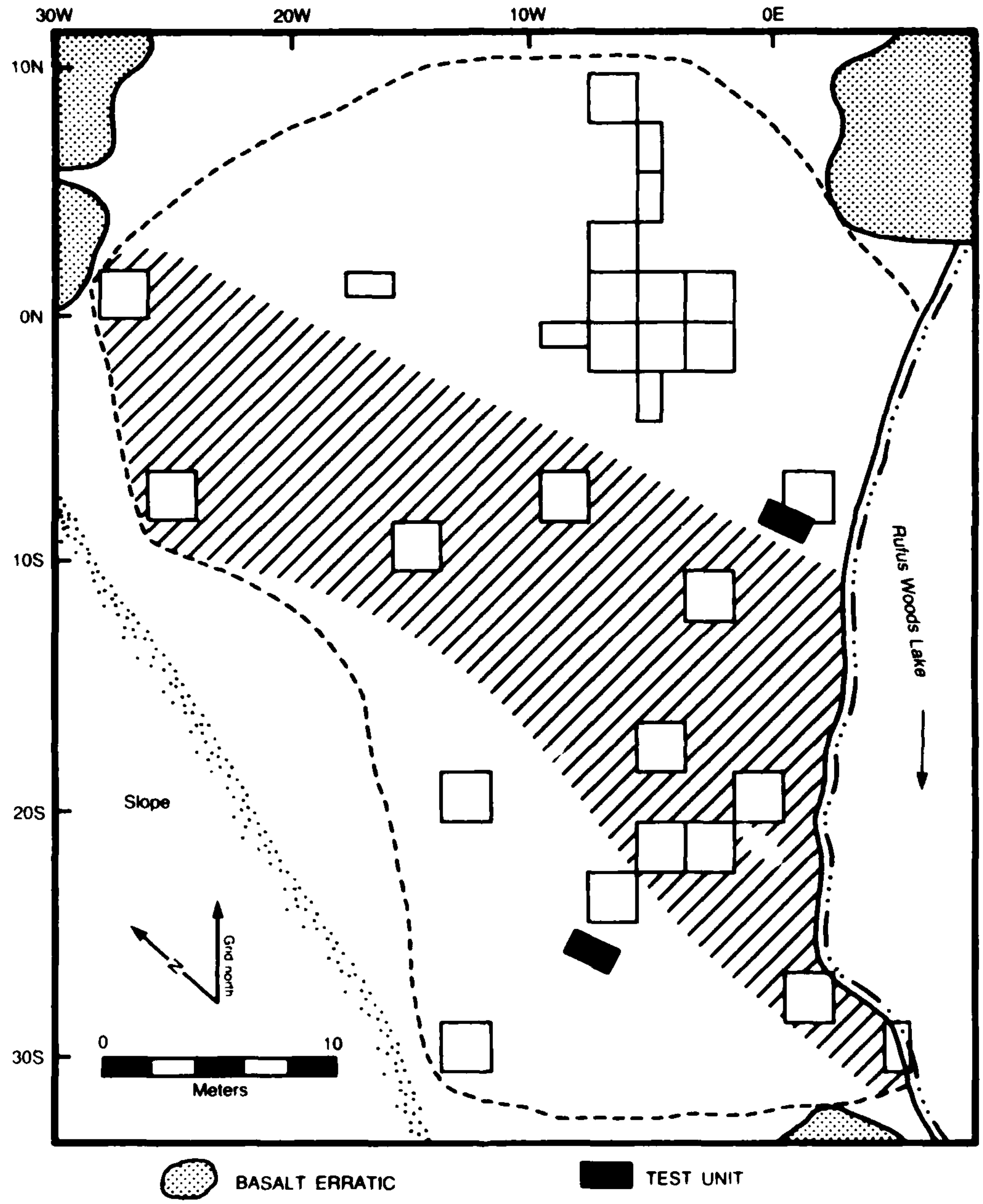


Figure 2-12. Area of active channel deposition in DU II and DU I, 45-OK-288 (indicated by diagonal lines).

CULTURAL ANALYTIC ZONES

For the purposes of this report, the independently determined cultural analytic zones for 45-OK-287 and 45-OK-288 were correlated *post hoc* on the basis of stratigraphic information, radiocarbon dates, and projectile point styles. The zones are, therefore, discussed separately for each site, and the rationale for their correlation is presented as well.

ANALYTIC ZONES, 45-OK-287

The analytic zones defined for 45-OK-287 are summarized in Table 2-3, which shows the the relationship of the zones to the stratigraphic deposits, associated radiocarbon dates, and cultural contents. The horizontal extent of the zones is shown in Figure 2-15. The analytic zones are discussed below from oldest to youngest.

Zone 4

Zone 4 includes cultural materials associated with the dark, poorly sorted strata 310 and 325, the oldest strata in DU II. These deposits, and this zone occur only in units south of the 40S grid line. The assemblage, the smallest of all the zones, includes lithic artifacts, bone, FMR, and only a few pieces of shell. No features were recovered, and no radiocarbon dates were obtained.

Zone 3

In the southern part of the site, where DU II is thickest, two peaks of cultural materials occurred in the middle strata of DU II. The upper peak was continuous with Zone 2 and the lower peak was designated as Zone 3. It occurred only in excavation units south of grid line 44S. Cultural material was much denser in this deposit than in the two overlying deposits, so that even the very limited volume excavated yielded an assemblage nearly as large as that of Zone 2. However, there were no features. No radiocarbon dates were obtained from this zone.

Zone 2

Zone 2 is associated with strata 200, 210, 220, and 250 of DU II. The assemblage, the largest recovered from any zone at this site, includes lithic and non-lithic artifacts, bone, shell, and FMR. Two features were recorded. Feature 10, a pit, yielded a radiocarbon date of 1399±112 (TX-4037). Another radiocarbon date 1064±64 (TX-4036) was obtained from unit level matrix. Zone 2 was identified in all units south of 10S (Figure 2-15).

STRATA DESCRIPTIONS

100. Brown (10YR5/3) coarse sand lens, moderately sorted, some single grains, some organics, boundary clear, smooth.' Probably slope wash deposit from above.

102-105. Medium to fine sand, structureless, soft to loose consistence, moderately well sorted, contains some fine gravel. The similar matrices of these lenses show only minor differences in grain size and color. They are seperated from one another by a 1-5 mm thick layer of 101 that was too small to include in the drawing.

101. Dark grayish brown (10YR4/3) fine/medium sand, indurated, reacts to acid.

102. Brown (10YR5/3) fine sand.

103. Yellowish brown (10YR5/4) medium sand, some medium gravel and charcoal.

104. Yellowish brown (10YR5/4) fine and coarse sand mixture.

105. Yellowish brown (10YR5/4) mainly coarse sand with some fine.

106. Yellowish brown (10YR5/4) medium sand.

107. Light yellowish brown (10YR6/4) loam, poorly sorted, contains some coarse sand, hard consistence, boundary abrupt, wavy.

150. Brown (10YR5/3) medium grained sand, some gravel and a few fine pebbles, poorly sorted, boundary gradual, smooth.

210. Grayish brown to brown (10YR5/2-5/3) sand with gravel, very similar to 150 slightly less compact, boundary gradual, smooth.

250. Grayish brown (10YR5/2) poorly sorted sandy gravel, some pebbles, loose, boundary gradual, smooth. Very gradual constituent and attribute change between 150, 210, and 250.

200. Brown to dark brown (10YR5/3-4/3) very poorly sorted sandy gravel, granitic and basalt pebbles, some burnt roots boundary clear, wavy. More pebbles and darker than 250.

201. Brown (10YR5/3) coarse and medium sand, moderately sorted, occasional medium and coarse gravel, very wet, boundary unknown. Darker in color than V.

310. Brown to dark brown (10YR4/3) pebble/cobble level, main matrix coarse sand with water rounded basalt and granitic pebbles and cobbles and some colluvial granitic cobbles, boundary unknown.

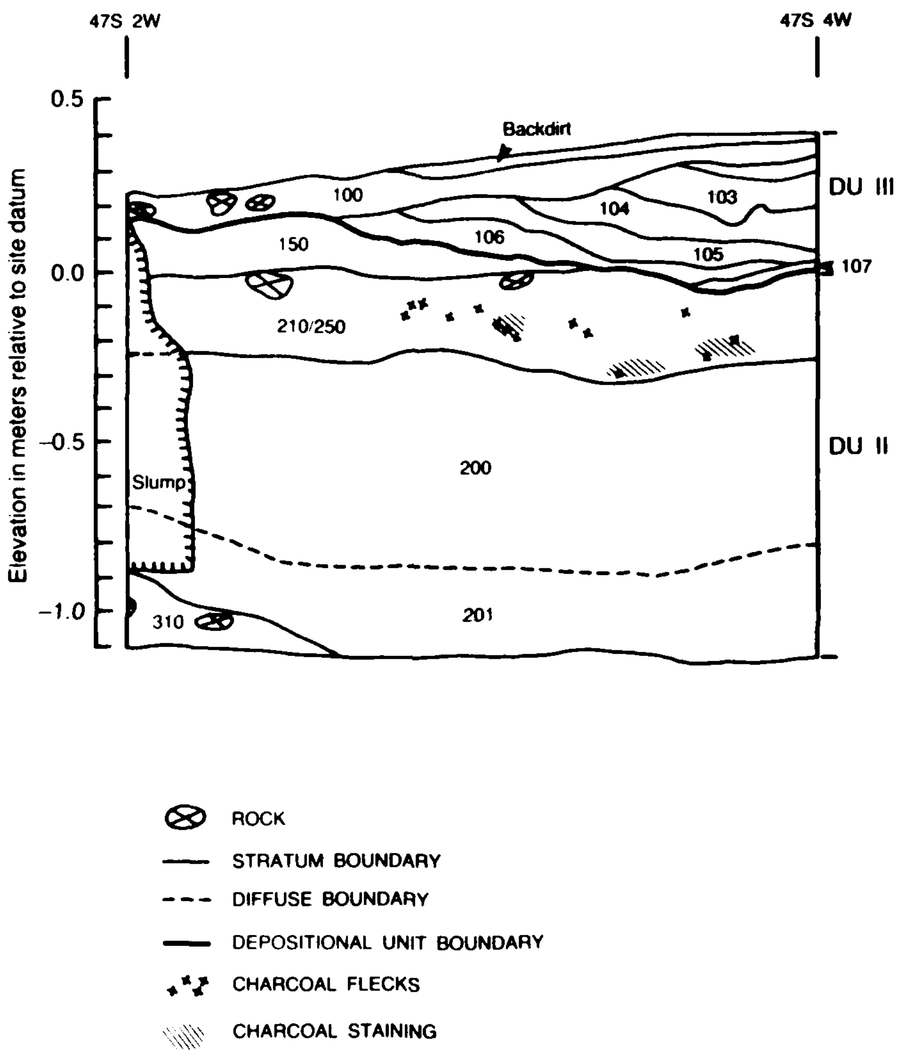


Figure 2-13. Profile of south wall, 46S2W, 45-OK-287. Elevations given in meters below site datum, 0N0W.

STRATA DESCRIPTIONS

A. Pale brown to brown (10YR6/3-5/3) organic fibric litter mat, roots, twigs, grasses heavily mixed with sand from slope. Boundary varies from abrupt to very disturbed, broken to irregular to smooth.

100. Pale brown (10YR6/3) fine grained sand, moderately sorted, loose, boundary clear, irregular. May be bedded with thin lamination bands of hardened sand, cause of induration unknown.

500. Brown (10YR5/3) sand, fine to medium grained, moderately sorted, some fine gravels and occasional rounded pebbles, moderately compact, boundary gradual, smooth. Very slightly darker than lower strata.

600. Brown (10YR5.5/3) medium grained sand, moderately to poorly sorted with some coarse grains and gravel and pebbles, loose, boundary gradual, smooth. Coarser material is well rounded.

700. Brown to yellowish brown (10YR5/3-5/4) medium to coarse grained sand, poorly sorted, with some gravel and pebbles and some angular basalt, loose, boundary gradual, smooth. More pebbles and gravels than above.

800. Pale brown to light yellowish brown (10YR6/3-6/4) medium and coarse sand, poorly sorted, with gravel, pebbles and angular basalt boulders, very soft and loose, boundary gradual, smooth.

900. Pale brown to light yellowish brown (10YR6/3-6/4) and occasionally salt and pepper coarse sand with some gravel, pebbles, very loose. Fewer pebbles than 800.

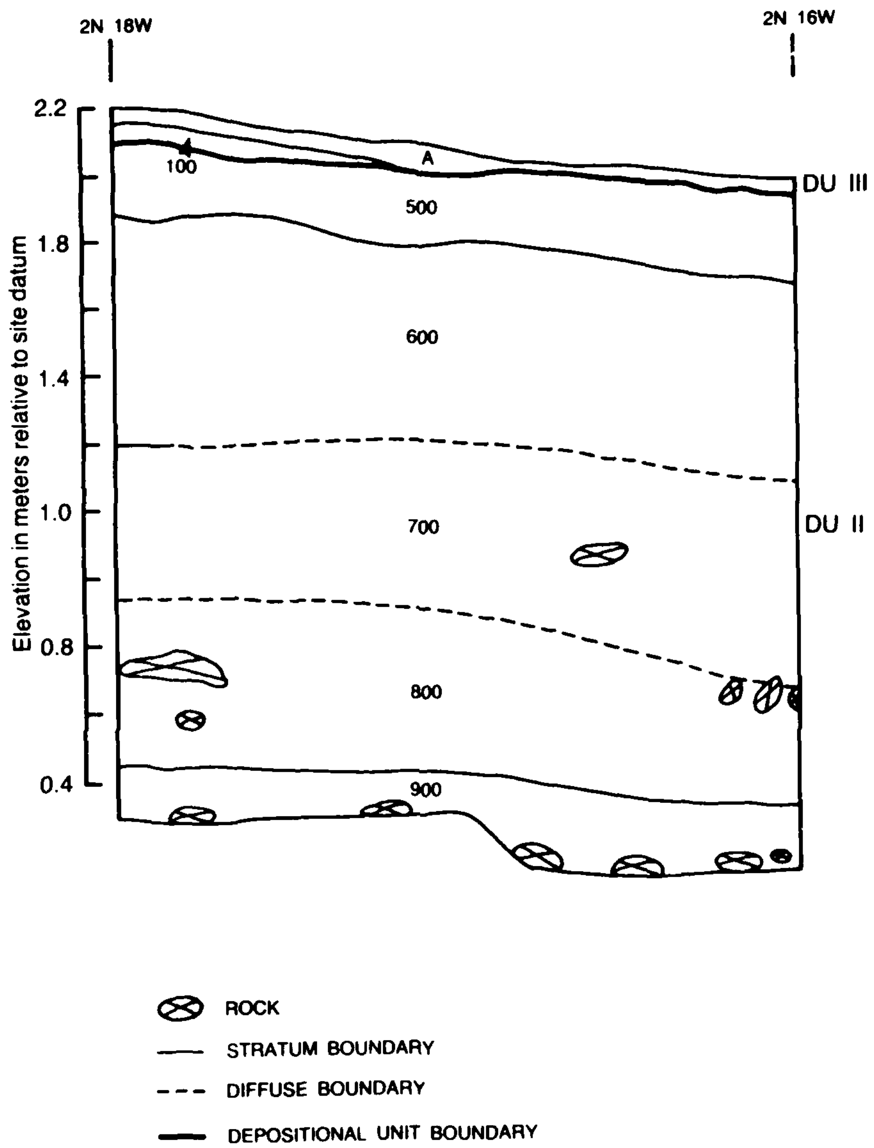


Figure 2-14. Profile of north wall, 2N18W, 45-OK-288. Elevation given in meters relative to site datum 0N0W.

Table 2-3. The analytic zones of 45-OK-287: their stratigraphic definition, radiocarbon dates, and contents.

Zone	DU	Stratum	Major Description	Radiocarbon[1] Dates (Years B.P.)	Lithic # Row %	Nonlithic # Row %	Bone # Row % grams	Shell # Row % grams	FMR # Row % grams	Total[2]	# Features	Volume (m^3)	Density Objects (m^3)
1	III	0 100 150	Recent aeolian slope wash	628±50 774±67	234 18.1	6 0.5	515 39.7 190	42 3.2 161	499 38.5 288,829	1,296	4	22.6	57.3
2	II	200 210 250 220	Mixed colluvial & alluvial	1064+64 1399±112	369 23.2	7 0.4	999 62.8 293	33 2.1 98	183 11.5 46,953	1,591	2	19.7	80.8
3	II	250 275 200	Mixed colluvial & alluvial		74 7.3	3 0.3	917 90.7 215	15 1.5 52	2 0.2 400	1,011		5.5	183.8
4	II	325 310	Mixed colluvial & alluvial		69 8.0		784 90.4 167	2 0.2 3	12 1.4 1,455	867		7.3	118.8
TOTAL					746	16	3,215	92	696	4,765	6	55.1	84.5

1 See Appendix A.
2 Does not include historic material or miscellaneous.

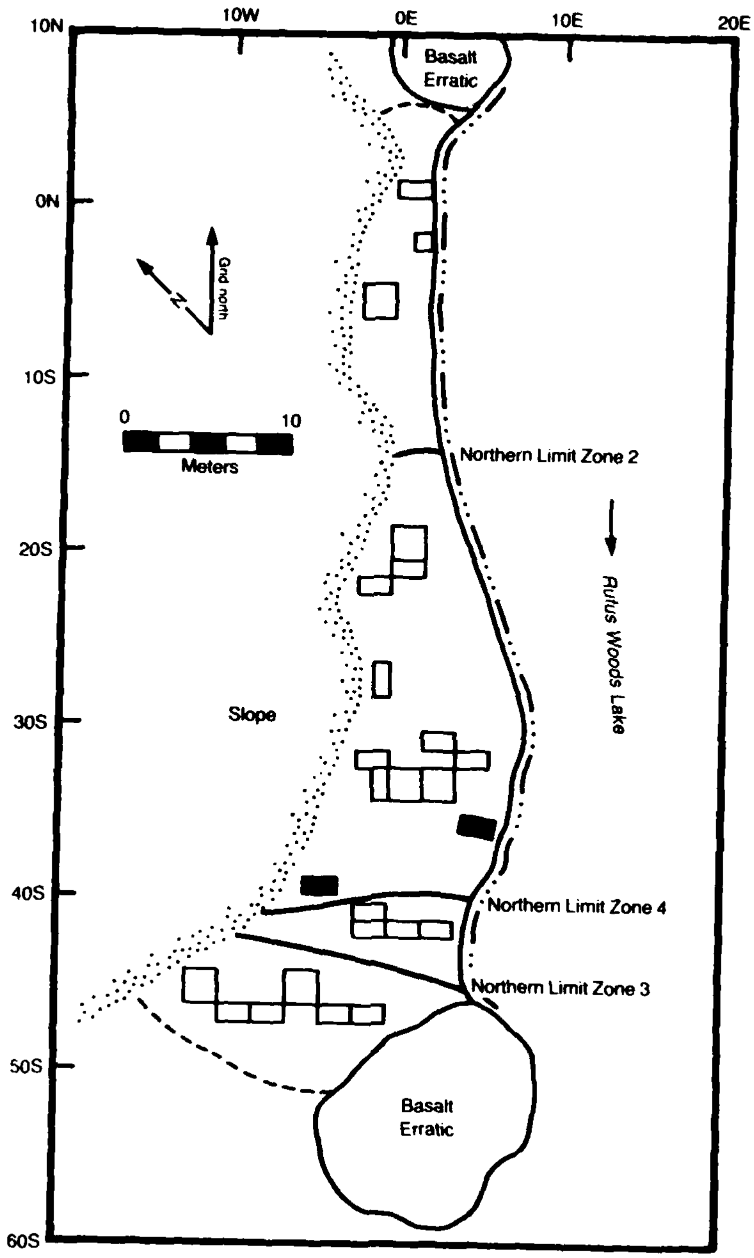


Figure 2-15. Extent of Zones 2, 3, and 4, 45-OK-287.

Zone 1

A peak of cultural materials was associated with Stratum 150 of DU II across most of the site. The overlying sediments of DU III, although younger in age, contained almost no cultural materials, and were also included in Zone 1. A small assemblage of cultural materials was recovered from this Zone, including lithic and non-lithic artifacts, bone, shell, and FMR. Historic materials, not indicated in the table, were found in the uppermost DU III sediments. Four features were recorded: an historic fence post, and three hearths or ovens. Radiocarbon dates of 774±67 (TX-4035) and 628±50 (TX-4038) were obtained from charcoal in two of these latter features. This zone was identified in all units at the site. The few cultural items occurring north of 10S are associated with the sand matrix in the granite talus which rests directly on the alluvial gravel bar. All of the levels in these units were assigned to Zone 1.

ANALYTIC ZONES, 45-OK-288

Table 2-4 shows the relationship of analytic zones to the stratigraphic sequence and summarizes the cultural assemblages from each analytic zone. Excavated volumes differ among zones, especially in the case of Zones 1 and 2, which were affected by bulldozing in the northern part of the site. Analytic zones were assigned to all excavated units except 28S4E. This unit, located on the beach, slumped after a few levels had been excavated, and no profiles were drawn. Although 26S0W is only a few meters away, the two units differ in surface elevation by almost 1 m, and it was not realistic to extrapolate zone boundaries by either absolute or relative elevation.

Zone 6

The cultural peak consistently associated with Stratum 900 was defined as Analytic Zone 6. The cultural assemblage recovered from this zone is smaller than those from Zones 5, 4, and 3. Features were recovered from both the southern and northern areas of the site, indicating **in situ** cultural deposits. However, the deposits of rounded cobbles, angular cobbles, and artifacts that occur along the river margin of the site, such as Feature 35, may be water-deflated deposits. Zone 6 was identified in all units except in a few quads where excavation terminated prior to reaching it (1N28W, 23S14W, 2620W, 26S1E, and 27S1E). No radiocarbon dates were obtained from this zone, but on the basis of the dates from Zone 5 we assume it to be older than about 4800 B.P.

Zone 5

Zone 5 corresponds to stratum 800 from which high numbers of cultural materials and features were recovered, constituting the site's largest assemblage. A major occupation surface in this zone was excavated intensively in the northern block excavation. Features also were found in the southern part of the site, indicating an extensive **in situ** cultural deposit. Two

Table 2-4. The analytic zones of 45-OK-288: their stratigraphic definition, radiocarbon dates, and contents.

Zone	DU	Stratum	Major Description	Radiocarbon[1] Dates (Years B.P.)	Lithic # Row %	Nonlithic # Row %	Bone # Row % grams	Shell # Row % grams	FMR # Row % grams	Total[2]	# Features	Volume (m^3)	Density Objects (m^3)
1	III	100's 200's 300's	Recent aeolian & slope wash	-	55 14.7	-	313 83.7 451	-	6 1.6 1,098	374	2	19.7	19.0
2	II	500	Overbank	473±43 756±67	288	3	2,411 84.4 897	1 <0.1 <0.1	152 5.3 36,570	2,855	3	23.7	120.5
3	II	600	Overbank	923±77 1048±69	1,991	13	15,737 85.0 5,285	2 <0.1 7	769 4.2 121,699	18,512	8	35.0	528.9
4	II	700 720 721	Overbank & colluvial	1543±84	1,628	4	10,374 83.1 3,098	5 <0.1 7	460 3.7 105,482	12,471	4	35.6	350.3
5	II	800	Overbank	4525±128 4681±150	3,175 14.0	40 0.2	18,763 82.6 5,495	18 0.1 64	693 3.1 134,142	22,689	15	39.8	570.1
6	II	900	Overbank	-	1,967 20.8	15 0.2	7,147 74.8 1,738	21 0.2 7	353 3.7 74,895	9,503	6	35.6	272.53
Un-Zoned	N/A	N/A	N/A	N/A	82	1	144 - 16	-	206 - 94,970	433	1	N/A	N/A
TOTAL					9,166	76	54,889	47	2,639	66,837			

1 See Appendix A.
2 Does not include historic material or miscellaneous.

radiocarbon dates were obtained from the occupation area in the northern part of the site, 4525±126 (TX-4027) and 4641±150 (TX-3800). The older date is from the base of Feature 7, the boundary between Zone 5 and Zone 6, and the younger from an overlying nonfeature level in the same excavation unit. This zone was identified in all units except the north half of 26S0W, where excavation was terminated prior to reaching these depths.

Zone 4

Zone 4 includes Stratum 700, which was found to contain a site-wide primary cultural deposit dating between roughly 1500 B.P. and 1200 B.P. In the northern area of the site, this stratum overlies the colluvial deposit (strata 740, 720, and 721) which contains cultural materials which are probably secondary deposits of materials dating between 1500 and 4400 B.P. Because the colluvial deposit was thin and intermittent, it was frequently excavated along with the overlying materials and so was included in Zone 4. The radiocarbon date of 1543±94 (TX-4029) is from an occupation surface, Feature 59. It does not necessarily date the oldest material in the zone because the colluvial deposit underlies this deposit in the northern part of the site. This zone was identified in all units.

Zone 3

Zone 3 represents a distinct peak of cultural material associated with sitewide stratum 600. The assemblage of bone, shell, FMR, and lithic and nonlithic artifacts is the second largest of all the assemblages. A structure floor, Feature 12, was excavated in the southern part of the site. The two radiocarbon dates from this feature, 1046±69 (TX-4030)and 1122±65 (TX-4031), date the lower boundary of Zone 3. Zone 3 was identified in all zonable units except the SW quad of 10N8W, where it was excavated without screening. However, it was partially truncated in the bulldozed units.

Zone 2

Zone 2 corresponds to Stratum 500, which occurs across the entire site. The zone was not sampled uniformly across the site, as it was removed from some northern units by bulldozing (Figure 2-16). Densities of cultural material are considerably higher than in Zone 1. The zone's three features were recovered from the southern area, indicating that cultural deposits in this area are **in situ**. Two radiocarbon dates, 473±43 (TX-4028) and 756±67 (TX-4026), are both from features in the southern part of the site.

Zone 1

Zone 1 corresponds to Depositional Unit III, which is comprised of many small lenses without horizontal extent. Collectively, these lenses can be traced across the site and are associated with a distinct peak of cultural materials. The zone generally is characterized by low densities of cultural

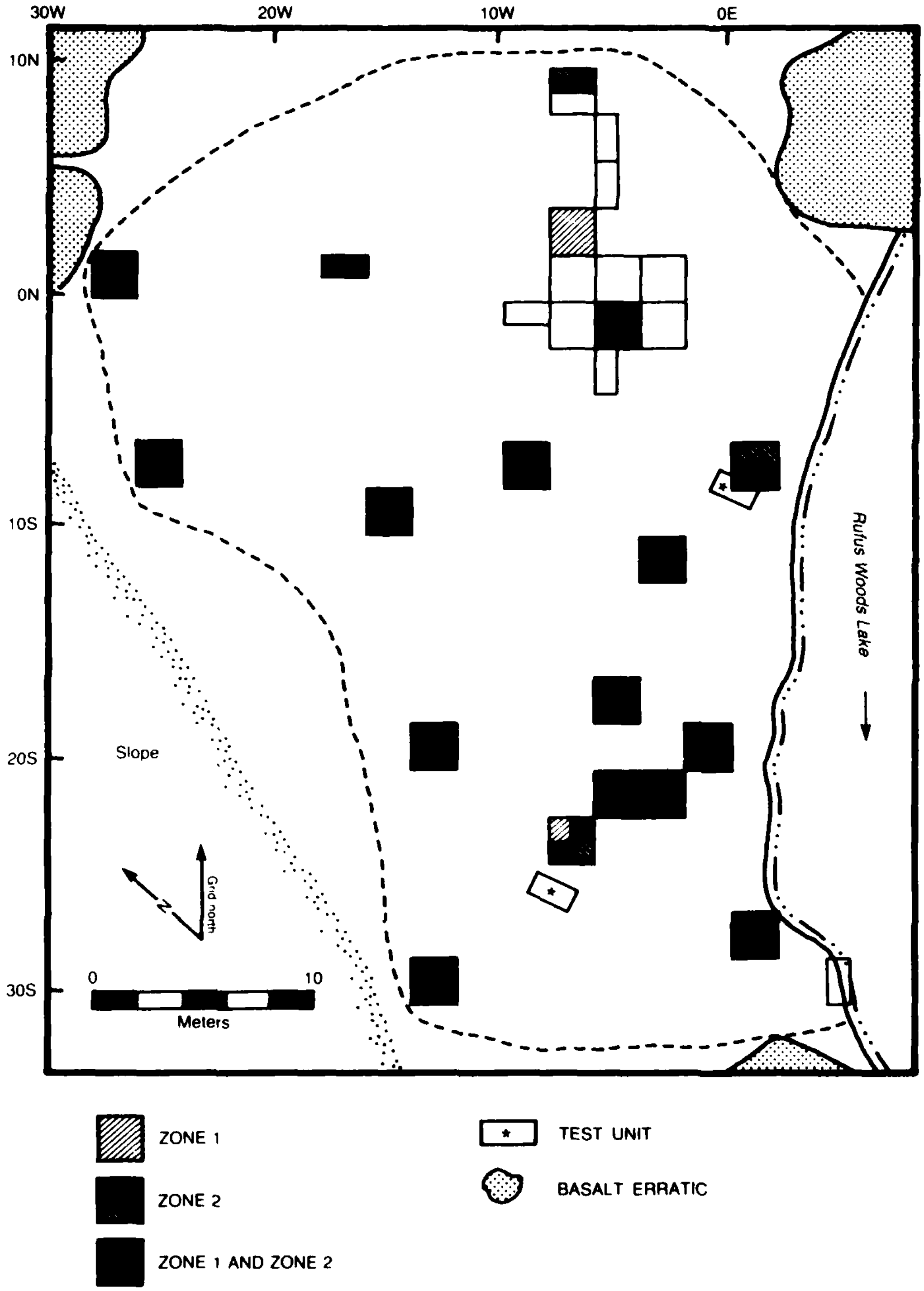


Figure 2-16. Extent of Zones 1 and 2, 45-OK-288.

materials, and only a small cultural assemblage was recovered. Densities apparently were lowest in the northern area: after a few units had been excavated, a bulldozer removed the upper 1 m of matrix. Figure 2-16 shows the horizontal distribution of units in which Zone 1 was sampled. The largest number of artifacts was recovered from the southern part of the site; this may be the result of secondary deposition, however, judging from the presence of erosional channels this area. The northern area yielded the only features found in Zone I. One is historic. No radiocarbon dates were obtained for Zone 1. The dating ot Zone 2 indicates that its age ranges from approximately 400 B.P. to historic times.

CORRELATION OF ZONES, 45-OK-287 AND 45-OK-288

Because of the small size of the assemblage from 45-OK-287 and the arbitrary designation of the basalt erratic as a boundary between the two contiguous site areas, the cultural material has been analyzed in the following chapters in terms of a single site whenever practical. We have combined the zones primarily on the basis of radiocarbon dates and stratigraphic position (Table 2-5). The stylistic analysis of the few projectile points and evidence from the botanical analysis corroborates the correlations. We have noted above the difficulty in arriving at direct correlations of stratigraphic units between the two sites. We view this scheme as a fair approximation of contemporaneous time spans.

Table 2-5. Equivalence of zones at 45-OK-287/288.

45-OK-287	45-OK-288	Combined Zones 45-OK-287/288
	1	1
1	2	2
2	3	3
3	4	4
4		
	5	5
	6	6

SUMMARY

Sometime before 7000 years ago, the Columbia River cut the terrace on which the sites occur and withdrew, leaving behind stratified, dipping deposits of coarse, waterworn materials. Human use of the gravel bar surface began sometime before 4800 B.P. As the river incised deeper to its historic level, it continued to flood the terrace periodically, depositing sands. The river may have been somewhat higher than historic elevations during the Zone 6 and Zone 5 occupations. Concentrations of cobbles at the river margin of the living surface in Zone 5 are similar to beach lag concentrations observed in front of sites in the reservoir today, suggesting that the shoreline of the river may have been that high. The 45-OK-287 area was not used by people during this time, and received little sedimentation.

The pattern of deposition at the site changed sometime between 4400 and 1500 B.P., resulting in an increase in colluvial sediments. Either alluvial deposition diminished and colluvial deposition remained the same, or colluvial deposition actually increased. It is not likely there was a depositional hiatus lasting 3,000 years; more evidence of surface exposure, such as soil development and weathering would be expected. The dates must be considered maximum bracketing dates--the interval was probably much shorter. Increased erosion during this episode may have resulted in redeposition of cultural materials. The oldest zone at 45-OK-287 may date from this period.

Human use of the site and the pattern of gradual accumulation of alluvium resumed by 1500 B.P. Sediments were gradually accumulating at 45-OK-287 and the human occupants used the southern end of the site. During the time period of Zones 2 and 3 (45-OK-288) alluvial fan deposition in the draw increased, but it is unknown whether this is due to local or regional changes in precipitation and river level. Alluvial sediments began to accumulate in the low southern area of 45-OK-287, and human use of the site increased (Zone 3). Further sedimentation began to cover the colluvial gravels at the north end of the site and the Zone 1 and 2 occupations extend further along the bank.

Use of the sites seems to have virtually ceased after 400 B.P. Sedimentation continued, capping the site deposits with aeolian sediments, and perhaps one flood deposit, with an alluvial fan building in the draw. These upper deposits were defined as a separate zone, Zone 1, at 45-OK-288, and included with the underlying strata at 45-OK-287. At both sites they contain evidence of historic Euroamerican activities in the area, but little other cultural material.

Although cultural materials at these sites are stratified, there is evidence of redeposition and disturbance. The depositional units, even though valid time-stratigraphic units, may not divide the cultural materials neatly into chronological units because of the problem of secondary deposition in the high energy environment of these steep slopes. Shell and bone were observed in eroding channel cuts at higher elevations on the western slope. It is likely that some cultural materials were washed down on to the site. Isolated pockets of material, especially bone and shell, in abruptly bounded lenses, may have resulted from redeposition. That _in situ_ deposits do occur is indicated by living surfaces and the house structure at 45-OK-288.

3. ARTIFACT ANALYSES

This chapter presents analyses of lithic and nonlithic items modified by use and/or manufacture recovered from 45-OK-287/288. Of the 71,602 objects recovered, 10,024 were worn and modified objects from six zones defined on the basis of site stratigraphy and radiocarbon dates (Tables 2-3 and 2-4). The remainder of the assemblage is distributed among the categories of bone, shell and fire-modified rock (FMR). The analysis of identifiable bone is presented in Chapter 4. The weights and numbers of unidentified bone, shell, and FMR were recorded by collection unit and their distribution is discussed in Chapter 7.

The worn/manufactured artifacts have been categorized on the basis of morphological, technological and functional attributes (Table 3-1). Traditionally used descriptors, such as drill, graver and burin, have been used to name the objects to allow comparison among the zones and with other sites in the project area and the region. Since these names imply uses which may or may not be accurate, their definitions are evaluated in the functional analysis section of this chapter. Rather than reclassify artifacts on the basis of the evaluation, they are retained in the original categories of the project computer data files.

The lithic objects described below have been subjected to two separate analyses. The technological analysis focuses on the use of lithic resources, describing the raw materials and the by-products of manufacture allowing us to infer the methods used to fashion stone implements. The functional analysis examines how lithic artifacts were modified by manufacture and use, thus providing evidence about activities at the site. The two analyses are complementary though conducted independently. A third analysis describes bone which shows evidence of use and/or modification. Although few in number and fragmented, these non-lithic artifacts contribute to an overall interpretation of activities at 45-OK-287/288. The final section analyzes projectile point styles which are classified by morphological and historical types.

Details of methods and procedures used to develop these analyses at the Chief Joseph Dam Project are presented in the research design (Campbell 1984d). They will be re-evaluated in the synthesis report, sequel to this series of descriptive site reports.

TECHNOLOGICAL ANALYSIS

The technological analysis is composed of five dimensions: object type, material type, presence or absence of cortex, degree of breakage, and evidence

Table 3-1. Formal object types sorted by zone, 45-OK-287/288.

Artifact	Zone												
	1		2		3		4		5		6		Total[1]
	N	Col %	N	Col %	N	Col %	N	Col %	N	Col %	N	Col %	N
Formed Object													
Projectile Point	-	-	4	19.0	15	16.9	7	10.9	7	7.9	2	1.6	35
Projectile Base	-	-	-	-	3	3.4	1	1.6	2	2.2	1	1.3	7
Projectile Tip	-	-	2	9.5	2	2.2	6	9.4	2	2.2	1	1.3	13
Biface	2	67.7	7	33.3	35	39.3	14	21.9	21	23.6	4	5.3	83
Graver	-	-	-	-	-	-	-	-	2	2.2	-	-	2
Scraper	-	-	-	-	7	7.9	7	10.9	13	14.6	4	5.3	31
Spokeshave	-	-	-	-	1	1.1	-	-	2	2.2	1	1.3	4
Tabular Knife	-	-	6	28.6	22	24.7	15	23.4	22	24.7	9	11.8	74
Chopper	1	33.3	1	4.8	4	4.5	13	20.3	8	20.2	54	71.0	91
Pestle	-	-	1	4.8	-	-	-	-	-	-	-	-	1
Bead	-	-	-	-	-		1	1.6	-	-	-	-	1
Subtotal	3	100.0	21	100.0	89	100.0	64	100.0	89	99.8	76	99.9	342
% Zone Total		5.6		4.3		4.6		3.7		2.9		3.8	
Worn/Modified Objects													
Peripherally Flaked Cobble	-	-	2	40.0	2	25.0	1	12.5	-	-	4	14.3	9
Edge Ground Cobble	-	-	-	-	-	-	1	-	-	-	-	-	1
Hammerstone	1	100.0	3	60.0	5	62.5	6	12.5	16	84.2	23	82.1	54
Anvil	-	-	-	-	1	12.5	-	75.0	2	10.5	1	3.6	4
Hopper	-	-	-	-	-	-	-	-	1	5.3	-	-	1
Subtotal	1	100.0	5	100.0	8	100.0	8	100.0	19	100.0	28	100.0	69
% Zone Total		1.9		1.0		0.4		0.5		0.6		1.4	
Cores and Specialized/ Modified/Worn Flakes													
Cores	1	14.3	-	-	4	2.7	1	0.7	1	0.6	5	6.3	12
Burin Spall	-	-	2	5.6	-	-	-	-	2	1.2	1	1.3	5
Blade	-	-	-	-	1	0.7	4	2.9	2	1.2	-	-	7
Linear Flake	2	28.6	11	30.6	61	40.9	48	35.3	73	43.7	28	35.4	223
Resharpened Flake	-	-	1	2.8	3	2.0	4	2.9	2	1.2	3	3.8	13
Bifacial Retouched Flake	-	-	2	5.6	5	3.4	10	7.4	3	1.8	4	5.1	24
Utilized Retouced Flake	2	28.6	2	5.6	17	11.4	16	11.8	23	13.8	9	11.4	69
Utilized Flake	2	28.6	18	50.0	58	38.9	53	39.0	61	36.5	29	36.7	221
Subtotal	7	100.1	36	100.2	149	100.0	136	100.0	167	100.0	79	100.0	574
% Zone Total		13.0		7.4		7.8		7.9		5.4		4.0	
Lithic Debitage													
Conchoidal Flake	32	74.4	344	81.3	1,310	78.6	1,203	80.0	2,271	80.4	1,388	77.4	6,548
Tabular Knife	5	11.6	33	7.8	182	10.9	127	8.4	168	5.9	161	9.0	676
Chunk	4	9.3	36	8.5	151	9.1	138	9.2	337	11.9	189	10.5	855
Weathered	1	2.3	2	0.5	11	0.7	14	0.9	12	0.4	10	0.6	50
Unmodified	1	2.3	3	0.7	7	0.4	7	0.5	16	0.6	2,	1.5	61
Ind/Missing	-		5	1.2	6	0.4	14	0.9	20	0.7	19	1.1	64
Subtotal	43	99.9	423	100.0	1,667	100.1	1,503	99.9	2,824	99.9	1,794	100.1	8,254
% Zone Total		79.6		87.2		87.1		87.8		91.1		90.7	
TOTAL	54		485		1,913		1,711		3,099		1,977		9,239

[1] Does not include <1/4" flakes or unassigned lithic objects.

of burning or dehydration. The variables of each dimension, the raw data, and data tabulations are presented in Appendix B, Table B-1.

Jasper, chalcedony, petrified wood and opal, the cryptocrystalline silicas (CCS), make up over 70% of the site assemblage and are the most common materials in each zone (Table 3-2). Quartzite, including fine- and coarse-grained forms, is the next most frequent material followed by argillite. Basalts, obsidian, siliceous mudstone, granite, sandstone silt/mudstone, schist and other materials make up the remainder of the assemblage.

Table 3-2. Lithic material type by zone, 45-OK-287/288.

Material Type	Zone						Total[1]
	1	2	3	4	5	6	
Jasper	11	205	574	520	900	288	2,545
Chalcedony	25	166	716	399	480	244	2,041
Petrified Wood	–	2	10	8	10	2	33
Obsidian	–	1	5	4	7	8	25
Opal	3	11	135	309	787	361	1,615
Quartzite	8	44	263	205	298	411	1,230
Fine-grained Quartzite	1	1	20	33	107	93	255
Basalt	–	4	14	24	55	63	160
Fine-grained Basalt	–	–	8	15	60	31	114
Silicized Mudstone	1	1	14	8	14	15	53
Argillite	–	2	27	64	212	296	609
Granitic	1	3	4	6	15	25	54
Sandstone	–	–	–	–	1	–	1
Silt/Mudstone	–	5	–	–	–	2	7
Schist	–	–	–	–	3	1	4
Very-fine-grained Sandstone	–	–	1	1	3	1	6
Indeterminate/Misc.	–	–	7	20	30	47	104
TOTAL[1]	50	445	1,798	1,616	2,982	1,888	8,856

[1] Does not include 77 unassigned objects or <1/4" flakes.

The most notable change among the zones is the gradual increase of argillite from Zone 2 to Zone 6, accompanied by a decrease in CCS. The quartzite proportion remains fairly constant for Zones 1, 3, 4 and 5, dropping slightly in Zone 2. In Zone 6 there is an increase in the proportion of quartzite accompanying the argillite.

Jasper, chalcedony and opal are cryptocrystalline silicas formed by similar processes. They are available at a moderate distance from the site in the escarpments of the Columbia River valley's rim. Argillite has no nearby source and is not common in the river gravels (Hibbert 1984:Appendix B). Quartzites and basalts are available on site from river gravels. Despite low frequencies obsidian and petrified wood are noteworthy because they are also materials with no known local source. Most of the remaining materials are locally available.

Jasper, chalcedony, petrified wood and, to some extent, opal all have similar physical properties. Their elasticity and homogeneity cause them to flake in a predictable conchoidal manner. Because of these similarities, they will be considered as a single group. Although argillite is less homogeneous

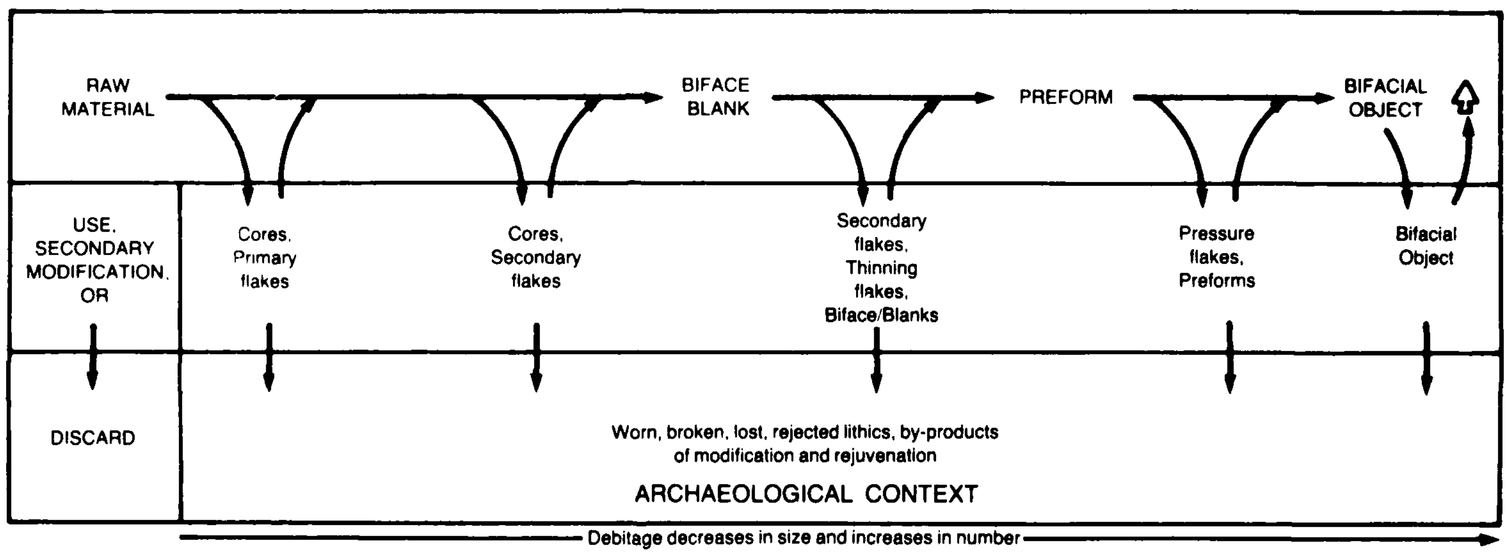


Figure 3-1. Schematic of the bifacial reduction process.

and elastic than CCS, its flaking characteristics are also predictably conchoidal. Much of the quartzite found in the project area tends to break along bedding planes, producing tabular rather than conchoidal flakes. The fine-grained form has some tendency to fracture conchoidally, but its flaking is less predictable and less controllable than that of CCS and argillite. Coarse-grained basalts are similar to the coarse-grained quartzites in that both produce unpredictable fractures. In its fine-grained form, basalt flakes much like CCS and argillite. Elsewhere on the Plateau, a reliance on fine-grained basalts to manufacture projectile points and other finely crafted implements is characteristic of early cultural phases (e.g., Leonhardy and Rice 1970).

Two parallel systems of lithic production based on material type and the physical characteristics described above were apparently used at 45-OK-287/288. Cores, specialized flakes, debitage, and, to some extent, the formed objects, provide information about these systems.

The first system consists of the bifacial reduction of materials with pronounced, predictable conchoidal flaking characteristics. Sequential stage models have been developed elsewhere to describe this process of manufacture (Holmes 1919; Sharrock 1966; Muto 1971; Womack 1977; Callahan 1979). Basically, they involve the same process: the acquisition of raw materials and their reduction into increasingly refined bifacial forms until the desired product is reached. Each stage of the model has characteristic products and by-products (Figure 3-1). Primary flakes show weathered or rind surfaces of the original exterior on all or portions of their dorsal surfaces. Secondary flakes lack cortex and show only scars of previously detached flakes on their dorsal surfaces. Predictably, cores discarded earlier in the sequence exhibit cortex while those discarded later do not. Flakes removed toward the latter portion of the sequence as bifaces are formed have a diagnostic appearance; the dorsal surface retains the scars from earlier secondary flake detachment, the ventral surface is smooth, and the striking platform retains a portion of the biface edge. In the final stages of manufacture, small, thin flakes are removed by the pressure technique and the desired tool is formed.

The second system of reduction is similar to the first except that large flakes derived from locally available cobbles and the modified cobbles themselves are the desired products. Since it represents an "indulgent" system based on readily available resources (MacDonald 1971), extensive modification and reuse of the products in this system is less likely to occur (Figure 3-2).

During any stage of either system, the products of reduction may be modified and used, put directly to use, or discarded. Discarded items can re-enter the main sequence resulting in the production of smaller waste flakes indistinguishable from other by-products. When worn lithics are rejuvenated, characteristic flakes retaining the wear removed from the parent object are produced. In both systems, debitage tends to decrease in size and increase in number at each successive stage of reduction.

Various formal categories used to classify the 45-OK-287/288 assemblage demonstrate these systems. Cores, bifaces, primary flakes and secondary flakes, are categories in the project classification. Preforms are classified as morphological Type 2 in the stylistic analysis of projectile points. Linear flakes, manufactured by pressure flaking, represent final reduction. Flakes less than 1/4" in size can also be associated with the later stages of reduction. In the project system, the classification "resharpening flakes" includes bifacial thinning flakes and flakes from tool rejuvenation. Bifacially and unifacially retouched flakes and utilized flakes are by-products of the sequence that have been modified and/or used.

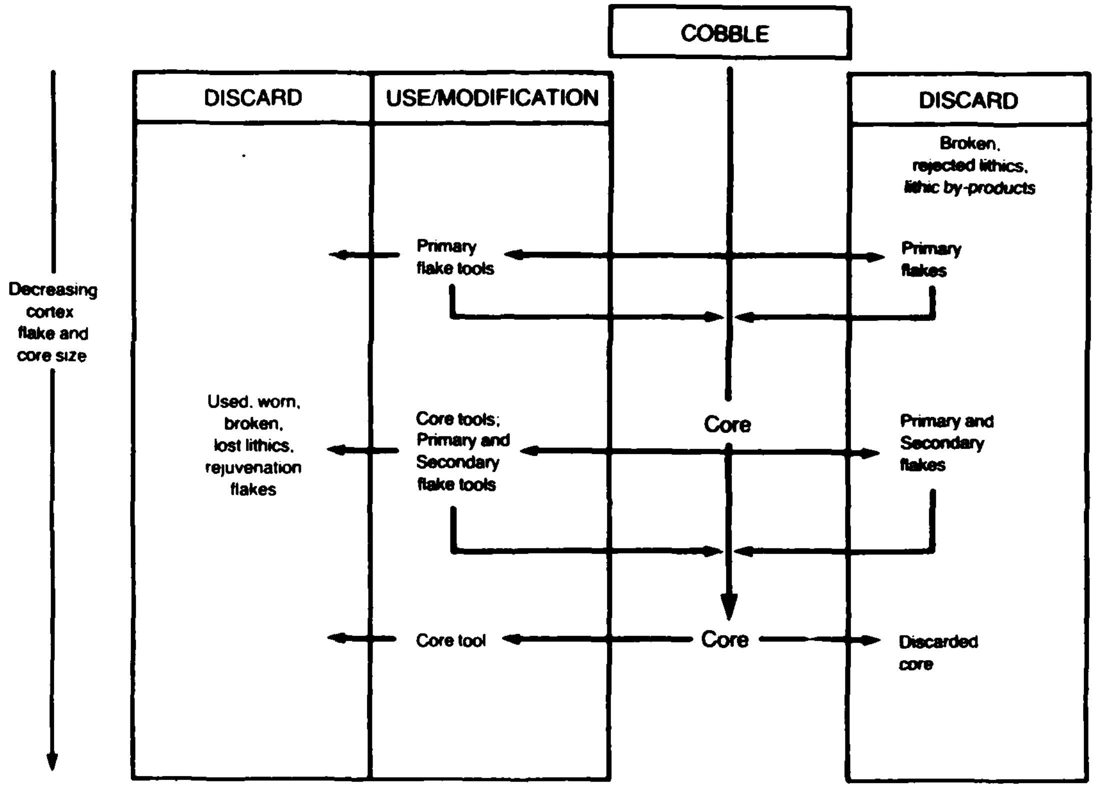


Figure 3-2. Schematic of the cobble reduction process.

Artifact assemblages of each major material type are evidence of the use of both systems to produce the implements of prehistoric subsistence at 45-OK-287/288. In the discussion below reference may be made to Tables 3-3 through 3-6 for artifacts sorted by material type and zone. Size attributes of conchoidal debitage, relative frequencies of kinds of debitage, percent of primary flakes (flakes with cortex) and proportion of <1/4" flakes are presented by material type in Figures 3-3 through 3-6. Additional zonal information and sample sizes are available in Appendix B, Tables B-2 through B-11.

Products of the bifacial reduction system are easily recognized in the CCS assemblage (Table 3-3). In addition to the formed objects such as projectile points and bifaces, cores and all the specialized flake types occur

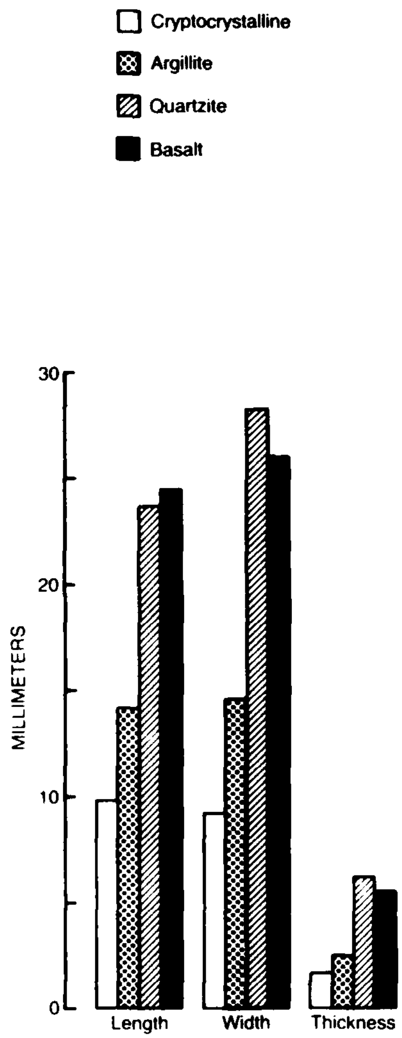


Figure 3-3. Size attributes of conchoidal debitage, 45-OK-287/288.

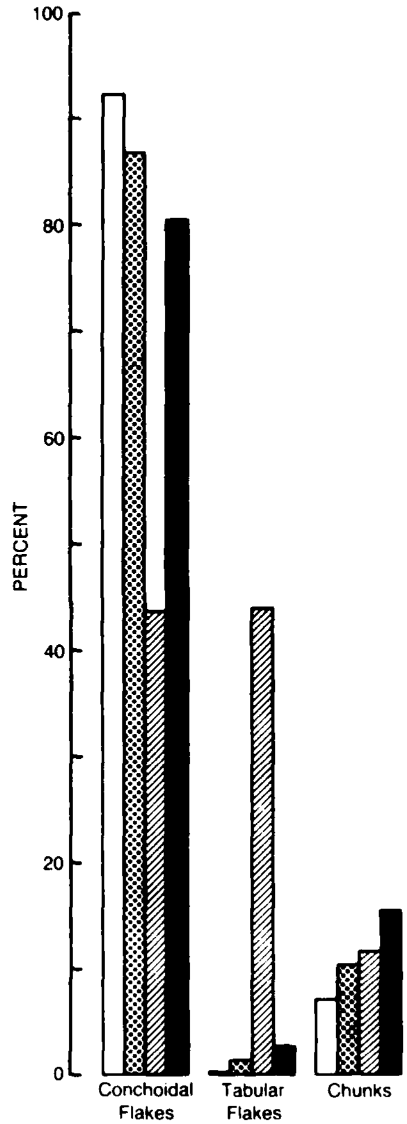


Figure 3-4. Relative frequencies of kinds of debitage, 45-OK-287/288.

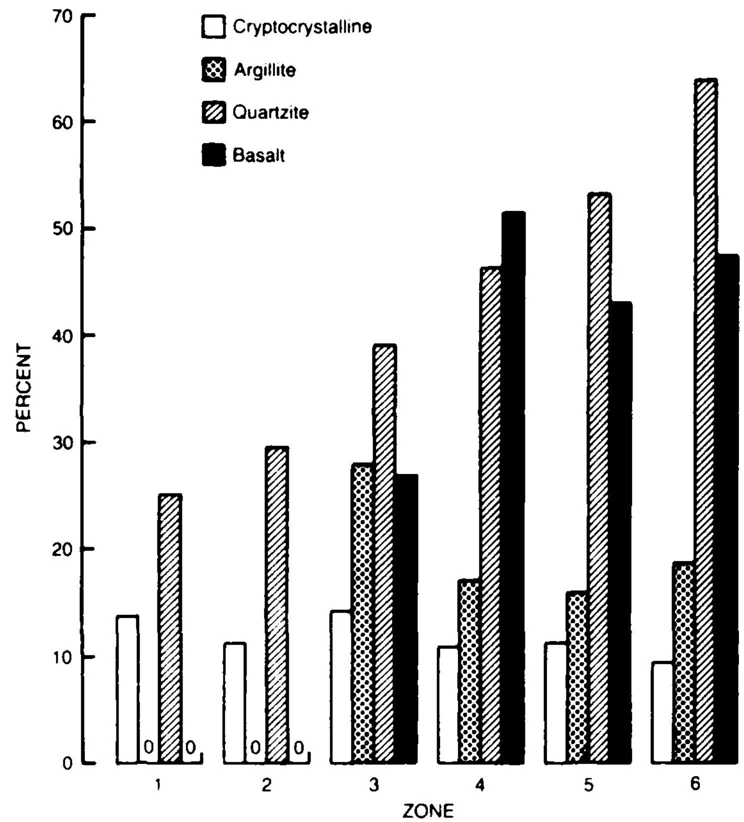


Figure 3-5. Percent of primary debitage (flakes with cortex) by zone, 45-OK-287/288.

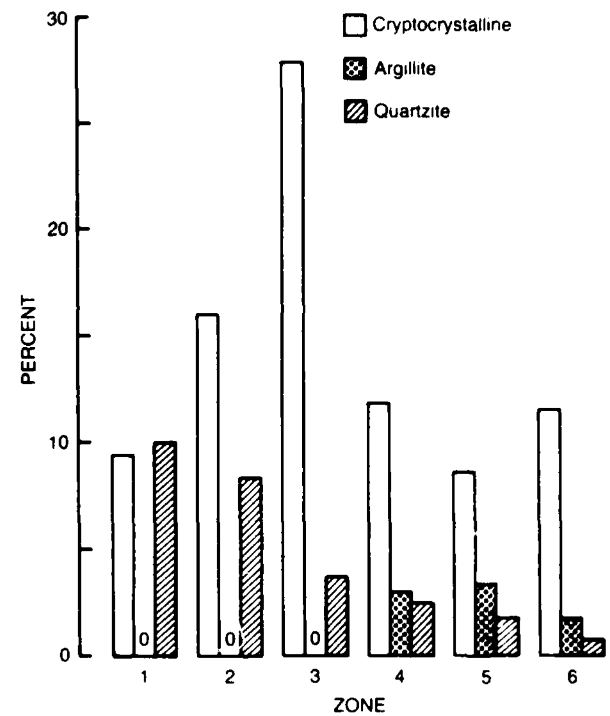


Figure 3-6. Percent of <1/4" flakes by zone, 45-OK-287/288.

in the assemblage. The CCS debitage is made up of the smallest conchoidal flakes, few of which retain cortex. These characteristics are relatively consistent through the zones. Notably, the numbers of <1/4" flakes is highest in Zone 3 (Appendix B, Table B-9).

Table 3-3. Cryptocrystalline artifacts sorted by zone, 45-OK-287/288.

Artifact	Zone						Total
	1	2	3	4	5	6	
Formed Object							
Projectile Point	-	4	15	6	6	-	31
Projectile Base	-	-	3	-	2	1	6
Projectile Tip	-	2	2	5	2	1	12
Biface	2	7	35	11	20	4	79
Graver	-	-	-	-	2	-	2
Scraper	-	-	6	7	13	4	30
Subtotal	2	13	61	29	45	10	160
Worn/Modified Objects							
Hammerstone	-	-	-	-	1	-	1
Cores and Specialized/ Worn/Modified Flakes							
Cores	1	-	4	1	1	-	7
Burin Spall	-	2	-	-	2	1	5
Blade	-	-	-	4	2	-	6
Linear Flake	2	11	61	46	68	25	213
Resharpened Flake	-	1	3	3	1	3	11
Bifacially Retouched Flake	-	2	3	10	3	3	21
Unifacially Retouced Flake	2	2	14	16	21	4	59
Utilized Flake	2	17	57	51	57	22	206
Subtotal	7	35	142	131	155	58	528
TOTAL[1]	9	48	203	160	200	68	688

[1] Does not include indeterminate or unassigned objects.

Kinds of formed objects and specialized flakes of argillite are similar to those made from CCS (Table 3-4). Debitage is primarily conchoidal and slightly larger than that of CCS in size. Primary flakes first occur in Zone 3 and show their highest frequency in that Zone. In subsequent zones the proportion of these flakes--lower than that of quartzite or basalt--remains fairly constant. The percentage of <1/4" flakes, which first occur in Zone 4, is also fairly constant and makes up a much smaller proportion of the argillite assemblage than it does the CCS (Appendix B, Table B-10).

The quartzite assemblage contains representatives of the first reduction system in its single projectile point, linear flake and conchoidal flakes (Table 3-5). The remainder of the collection belongs to the second reduction system which includes minimally modified tabular knives, spokeshaves, choppers, modified and used flakes, tabular flakes and cobble artifacts. The conchoidal flakes and debitage tend to be larger, there are more tabular and primary flakes and the lowest proportion of <1/4" flakes (Appendix B, Table B-10). Fine-grained quartzite is distinguished from the coarse-grained variety by a smaller, slightly more elongate flake form, and more conchoidal flakes (Appendix B, Table B-8).

Table 3-4. Argillite artifacts sorted by zone, 45-OK-287/288.

Artifact	Zone					Total
	2	3	4	5	6	
Formed Object						
Projectile Point	–	–	–	–	1	1
Projectile Base	–	–	1	–	–	1
Projectile Tip	–	–	1	–	–	1
Biface	–	–	2	1	–	3
Subtotal	–	–	4	1	1	6
Cores and Specialized/ Worn/Modified Flakes						
Cores	–	–	–	–	2	2
Linear Flake	–	–	–	2	2	4
Unifacially Retouched Flake	–	–	–	–	1	1
Utilized Flake	1	1	1	2	3	8
Subtotal	1	1	1	4	8	15
TOTAL[1]	1	1	5	5	9	21

[1] Does not include indeterminate or unassigned objects.

Data for basalt, obsidian and the remaining lithic material types have been combined in a single table (Table 3-6) because of the small sample sizes. Briefly, basalt shows elements of both systems; there is evidence for the bifacial system in the projectile point and specialized flakes. The second system is represented by tabular knives and various cobble-derived implements. Debitage is similar in size to that of quartzite but contains fewer tabular flakes (Appendix B, Table B-8). Primary debitage appears first in Zone 3 and increases markedly through the lower zones. There are only four <1/4" flakes from the entire assemblage.

The few pieces of obsidian most resemble the CCS assemblage. Artifacts of this material include a biface, linear flake and bifacially retouched flake. The debitage is made up of 23 conchoidal flakes and a single chunk. The material occurs in all zones except the first, increasing slightly in frequency from top to bottom.

The remaining materials, especially the granitics, occur primarily as percussive implements or supports. Only granite has a large enough sample size to suggest a trend: it decreases in frequency from Zone 6 to Zone 1.

Table 3-5. Quartzite artifacts sorted by zone, 45-OK-287/288.

Artifact	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Total
Formed Object							
Projectile Point	-	-	-	-	1[1]	-	1[1]
Spokeshave	-	-	-	-	-	1	1
Tabular Knife	-	6	21	13/1[1]	20/1[1]	9	69/2[1]
Chopper	1	-	2	8	12/2[1]	29/10[1]	52/12[1]
Subtotal	1	6	23	22	36	49	138
Worn/Modified Objects							
Edge-Ground Cobble	-	-	-	1	-	-	1
Peripherally Flaked Cobble	-	1	2	1	-	1	5
Hammerstone	-	1	1	1/1[1]	2/1[1]	6	11/2[1]
Millingstone	-	-	-	-	-	1	1
Subtotal	-	2	3	4	3	8	20
Cores and Specialized/ Worn/Modified Flakes							
Linear Flake	-	-	-	1[1]	-	-	1[1]
Bifacially Retouched Flake	-	-	-	-	-	1	1
Unifacially Retouced Flake	-	-	1/1[1]	-	1	2/2[1]	4/3[1]
Utilized Flake	-	-	-	-	-	1[1]	1[1]
Subtotal	-	-	2	1	1	6	10
TOTAL[2]	1	8	28	27	41	63	168

[1] Fine-grained quartzite.
[2] Does not include indeterminate or unassigned objects.

Table 3-6. Artifacts of basalt, obsidian, granite and other[1] material sorted by zone, 45-OK-287/288.

Artifact	Material	Zone 1	2	3	4	5	6	Total
Formed Object								
Projectile Point	Basalt	–	–	–	–	–	1	1
	Other	–	–	–	1	–	–	1
Biface	Obsidian	–	–	–	1	–	–	1
Scraper	Other	–	–	1	–	–	–	1
Spokeshave	Other	–	–	1	–	–	–	1
Tabular Knife	Basalt	–	–	1	–	1	–	2
	Indeterminate	–	–	–	1			1
Pestle	Basalt	–	1	–	–	–	–	1
Bead	Indeterminate	–	–	–	1	–	–	1
Chopper	Basalt	–	1	2	3	3	11	20
	Grantic	–	–	–	2	–	2	4
	Indeterminate	–	–	–	–	1	2	3
Subtotal		–	2	5	9	5	16	37
Worn/Modified Objects								
Hammerstone	Basalt	–	–	1	2	6	6	15
	Ganitic	1	2	3	2	4	9	21
	Indeterminate	–	–	–	–	2	2	4
Peripherally Flaked Cobble	Granitic	–	1	–	–	–	3	4
Hopper	Basalt	–	–	–	–	1	–	1
Anvil	Granitic	–	–	–	–	1	–	1
Millingstone	Granitic	–	–	1	–	1	–	2
Subtotal		–	3	5	4	15	20	48
Cores and Specialized/ Worn/Modified Flakes								
Core	Basalt	–	–	–	–	–	1	1
	Indetermiate	–	–	–	–	–	2	2
Blade	Basalt	–	–	1	–	–	–	1
Linear Flake	Basalt	–	–	–	1	3	–	4
	Obsidian	–	–	–	–	–	1	1
Resharpened Flake	Basalt	–	–	–	1	1	–	2
Bifacially Retouched Flake	Basalt	–	–	1	–	–	–	1
	Obsidian	–	–	1	–	–	–	1
Unifacially Retouched Flake	Other	–	–	1	–	1	–	2
Utilized Flake	Basalt	–	–	–	1	–	2	3
	Other	–	–	–	–	–	1	1
	Indeterminate	–	–	–	–	2	–	2
Subtotal		–	–	4	3	7	7	21
Total by Material	Basalt	–	2	6	8	15	21	52
	Obsidian	–	–	1	1	–	1	3
	Granitic	1	3	4	4	6	14	32
	Other	–	–	3	1	1	1	6
	Indeterminate	–	–	–	2	5	6	13
TOTAL[2]		1	5	14	16	27	43	106

[1] Other = silicized mudstone, sandstone, silt/mudstone, schist.
[2] Does not include indeterminate or unassigned objects.

Figure 3-7 presents the condition of the lithic assemblage by zone. Most notable is the trend toward increased numbers of complete items below Zone 2. The trend is accompanied by decreases in the frequencies of proximal fragments, i.e., flakes lacking platform and distal termination.

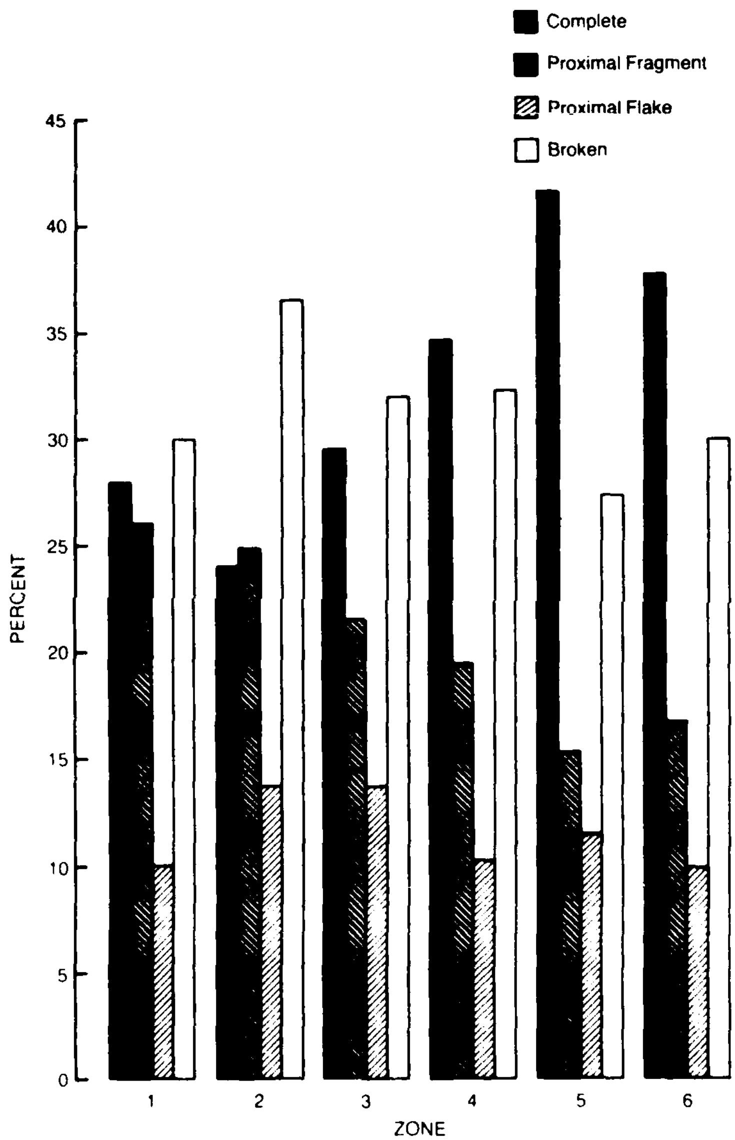


Figure 3-7. Percentage of condition by zone, 45-OK-287/288. N=8,779.

The final dimension of the technological analysis concerns evidence of burning. Analysis shows that heat treatment of lithic material was not generally practiced at 45-OK-287/288. Over 96% of the site assemblage shows no sign of burning or dehydration (Appendix B, Table B-11). Among the zones, the greatest incidence of burning is 5.2% or 23 objects in Zone 2. Dehydrated objects never make up more than 0.2% of a zonal assemblage. The appearance of burned objects does not necessarily reflect a cultural practice; they could easily have been modified by incidental proximity to hearths and firepits.

We can make several significant observations from the technological analysis of the lithic assemblage of 45-OK-287/288. First, we note the emphasis placed on conchoidally fracturing materials. The CCS and argillite assemblages are similar in that they represent the latter portions of the bifacial reduction system. In addition to the bifacial products, the assemblages are marked by little cortex, small reworked cores, linear and bifacial thinning flakes, extensive reuse of flake by-products, small debitage size, and a generally fragmented character. In the case of the CCS, we must temper this interpretation with information about the raw material. The nodules of locally available CCS generally lack the weathered surfaces which make it possible to identify primary flakes. They yield small pieces of workable CCS surrounded by less desirable opal material. The opal tends to fracture conchoidally but is brittle and inadequate for many tool types.

Figure 3-8 shows the frequencies of jasper, chalcedony and opal by analytic zone. Although the CCS tend to decrease in frequency (Figure 3-1) in the lower zones, the frequency of opal increases in Zones 4, 5, and 6. It is difficult for us to determine if this indicates more primary reduction in the earlier zones. There is evidence that primary reduction of other materials did take place: the greater number of primary flakes of basalt and quartzite, the lower numbers of <1/4" flakes of all materials and the increased numbers of complete objects recovered. However, as will be demonstrated shortly, we should not rely heavily on evidence of primary lithic reduction of the non-conchoidally fracturing materials to infer similar treatment of CCS.

The small size of the remaining desirable CCS material from the nodules and the assemblage itself suggest that special techniques, varying from the basic scheme presented above, were used in the bifacial lithic reduction. Rather than reducing raw material step by step through the entire sequence until a projectile point, for example, was formed, bifacial modification of relatively large flakes into formed objects is more common. This reduction method produces tools from flakes rather than from cores.

A bipolar technique was probably used on relatively small pieces of raw material to produce the maximum number of usable flakes and possibly tabular blanks for further reduction. In this system, a core was placed on an anvil stone, held in place and struck with a hammerstone. Because the force passing through the core travels unobstructed into the anvil this method produces characteristic flakes that are flat in half section as well as characteristic cores and shatter (Flenniken, in Cleveland et al. 1978; Leaf 1979). The technique has been suggested by the artifact assemblage from the Miller Site near the confluence of the Snake and Columbia Rivers (Flenniken 1978) but it cannot be confirmed here without re-examination of the debitage.

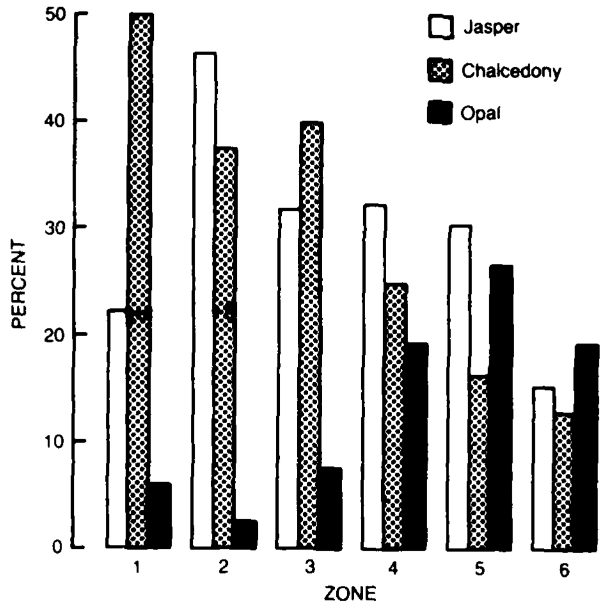


Figure 3-8. Relative frequencies of cryptocrystalline silicas by zone, 45-OK-287/288.

Our second observation concerns the increased frequency of argillite in Zones 5 and 6. The argillite assemblage is dominated even more by products of later reduction stages than the CCS. There is a remarkable lack of representative by-products from the early manufacture stages. The near absence of cores and primary debitage suggests initial reduction at another location. At Kettle Falls the sources of black argillites in the Ksunku Phase are thought to have been mountainous regions some distance from the river (Chance and Chance 1982). In any case, argillite appears to replace at least some of the CCS in the lower zones. We attribute this to cultural preference rather than any intrinsic physical characteristic of the argillite.

Third, we note the increased frequency of basalts and quartzites in the lower zones. We attribute this to a shift in site function, rather than to the substitution of one material by another. In the lower zones there is a greater emphasis on cobble-derived objects and a simultaneous increase in quartzite and basalt debitage as these items are manufactured and modified. Figure 3-9 illustrates this trend. Zones 1 and 2 are not presented because of small sample sizes and Zone 4 is not presented because it represents a broad time span and uncertain cultural context for most of the artifacts.

The artifacts which are primarily CCS and argillite (projectile points, bifaces, gravers, scrapers, and spokeshaves) make up different proportions of the zone assemblages. In Zone 3 formed objects, clearly dominated by projectile points and bifaces, make up 64.9% of the artifacts presented in Figure 3-9. The bifaces in conjunction with the greater frequency of <1/4 inch flakes suggests greater emphasis on the final stages of CCS reduction to manufacture projectile points and other bifacial implements.

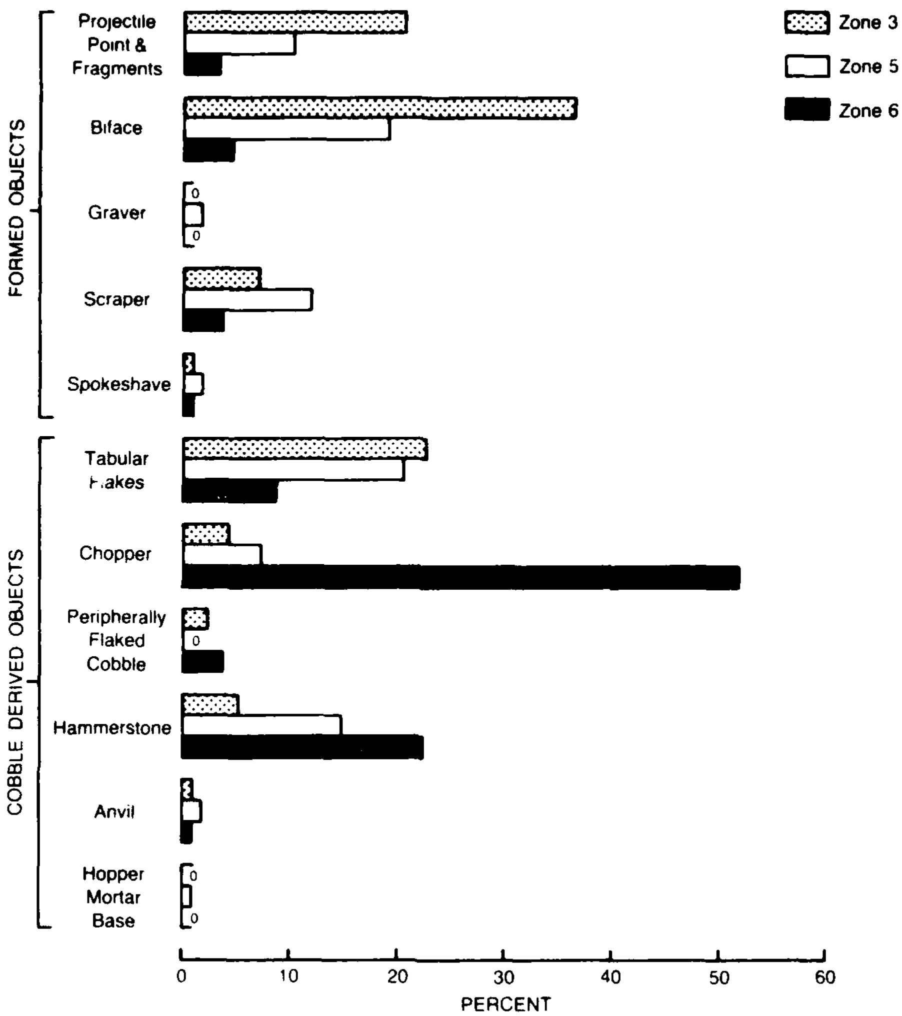


Figure 3-9. Relative frequencies of cobble derived objects (N=234), other formed objects (N=177), excluding specialized/ modified/worn flakes, bifaces and tabular knives, 45-OK-287/288.

In contrast, the objects made primarily from quartzite, basalt and granitic cobbles (particularly choppers and hammerstones) make up a larger proportion of the objects in Zones 5 and 6. Projectile points and bifaces make up a smaller proportion of the artifacts in these zones than in Zone 3.

The differences are most pronounced between Zones 3 and 6. The deflation of many of the cultural concentrations in Zone 6 as discussed in Chapter 2 is probably responsible for the size of the contrast. However, a similar trend is apparent when Zones 3 and 5 are compared. In Zone 5 the formed objects of Figure 3-9 make up 50.0% of the artifacts presented. There are smaller proportions of projectile points and bifaces and larger relative frequencies of choppers and hammerstones. Notably, the proportions of tabular knives are similar in Zones 3 and 5 suggesting they were necessary implements in occupations of both zones.

As will be shown in the analyses of features, faunal and botanical remains, these variations probably are linked to different activities and patterns of site use. Zone 3 contains a structure, perhaps used year-round, and related activity areas, while the lower zones contain evidence of seasonally visited hunting camps.

Finally, we note that while emphasis on different material types may vary among the zones, the technological systems employed do not. Conchoidally flaking materials were used consistently to produce finely flaked objects. Other materials were used for percussion and to form minimally modified objects.

FUNCTIONAL ANALYSIS

The functional analysis of lithic artifacts from 45-OK-287/288 provides basic descriptive information on characteristics and modifications associated with manufacture and use. Manufacture-specific dimensions include indications of utilization and modification as well as manufacture type and its disposition. Seven dimensions are specific to each worn area on an object: condition of wear, the relationship between wear and manufacture, kind of wear, wear location on the object, wear area shape, wear orientation, and the edge angle at the wear location. The variables of the dimensions are presented in Appendix B, Table B-13.

It may prove helpful to summarize briefly the sequence involved in the selection of most lithic tools. The tool user chooses a lithic item according to the nature of the task at hand and the availability of a tool to perform it. Any task demands that the selected tool possess certain attributes which may be inherent in the tool or require its modification. The use of a tool may destroy these attributes, resulting in modification or discard or it may create the attributes that identify tool function. A single tool may serve several functions before it is finally discarded.

The functional analysis presented here does not exhaustively identify or quantify the activities which took place at 45-OK-287/288, but it does indicate the kinds of tasks undertaken by the occupants. When applied to the traditional descriptive categories, functional analysis refines object classification and interpretation.

Various investigators have documented and described complexes of wear attrition and edge angle associated with specific functions both ethnographically and experimentally (e.g., Frison 1968; Wilmsen 1970; Gould et al. 1971; Gould and Quilter 1972; Hayden and Kamminga 1973; Wylie 1975). While it would be difficult to correlate the present analysis directly with the observations in the literature, because of differences in method and quantification, some indication of general functions may be derived. The kinds, locations and intensity of detectable wear traces are dependent on the mode of use, the material the tool is made from, the character of the tool edge, the nature of the material worked, and the presence or absence of abrasive agents (Hayden and Kamminga 1973:6). These traces are not directly comparable as quantifications of the tasks performed because tool material types, tool forms, and functional activities all influence the number and kinds of traces resulting from use (Wylie 1975). A host of other factors, including weathering, manufacturing and rejuvenating practices, multiple use for different tasks, recovery processes, and postrecovery accidents complicate wear detection and functional interpretation.

Just as no single wear trace is clear evidence of function, neither is edge angle alone diagnostic of a particular task. The shear and tensile strength of the tool material in relation to the force and angle of application, the artifact form, and the hardness of the material being worked are also key factors. The optimal tool edge angle is "a compromise between worked material hardness and the ability of the tool to withstand stress" (Wilmsen 1974:91). Cryptocrystallines, for example, are stronger in compression than in shear or tensile strengths. This means that forces exerted into the body of the tool are absorbed without damage if the tool is thick enough at the point of force application to transmit the developed stresses. Thus, very acute angles were probably seldom used because of the fragility of such an edge. Edges with mid-range angles can transmit forces directly into the body of the tool without excessive damage, but break easily under transversely applied loads. More obtuse angles are able to absorb shear stresses as well as compression (Wilmsen 1974:92).

Table 3-7 presents general correlations and variables of wear. In the subsequent discussion, some variables of the wear dimensions have been combined as shown in Appendix B (Table B-16). A single category, smoothing, represents variables of smoothing, polishing and abrasion; a second category, crushing, includes all modes involving crushing. All locations that involve a point have been combined as point. Convex and mildly convex shapes of worn area were collapsed , as were concave and mildly concave.

The following discussion is intended to characterize the assemblage and to highlight contrasts among the zones. Contrast among zones alert us to possible differences in site function and activities that may not be apparent from the distribution of formal object types above. We can then trace general patterns to association with specific kinds of cultural contexts or implements where morphological or technological attributes may then help us interpret the assemblage. Zones may also be compared among the project sites on the basis of similar variables to identify cultural trends without recourse to individual artifact comparisons.

Over 92.2% of the lithic assemblage from 45-OK-287/288 is unmodified debitage from the manufacturing processes. Among the remaining artifacts, worn and worn and manufactured objects are almost twice as common as objects in the site assemblage displaying manufacture only (Figure 3-10). If we disregard Zones 1 and 2 whose sample sizes are very low, we find the greatest difference in the category of manufacture only; Zone 3 has the greatest frequency, Zone 5 the lowest. Among the other categories, the differences are less pronounced.

Table 3-7. Variables of wear and implied functions[1].

General Activity	Specific Function	Materials Modified	Associated Edge Angle (degrees)	Typical Wear Traces
Scraping	Soft Scraping	Hide	50-80	Smoothing; edge and unifacial
	Hard Scraping	Wood, Bone	70-90	Hinged and feathered chipping, smoothing edge and unifacial
Cutting	Carving	Hide, Flesh Wood	30-60	Feathered chipping and smoothing; bifacial
	Sawing	Wood, Bone	20-70	
Percussion	Chopping	Wood, Bone	60-90	Hinge chipping and crushing; edge and bifacial
	Pounding	Wood, Bone Stone, Shell	N/A	Crushing, pecking, surface
Penetration	Drilling	Wood, Bone Stone, Shell	N/A	Hinged and feathered chipping, smoothing; opposing unifacial and point
	Awling	Hide	N/A	Feathered chipping, smoothing; bifacial and point
	Projectile Impact	Hide, Bone Soil, Stone	N/A	Tip burination striations Hinge fracture

1 Adapted from Wylie 1975:Figure 2, Figure19.

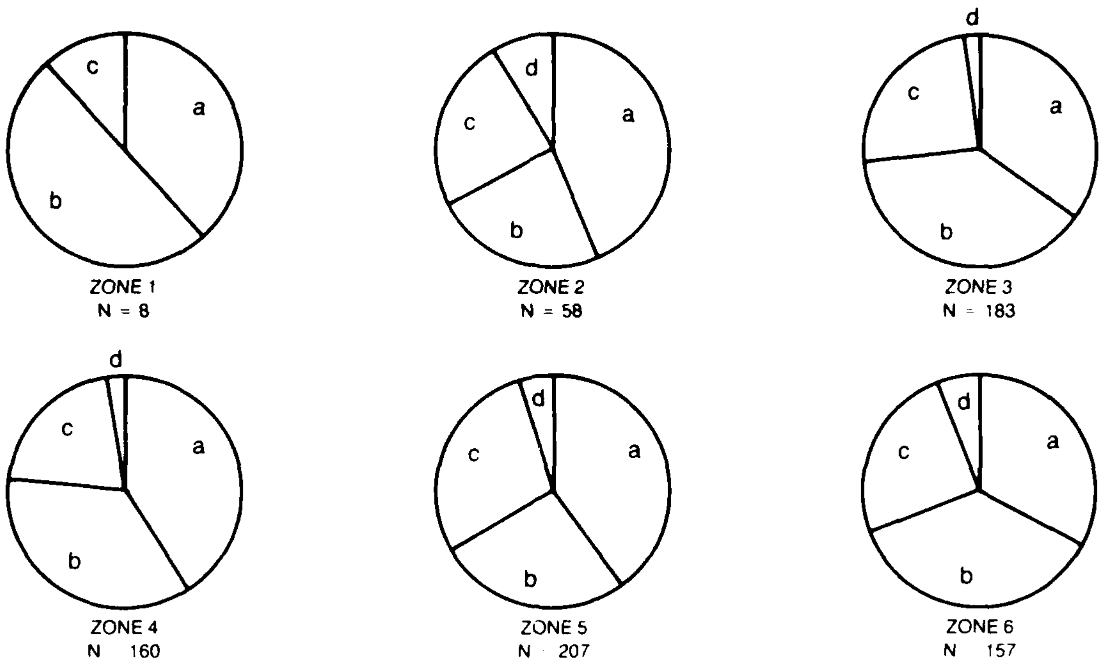


Figure 3-10. *Count of utilization/modification of lithic artifacts by zone,* 45-OK-287/288. (a = wear only, b = manufacture only, c = wear and manufacture, d = indeterminate)

The type of manufacture is limited to chipping and one instance of *pecking and grinding.* Manufacture partially modifies 83.0% of the objects; the rest are totally modified or indeterminate. Zone 6 shows the lowest occurrence of totally modified lithic artifacts and the greatest frequency of partially modified artifacts (Figure 3-11). The remaining zonal frequencies, again excluding Zones 1 and 2, decrease from Zone 5 to Zone 3 for partial modification and from Zone 3 to Zone 5 for total modification. When wear occurs on modified artifacts, it most often totally or partially overlaps the manufacture (Figure 3-12). There is a small percentage of artifacts with wear occurring opposite to, or independent of, the manufacture, suggesting tool backing.

Feathered chipping is the most common kind of wear (Figure 3-13). Smoothing is next most common, followed by hinged chipping. This pattern is followed in all of the zones except for Zone 6 where instances of crushing outnumber all other kinds of wear and smoothing and feathered chipping occur with similar frequency.

Feathered and hinged chipping occur primarily unifacially (Figure 3-14). Smoothing is most diverse in its locations, occurring most frequently on edges alone, and, in lower frequencies, unifacially and bifacially on edges. Smoothing is the most common wear trace found on points. Crushing is most common on surfaces, and is also found on edges.

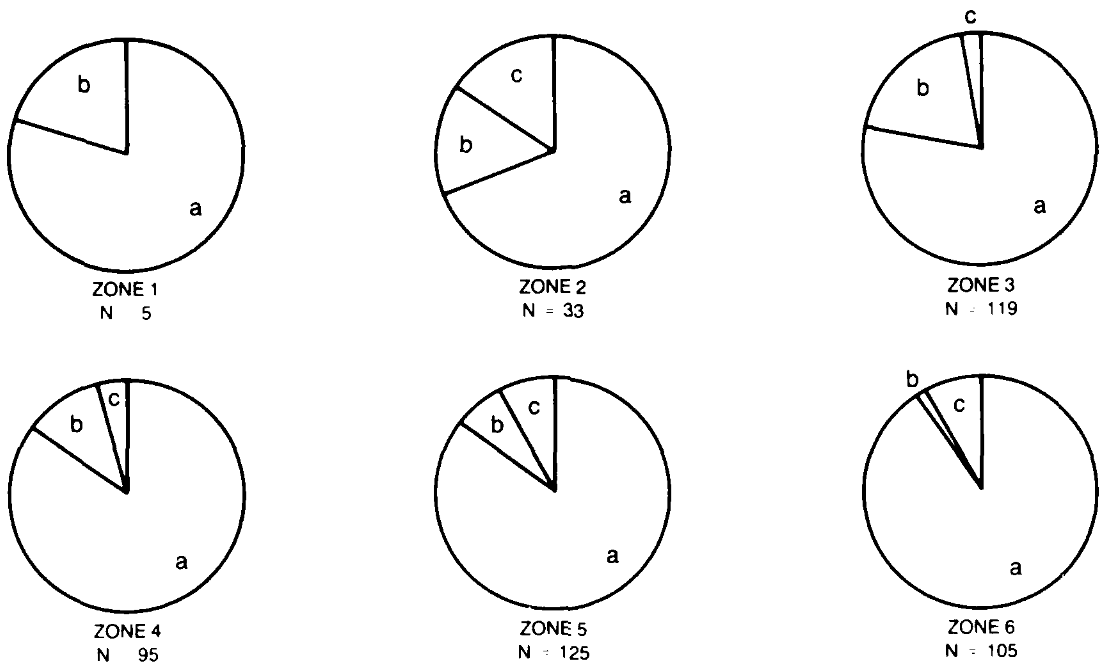


Figure 3-11. Lithic manufacture disposition by zone, 45-OK-287/288. (a = partial, b = total, c = indeterminate)

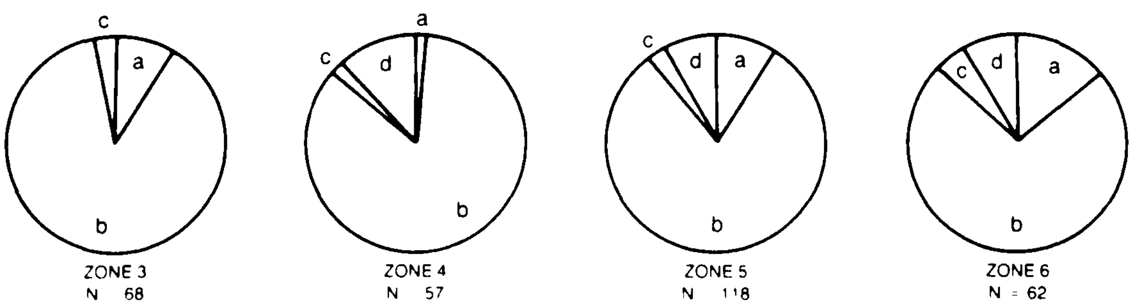


Figure 3-12. Lithic wear-manufacture relationship by zone, 45-OK-287/288. Zone 1 (N=1) and Zone 2 (N=24) show total overlap only. (a = independent, b = total overlap, c = partial overlap, d = independent-opposite)

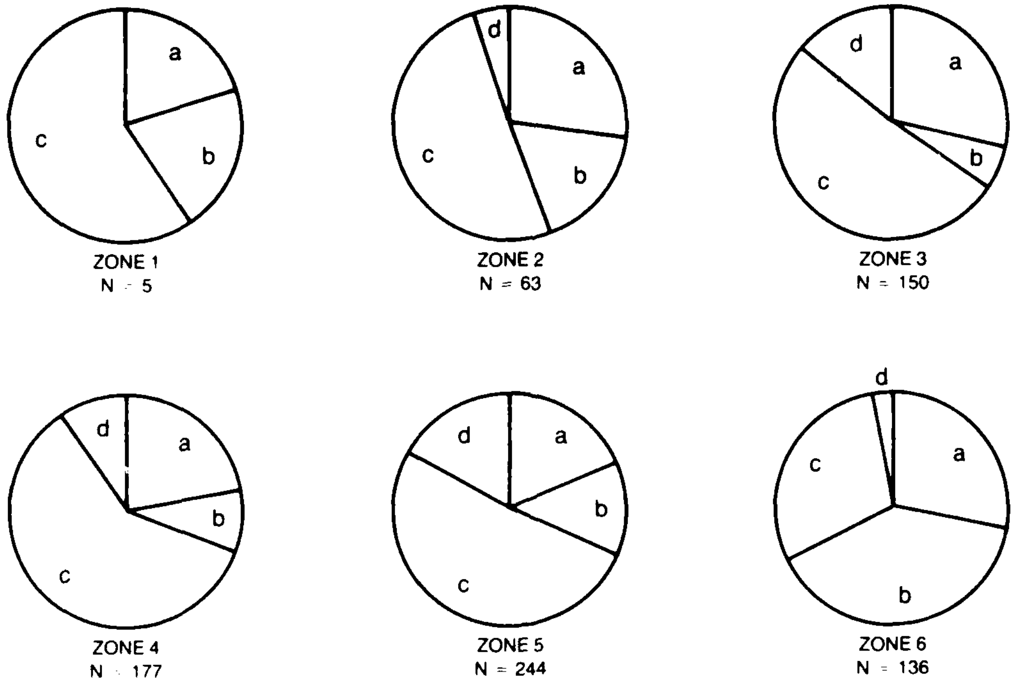


Figure 3-13. Kinds of wear on lithic artifacts by zone, 45-OK-287/288. (a = smoothing, b = crushing, c = feathered chipping, d = hinged chipping)

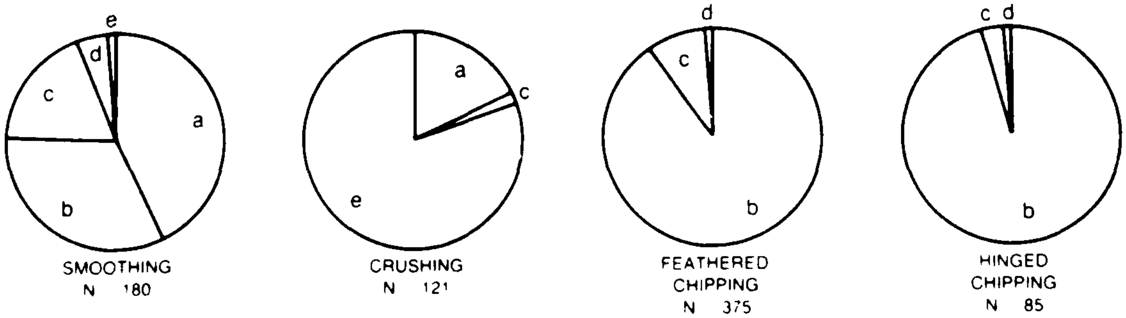


Figure 3-14. Kinds of wear by location of wear, 45-OK-287/288. (a = edge only, b = unifacial, c = bifacial, d = point, e = surface)

The association of kind of wear with the shape of the worn location is presented in Figure 3-15. Hinged and feathered chipping are generally associated with straight or convex worn areas and are often found on concave areas. Smoothing and crushing are more frequently found on convex areas than the other two kinds of wear. Smoothing also appears on straight areas, points and concavities. Crushing also occurs on straight and concave areas.

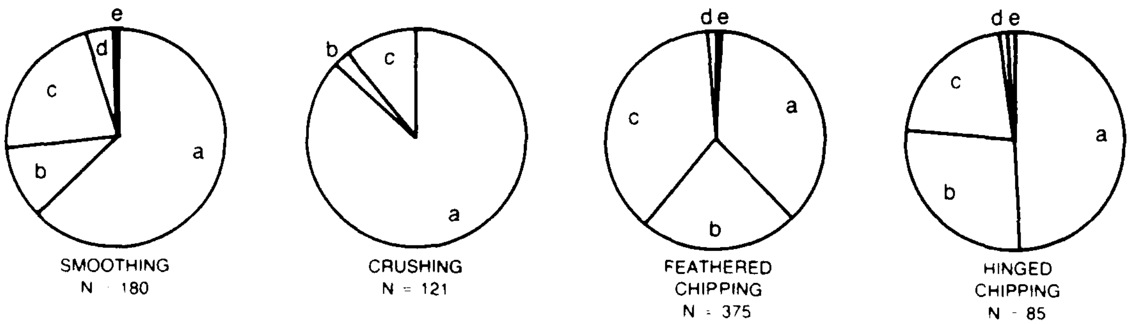


Figure 3-15. Kinds of wear by the shape of worn area, 45-OK-287/288. (a = convex, b = concave, c = straight, d = point, e = irregular)

Feathered chipping is associated with more acute edge angles from 6 to 45 degrees (Figure 3-16). Only 17.9% of the edge angles associated with this kind of wear are greater than 55 degrees. In contrast, hinged chipping, while found on similar locations and similarly shaped areas, is associated with steeper angles, the greatest frequencies occurring between 46 and 75 degrees. Only 26.0% of the hinge chipped edge angles are less than 46 degrees. Angles associated with smoothing hold an intermediate position between feathered and hinged chipping wear. The greatest frequency is found in the 36 to 75 degree range. Crushing is almost entirely limited to surfaces. Only 19.1% of the crushed locations are associated with edges. Of these, all but three have angles greater than 56 degrees.

Most of the wear is oriented perpendicular to the edge. Less than 1.4% of the wear had oblique or diffuse orientation. The condition of the wear, that is, the complete or fragmentary state of the wear location and its complex of variables, also was recorded. Over 77% of the wear locations were determined to be complete. These characteristics vary little in the zones with large samples (Appendix B, Table B-26).

The intent of manufacture to modify the characteristics of a lithic object are apparent when wear and wear/manufacture are correlated with edge angle (Figure 3-17). Manufactured items show steeper edge angles than unmodified, worn objects.

The relationship of kinds of wear to manufacture also helps us understand how tools might have been modified (Figure 3-18). Manufactured items show greater portions of hinged chipping and smoothing. While these associations may be attributed to use, it is likely that some are the result of manufacture. Hinged chipping, in particular, is known to result from platform preparation and flake detachment, especially where a broad-edged percussor is

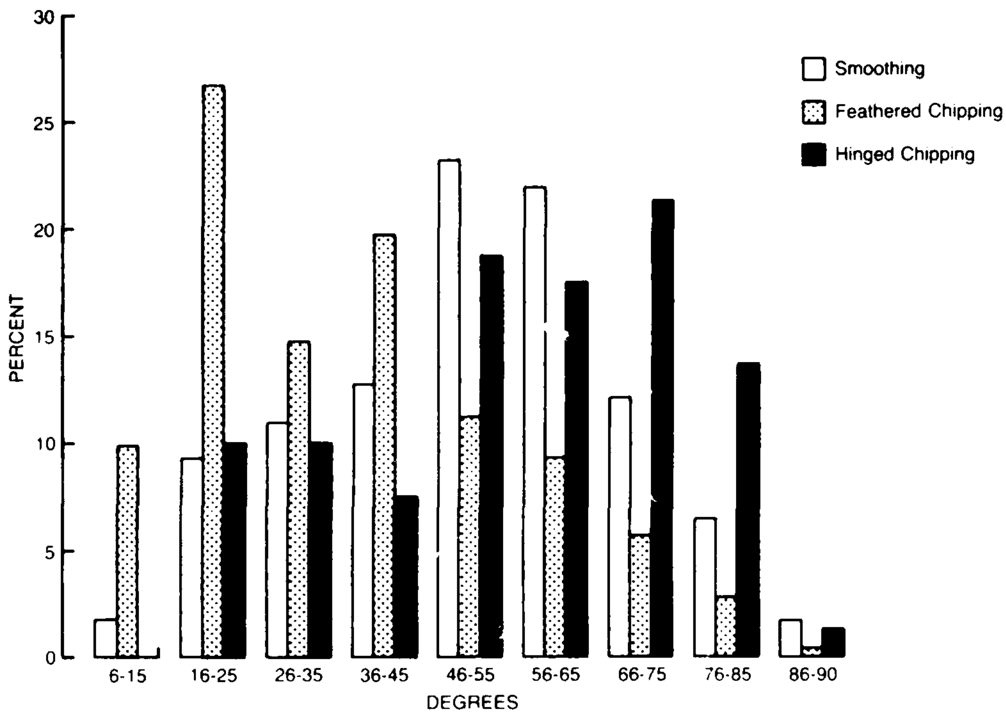


Figure 3-16. Kinds of wear associated with edge angles, 45-OK-287/288. (Smoothing, N=173; feathered chipping, N=375; hinged chipping, N=80)

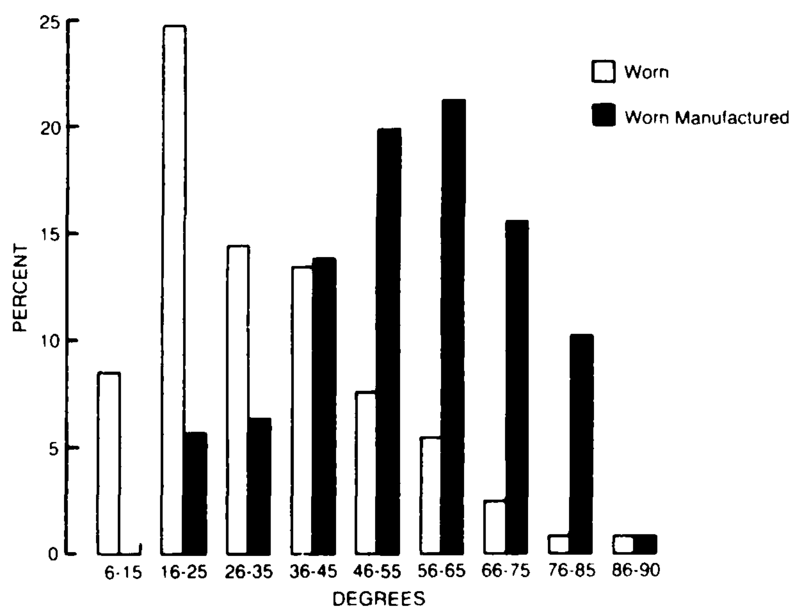
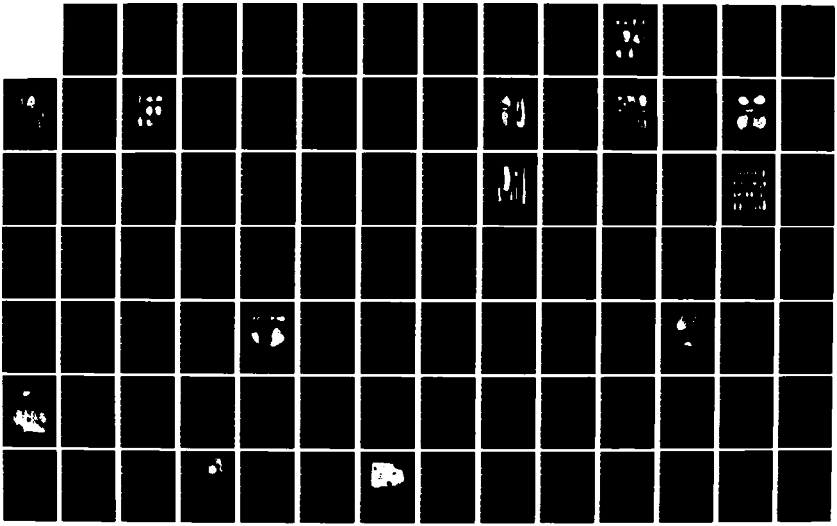
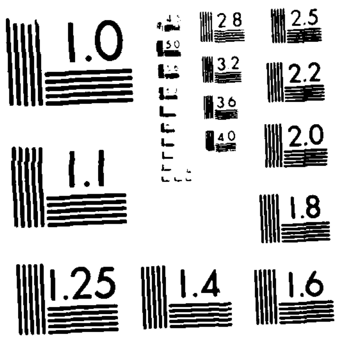


Figure 3-17. Angle distribution for worn only (N=430) and worn/manufactured edges (N=327), 45-OK-287/288. (Indeterminate, N=4)

AD-A162 760 ARCHAEOLOGICAL INVESTIGATIONS AT SITES 45-OK-287 AND 2/4
45-OK-288 CHIEF JOSE . (U) WASHINGTON UNIV SEATTLE
OFFICE OF PUBLIC ARCHAEOLOGY C J MISS ET AL 1984
UNCLASSIFIED DACW67-78-C-0106 F/G 5/6 NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS

applied. Misadventure is another common source of edge damage (e.g., Flenniken and Haggarty 1979).

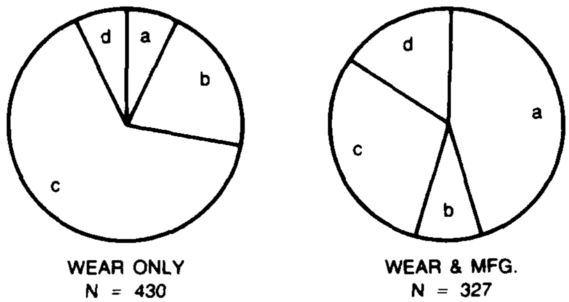


Figure 3-18. Kinds of wear by utilization/manufacture, 45-OK-287/288. (a = smoothing, b = crushing, c = featherd chipping, d = hinged chipping)

With the characteristics of the site assemblage in mind, we may examine traditional lithic artifact definitions from the perspective of the functional data. Figure 3-19 presents the percentage of worn object types. Figure 3-20 presents the ratios of the number of wear locations to the number of worn object types. It illustrates the general degree of use of a class of artifacts without implying function and the degree to which functional attributes influence classification. Projectile points and tips, bifaces, and linear flakes and all objects whose definitions are more closely associated with morphology and the manufacturing system, show relatively low wear percentages. Projectile points also have a relatively low ratio because they are associated with a single function and are easily recognized. Drills, resharpening flakes, bifacially retouched flakes, and choppers have mean ratios of less than one, indicating that they depend strongly on morphology for definition. The ratio of 1.00 may reflect low object type frequency or the use of a single function for definition as in the case of the burin and the hopper. Ratios greater than 1.00 reflect the presence of several tools on single objects. This may indicate that an object has been used for several tasks, or bears traces unrelated to use for a task as in the case of hafting wear. The high ratios for hammerstones, unifacially retouched flakes, and utilized flakes reflect a tendency to use these tools repeatedly or for several tasks.

In the subsequent discussion, the lithic artifact assemblage is examined in terms of formal object types. Accompanying tables illustrate kinds of wear, locations of wear, and shapes of worn locations where appropriate. Table 3-8 presents edge angle data in 30 degree intervals in relation to kind and location of wear by object type. Illustrations of typical artifacts accompany the discussion.

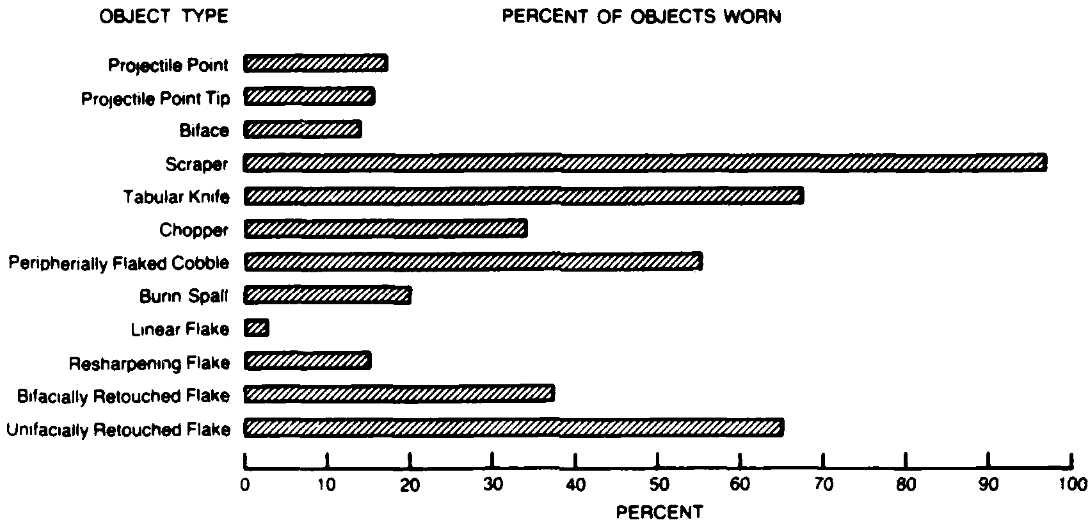


Figure 3-19. Percent of objects worn, 45-OK-287/288. Does not include objects where all are worn; gravers, spokeshaves, pestle, edge-ground cobble, hammerstones, anvils, utilized flakes.

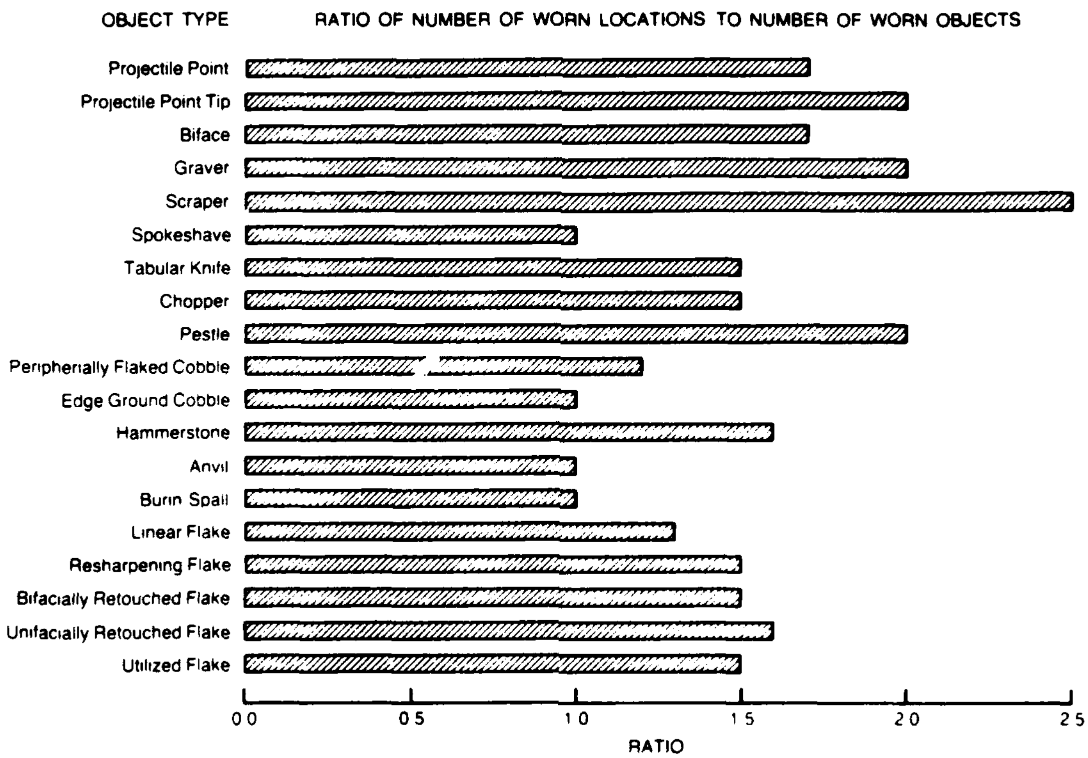


Figure 3-20. Ratio of worn locations to the number of worn objects, 45-OK-287/288.

Table 3-8. Kind of wear, location of wear and associated edge angle, 45-OK-287/288.

Kind of Wear	Smoothed									Feathered Chipping						Hinged Chipping					Crushing				Total[1]					
Location of Wear	Edge			Unifacial			Bifacial			Unifacial			Bifacial			Unifacial			Bifacial		Edge		Bifacial		N	Row %	N	Row %	N	Row %
Edge Angle[2]	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	2	3	2	3	1		2		3	
Projectile Point	-			-	-	1	-	2	-	-	1	-	1	3	-	-	2	-	-	-	-	-	-	-	1	10.0	8	80.0	1	10.0
Projectile Point Tip	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	100.0	-	-
Biface	-	-	-	-	1	2	-	2	-	-	4	1	-	4	-	-	1	2	-	-	-	-	-	-	-	-	12	70.6	5	29.4
Graver	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-
Scraper	-	-	-	2	7	18	-	1	-	-	9	11	1	1	1	1	5	17	-	-	-	-	-	-	4	5.4	25	31.1	47	63.5
Spokeshave	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	1	33.3	2	66.7
Tabular Knife	15	39	13	-	1	-	-	5	-	-	2	-	-	-	-	-	-	-	-	-	-	1	-	-	15	19.7	47	61.8	14	18.5
Chopper	-	2	3	-	4	1	-	2	6	-	-	-	-	-	-	-	-	-	-	-	4	14	1	1	-	-	13	34.2	25	65.8
Peripherally Flaked Cobble	-	2	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	60.0	2	40.0
Hammerstone	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	1	50.0	1	50.0
Burin Spall	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	100.0	-	-	-	-
Linear Flake	-	-	-	-	-	-	-	-	-	4	2	-	1	-	-	-	1	-	-	-	-	-	-	-	5	62.5	3	37.5	-	-
Resharpening Flake	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	2	66.7	1	33.3
Bifacially Retouched Flake	-	1	-	-	-	1	-	1	-	-	4	4	-	-	-	-	2	-	1	-	-	-	-	-	1	7.1	8	57.1	5	35.8
Unifacially Retouched Flake	-	-	-	1	4	2	-	2	-	6	26	8	1	1	-	1	4	11	-	-	-	-	-	-	9	13.4	36	53.7	22	32.9
Utilized Flake	-	2	-	4	7	2	5	3	1	114	89	15	13	7	-	11	8	5	-	1	-	-	-	-	177	55.8	177	36.9	23	7.3
Subtotal	15	46	16	7	24	28	5	18	8	154	142	40	17	16	1	13	26	38	2	1	5	16	1	1	213	33.3	278	43.4	149	23.3
Row %	19.5	59.7	20.8	11.8	40.7	47.4	16.1	58.1	25.8	45.8	42.3	11.9	50.0	47.1	2.9	16.9	33.8	49.3	66.7	33.3	23.8	76.2	50.0	50.0						
TOTAL		77 12.0			59 9.2			31 4.8			336 52.3			34 5.5			77 12.0			3 0.5	21 3.3		2 0.3					640 99.9		

[1] Does not include worn points, irregular SWA (N=2), smooth surface (N=1), >80° angles (N=1), surfaces.

[2] Edge angle codes:
- 1 = low edge angle (1-30°)
- 2 = intermediate edge angle (31-60°)
- 3 = steep edge angle (61-90°)

PROJECTILE POINTS, BASES, TIPS

These artifacts will be more thoroughly discussed in the stylistic analysis and are illustrated there. Generally, they are bifacially flaked, axially symmetrical objects, lenticular to planoconvex in cross section, triangular- to lozenge-shaped in plan section, with basal modification for hafting to an arrow, dart, or lance shaft.

All of the objects included in this category may not have been intended for use as projectile points. The stylistic analysis identified a single large triangular, finely finished object (Type 1) that seems more appropriately classified as a knife.

Less than 15% of the projectile points and tips display functional traces and bases show none at all except for gross hinge fracture (Figure 3-19). Worn points and tips come from Zones 3, 5, and 6. Wear consists primarily of bifacial feathered chipping on convex locations for the points and entirely of unifacial feathered chipping on convex or straight locations for the tips (Table 3-9). Unifacial and bifacial smoothing on convex and straight locations and unifacial hinged chipping of straight locations also occur. Medium edge angles are associated with most of the wear.

Table 3-9. Kind of wear, location of wear, and shape of worn areas of projectile points and tips, 45-OK-287/288.

Kind of Wear (% Total)	Location of Wear (% Total)	Shape of Worn Area (% Total)	Zone			Total	
			3	5	6		
Projectile Points							
Smoothed (30.0)	Unifacial (10.0)	Convex (10.0)	-	1	-	1	10.0
	Bifacial (20.0)	Convex (10.0)	-	-	1	1	50.0
		Straight (10.0)	-	-	1	1	10.0
Feathered (50.0)	Unifacial (10.0)	Convex (10.0)	1	-	-	1	10.0
	Bifacial (40.0)	Convex (40.0)	2	2	-	4	40.0
Hinged (20.0)	Unfacial (20.0)	Straight (20.0)	-	2	-	2	20.0
			-	2	-	2	20.0
Total			3	5	2	10	100.0
Projectile Point Tip							
Feathered (100.0)	Unifacial (100.0)	Convex (50.0)	-	2	-	2	50.0
		Straight (50.0)	-	-	2	2	50.0

Most of the traces recorded as wear probably resulted from manufacture as suggested by the dominance of bifacial damage on bifacially manufactured objects. However, the wear and edge angle complexes also suggest use for light cutting and scraping.

Breakage data for projectile points also provides information about use. Appendix B, Figure B-1 presents the variables of the breakage analysis. Eleven of the 36 projectile points included in the stylistic analysis are complete specimens. The remaining 25 points have 35 breakage locations (Table 3-10). The most common location of breakage is the blade with the breaks oriented perpendicularly or diagonally to the long axis of the projectile point. Distal and proximal blade breakage is more common than mid-blade breakage locations. Barbs and shoulders are broken most often diagonally.

Table 3-10. Breakage data for classified projectile points by zone, 45-OK-287/288.

Kind of Break by Location	Zone					Total
	2	3	4	5	6	
Distal 1/3						
Perpendicular	-	2	-	-	1	3
Diagonal	-	3	1	1	-	5
Barbed or Shouldered						
Perpendicular	-	1	-	-	-	1
Diagonal	-	6	-	1	-	7
Mid-Blade						
Perpendicular	-	-	-	-	1	1
Diagonal	-	-	-	-	1	1
Parallel	1	-	-	-	-	1
Proximal 1/3						
Diagonal	2	-	2	1	-	5
Parallel	-	-	-	1	-	1
Multiple	-	-	-	1	-	1
N/A						
Diagonal	-	1	-	-	-	1
Parallel	-	-	-	-	1	1
Multiple	-	-	2	-	-	2
Reworked						
Perpendicular	-	-	1	-	-	1
Multiple	-	-	-	1	-	1
Reworked	-	2	1	-	-	3
Total	3	15	7	6	4	35

We cannot tell what proportion of the damage to projectile points is due to impact during use as projectiles. Diagonal and parallel breaks could result from force applied to the long axis of the object. Perpendicular breaks would result from application of lateral force to the blade. We do not know the context in which these forces were applied. That the blade typically receives the damage suggests that hafting protected the proximal base and neck. However, the frequent breakage of barbs and shoulders suggests that these were exposed. Breakage is most common in Zone 3 which has the largest number of projectile points. As will be seen in the stylistic analysis, most of these points are small with fragile barbs so this result is not surprising. The points from the earlier zones tend to be lanceolate or shouldered with few projections so that breakage is primarily of the blade (see Appendix B, Table B-27 for breakage by historical type).

The breakage analysis was only applied to projectile points complete enough to be considered for stylistic analysis. Other tips, bases and fragments included in the functional analysis were not considered. It also does not take into account possible projectile point fragments included in the biface category.

BIFACES

This type of artifact has been mentioned in the discussion of the lithic reduction sequence. The objects are usually made from flakes. They are thin, lenticular in cross section, and ovate, sub-triangular or leaf-shaped in plan view. Numerous fragments of other kinds of bifacial artifacts are included in this category. Bifaces are distinguished from projectile points by lack of basal modification, broader width, and less refined, unpatterned or collateral flake scars. As with the projectile points, few of these objects display wear traces.

Feathered, unifacial and bifacial chipping on convex and straight locations is the most common complex (Table 3-11). Bifacial smoothing on convex and straight locations is next most frequent, followed by feathered unifacial chipping also on convex and straight locations. Unifacial and bifacial smoothing on convex and concave locations and minor occurrences of hinged chipping are also found. Medium edge angles are associated with the bifacial wear (Table 3-8). Steep edge angles are associated with the unifacial wear.

As with the projectile points, much of the wear, especially the feathered chipping, may be residual manufacturing traces. It may also result from the inclusion of fragments of other tools in the category. The high frequency of smoothing, bifacial damage, and associated medium edge angles suggests cutting activities. The location on convexities and concavities suggests cutting of soft material such as flesh or hides. The unifacial damage, steeper angles and convex and concave locations suggest light scraping of similar materials.

GRAVERS

Artifacts in this category are characterized by a unifacially modified projecting tip (Plate 3-1:i,j). Gravers may be entirely modified by manufacture into the desired form or show intentional retouch only on the bit. Traditionally they are thought to have been used for incising wood and bone. Two of the four wear complexes consist of smoothed points. The other two artifacts show unifacial hinged chipping on convex locations. While this wear is not incompatible with their proposed functions, more unifacial hinged chipping might be expected. Perhaps softer material than wood or bone, such as hide, was being worked.

Table 3-11. Kind of wear, location of wear, and shape of worn areas for bifaces, 45-OK-287/288.

Kind of Wear (% Total)	Location of Wear (% Total)	Shape of Worn Area (% Total)	Zone					Total
			2	3	4	5	6	
Smoothed (29.5)	Unifacial (17.7)	Convex (11.8)	-	-	-	1	1	2
		Concave (5.9)	-	-	-	1	-	1
	Bifacial (11.8)	Convex (11.8)	-	-	-	-	2	2
Feathered Chipping (52.9)	Unifacial (29.4)	Convex (17.6)	2	1	-	-	-	3
		Concave (11.8)	-	-	2	-	-	2
	Bifacial (23.5)	Convex (17.6)	-	-	2	1	-	3
		Straight (5.9)	-	-	-	1	-	1
Hinged Chipping (17.7)	Unifacial (17.7)	Convex (11.8)	-	2	-	-	-	2
		Concave (5.9)	-	1	-	-	-	1
Total			2	4	4	4	3	17

SCRAPERS

Scrapers have been defined in this analysis as flakes with steep, unifacial, intentional retouch forming a convex edge. The shape of the original flake and most of one surface must be altered by the modification (Plate 3-1:a-n). Unifacial smoothing of convex locations is the most common wear complex followed by unifacial hinged chipping on convex and straight locations (Table 3-12). Feathered unifacial chipping on convex and straight locations also is common. These major categories of wear are also found in lower frequencies on concave locations. The associated edge angles are usually greater than 60 degrees although many fall into the intermediate range as well (Table 3-8). The unifacial smoothing and chipping damage combined with the edge angles suggest either that scraping of both soft and harder materials was done, or that the implements were not used long enough on a soft material to develop uniform smoothing wear. The damage on concave locations suggests scraping of pliable materials or hafting.

SPOKESHAVES

These artifacts have deeply concave flake edge segments formed by unidirectional use or use and intentional retouch. Their surmised function is the shaping and smoothing of cylindrical wood and bone implements. The four instances of wear recorded for artifacts in Zones 3, 5 and 6 consist of

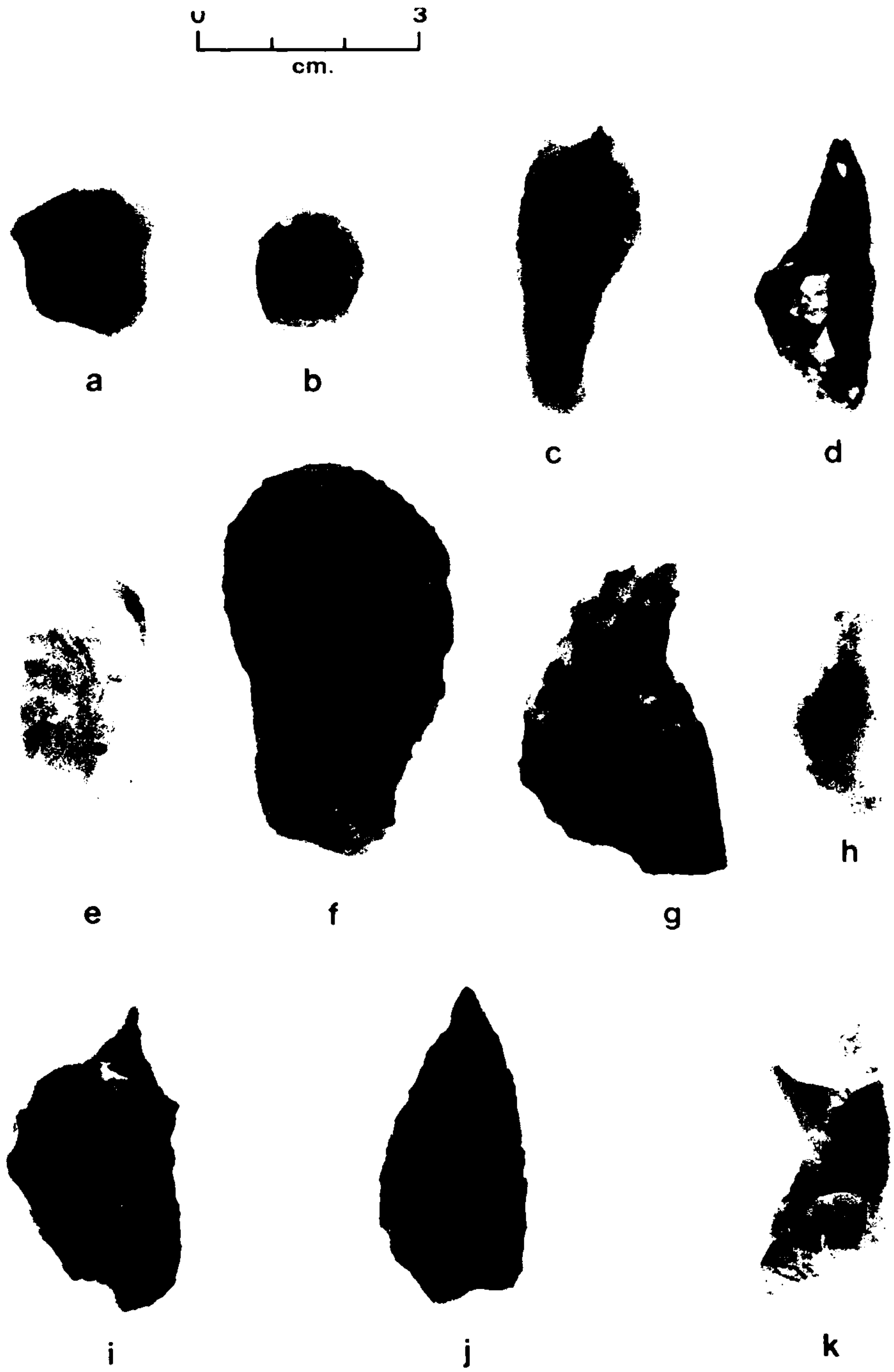
KEY
Master Number:
Tool:
Provenience/Level:
Zone:
Material:

a.	b.	c.	d.
281	515	263	20
Scraper	Scraper	Scraper	Scraper
1N6W/FE7,54/190	35SW/230	2N5W/FE7/195	0N4W/150
5	5	5	4
Chalcedony	Chalcedony	Chalcedony	Jasper

e.	f.	g.	h.
89	137	223	825
Scraper	Scraper	Scraper	Scraper
0N5W/FE7/200	155W/FE7/200	2N3W/180	20S3W/FE47/180
5	5	5	3
Opal	Jasper	Jasper	Opal

i.	j.	k.
214	67	676
Graver	Graver	Indeterminate
2N4W/190	0N6W/FE7/200	17S6W/FE59/160
5	5	4
Jasper	Jasper	Basalt

Plate 3-1. Examples of gravers and scrapers, 45-OK-287/288.


0
3
cm.
a
b
c
d
e
f
g
h
i
j
k

unifacial, hinged chipping of concave locations, a complex compatible with the traditional function. However, while displaying the expected wear attributes, three of the four artifacts should be regarded with caution. They occur on quartzite cobble fragments that have been modified with percussion blows. The narrowness (<1 cm) of the concavities in conjunction with location on cobble fragments and extreme hinged chipping to the point of crushing suggest the indentations may have resulted from blows during reduction rather than use as spokeshaves.

Table 3-12. Kind of wear, location of wear, and shape of worn areas for scrapers, 45-OK-287/288.

Kind of Wear (% Total)	Location of Wear (% Total)	Shape of Worn Area (% Total)	Zone 3	Zone 4	Zone 5	Zone 6	Total
Smoothed (36.8)	Unifacial (35.5)	Convex (25.0)	3	5	9	2	19
		Concave (6.6)	1	2	-	2	5
		Straight (3.9)	1	1	1	-	3
	Bifacial (1.3)	Convex (1.3)	-	-	1	-	1
Feathered Chipping (30.2)	Unifacial (26.3)	Convex (11.8)	2	2	5	-	9
		Concave (6.6)	1	-	2	2	5
		Straight (7.9)	1	-	5	-	6
	Bifacial (3.9)	Concave (1.3)	-	-	-	1	1
		Straight (2.6)	-	1	1	-	2
Hinged Chipping (32.9)	Unfacial (31.6)	Convex (18.4)	2	3	7	2	14
		Concave (6.6)	-	1	4	-	5
		Straight (5.3)	1	-	3	-	4
		Irregular (1.3)	-	-	1	-	1
	Point (1.3)	Point (1.3)	-	-	1	-	1
Total			12	15	40	9	76

TABULAR KNIVES

The artifacts in this category are thin slabs of quartzite with unifacial or bifacial modification of some or all edges. Generally bi-planar in cross section, they range from somewhat irregular in outline to ovate, circular, rectangular and subtriangular forms (Plate 3-2). They are manufactured from the locally available quartzite which breaks into thin, laminar pieces. Tabular objects which lack manufacture but display extensive smoothed edge attrition may also be classified as tabular knives.

Wear recorded for tabular knives consists almost entirely of smoothing of convex or straight edges (Table 3-13). The associated edge angles cover all angle intervals with the intermediate range most common (Table 3-8). The wear complex supports the implied cutting function. However, the implements also may have been used as scrapers, a use supported by ethnographic data (Collier et al. 1942).

Table 3-13. Kind of wear, location of wear, and shape of worn areas for tabular knives, 45-OK-287/288.

Kind of Wear (% Total)	Location of Wear (% Total)	Shape of Worn Area (% Total)	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Total
Smoothed (96.1)	Edge (88.2)	Convex (67.1)	6	19	9	12	5	51
		Concave (6.6)	2	-	2	1	-	5
		Straight (14.5)	3	2	-	5	1	11
	Unifacial (1.3)	Convex (1.3)	-	1	-	-	-	1
	Bifacial (6.6)	Convex (5.3)	-	-	1	3	-	4
		Concave (1.3)	-	1	-	-	-	1
Crushed (1.3)	Edge (1.3)	Concave (1.3)	-	-	-	1	-	1
Feathered Chipping (2.6)	Unifacial (2.6)	Convex (1.3)	-	-	-	1	-	1
		Straight (1.3)	-	1	-	-	-	1
Total			11	24	12	23	6	76

CHOPPERS

Choppers are manufactured from large, flat, circular or ovate river cobbles by removing overlapping unifacial or bifacial flakes to form a steep angled, sharp edge (Plate 3-3). Such an edge is adequate for heavy butchering activities and carcass dismemberment. The tool may have been used for the working of wood or the cutting, crushing and splintering of green bone for marrow extraction. Some investigators believe these implements are initially unifacially flaked and become bifacial from battering (Flenniken 1978).

Wear identified on choppers consists of crushing damage either to the edge alone or bifacially (Table 3-14). Smoothing of the edge alone as well as unifacially and bifacially occurs equally as often. Wear locations are primarily convex or straight, and associated angles are most often greater than 60 degrees (Table 3-8). This wear complex supports the traditional definition, with strong evidence of both chopping and cutting activities. The small amount of unifacial wear may be associated with scraping, a task that

KEY

	Master Number:
	Tool:
KEY	Provenience/Level:
	Zone:
	Material:

a.
677
Tabular Knife
17S5W/FE76/120
3
Course-grained Quartzite

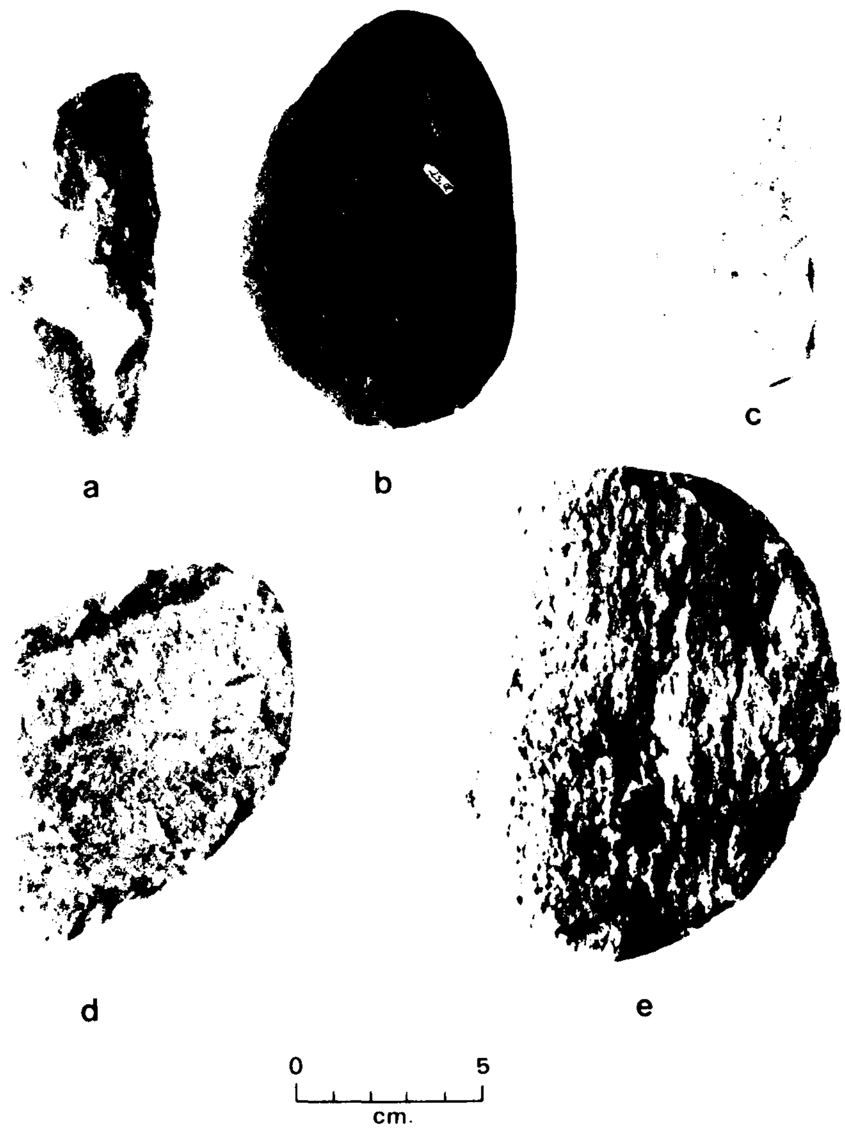
b.
570
Tabular Knife
11S3W/150
5
Basalt

c.
888
Tabular Knife
20S5W/FE26/120
3
Coarse-grained Quartzite

d.
525
Tabular Knife
7S1E/120
5
Coarse-grained Quartzite

e.
682
Tabular Knife
17S5W/FE59/170
4
Coarse-grained Quartzite

Plate 3-2. Examples of tabular knives, 45-OK-287/288.


a
b
c
d
e
0
5
cm.

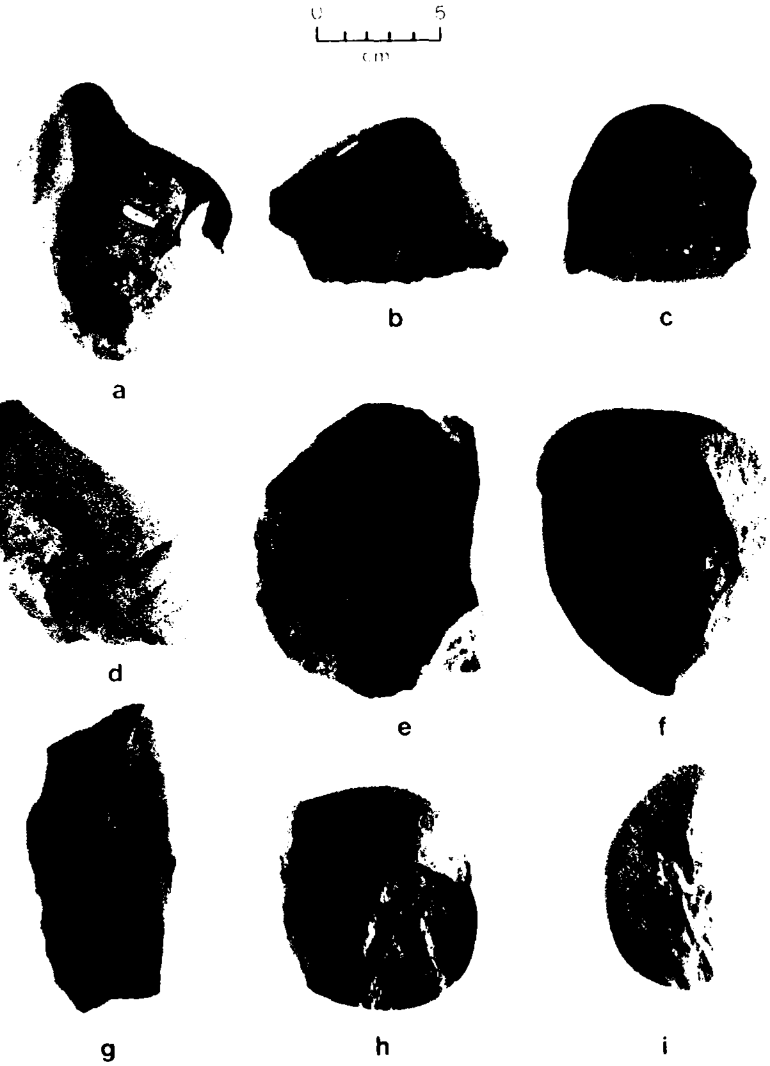
KEY
Master Number:
Tool:
Provenience/Level:
Zone:
Material:

a.	b.	c.
579	257	533
Chopper	Chopper	Chopper
22S91W/FE56/150	2S62W/220	6S9W/270
6	6	6
Coarse-grained Quartzite	Fine-grained Quartzite	Coarse-grained Quartzite

d.	e.	f.
784	405	513
Chopper	Chopper	Chopper
20S4W/20	3N7W/110	3S6W/220
1	4	5
Coarse-grained Quartzite	Coarse-grained Quartzite	Fine-grained Quartzite

g.	h.	i.
618	419	327
Chopper	Chopper	Chopper
9S15W/FE57/190	6N6W/FE40/200	1N5W/FE35,45/230
4	6	6
Basalt	Coarse-grained Quartzite	Coarse-grained Quartzite

Plate 3-3. Examples of choppers, 45-OK-287/288.



a b c d e f g h i

small amount of unifacial wear may be associated with scraping, a task that might well accompany general butchering. However, wear occurs on only 34.1% (Figure 3-19) of the artifacts thus calling into question the morphological characteristics used to assign artifacts to this category.

Table 3-14. Kind of wear, location of wear, and shape of worn areas for choppers, 45-OK-287/288.

Kind of Wear (% Total)	Location of Wear (% Total)	Shape of Worn Area (% Total)	Zone						Total
			1	2	3	4	5	6	
Smoothed (45.7)	Edge (10.9)	Convex (6.5)	-	1	-	1	-	1	3
		Concave (2.2)	-	-	-	1	-	-	1
		Straight (2.2)	-	1	-	-	-	-	1
	Unifacial (10.9)	Convex (2.2)	-	-	-	-	1	-	1
		Straight (8.7)	-	-	1	-	2	1	4
	Bifacial (17.4)	Convex (10.9)	-	-	5	-	-	-	5
		Concave (4.3)	-	-	-	-	-	2	2
		Straight (2.2)	-	-	-	-	-	1	1
	Point (6.5)	Point (6.5)	1	-	-	-	1	1	3
Crushed (54.4)	Edge (41.3)	Convex (26.1)	-	-	-	1	2	9	12
		Concave (2.2)	-	-	-	-	1	-	1
		Straight (13.0)	-	-	-	1	1	4	6
	Bifacial (4.4)	Convex (2.2)	-	-	1	-	-	-	1
		Straight (2.2)	-	-	-	-	-	1	1
	Surface (8.7)	Convex (6.5)	-	-	1	-	-	2	3
		Straight (2.2)	-	-	-	-	-	1	1
Total			1	2	8	4	8	23	46

Because of the unexpectedly low frequency of wear the choppers were re-examined to determine the amount of variability within the category. While all of the artifacts are waterworn cobbles or cobble fragments that exhibit unifacial or bifacial scars on some portion of an edge these scars are not of identical origin. Many are the result of attempts at intentional modification rather than use. In addition, the form of the edge and the shape of the artifacts in general varies greatly.

The artifacts can be divided into six subcategories on the basis of form (Table 3-15). The first group includes small, flat cobbles with unifacial or bifacial flake scars on some or all of the circumference (Plate 3-3;e,g,h).

The second group consists of small, flat cobbles which have been split diagonally (Plate 3-3;f,i). The resulting edge may show intentional unifacial or bifacial retouch scars or damage similar to scars resulting from use only. The third category includes large thick flakes with dorsal cortex and the same modification and use pattern as in the previous group (Plate 3-3;b). These artifacts could be regarded as a variation of the second subcategory, except that the size of the parent cobble cannot be determined. Thus, they could be formed from small, flat cobbles or spalled from larger core cobbles. The fourth group is made up of cobbles which have been split perpendicular to their length (Plate 3-3;c,d). The resulting break has an edge approximating 90 degrees. The entire edge or some portion of it may show retouch or use damage directed toward the interior or exterior of the cobble or both. Although they were manufactured in different manners, the objects in these four groups probably functioned as choppers as described above.

Table 3-15. Subcategories of artifacts included in the chopper category, 45-OK-287/288.

Type		Zone						Total
		1	2	3	4	5	6	
Flat, edge flaked/utilized	N	-	1	-	5	4	17	27
	Row %		3.7		18.5	14.8	63.0	100.0
Diagonally split cobble	N	-	-	3	2	3	7	15
	Row %			20.0	13.3	20.0	46.7	100.0
Retouched/utilized spalls	N	-	-	-	3	6	5	14
	Row %				21.4	42.9	35.7	100.0
Perpendicularly split cobble	N	1	-	-	-	5	12	18
	Row %	5.6				27.8	66.7	100.1
Longitudinally split cobble	N	-	-	-	-	-	1	1
	Row %						100.0	100.0
NA/missing	N	-	-	1	3	-	12	16
	Row %			6.3	18.8		75.0	100.1
TOTAL	N	1	1	4	13	18	54	91
	Row %	1.1	1.1	4.4	14.3	19.8	59.3	100.0

The remaining two categories contain items of entirely different function. The fifth category comprises a single cylindrical longitudinally split cobble with platforms at each end. suggesting bipolar splitting. The final category includes cobble fragments with crushed and battered edges or small edge segments (Plate 3-3;a). Also included are fragments with occasional large flake scars. Three of these are probably cores rather than choppers. They may have been discarded beccause of the poor quality of flake produced as evidenced by the truncated flake scars. Two other artifacts in this category appear to be FMR that may have been incidentally used.

Not surprisingly, the greatest frequency of each subcategory usually occurs in Zone 6. The exception is the third type, which has its greatest frequency in Zone 5. Other variations in frequency among Zones 1 through 5 occur, but the small sample sizes make it difficult to assess their importance. Most of the variation amounts to differences of a single artifact.

Table 3-16 presents the kinds of wear associated with the chopper subcategories and the percent of worn artifacts for each category. Although the sample populations are small, some trends are suggested. Smoothing is most frequent on the diagonally split cobbles, the subcategory with the greatest percentage of worn artifacts. Smoothing is also slightly more frequent on the large spalls. These two kinds of artifacts are similar in edge form to the tabular knives and may have been used for similar activities. The sharp edge produced by splitting a cobble or detaching a spall would be ideal for cutting and butchering, tasks reflected by the smoothing wear.

Table 3-16. Kind of wear associated with the chopper subcategories, 45-OK-287/288.

Type		Wear				Total	% Worn
		Abrasion	Smoothing	Crushing	Hinged chipping		
Flat, edge flaked/utilized	N	-	5	10	-	15	37.0
	Row %		33.3	66.7		100.0	
Diagonally split	N	1	7	6	-	14	46.7
	Row	7.1	50.0	42.9		100.0	
Retouched/utilized spalls	N	-	3	2	-	5	35.7
	Row %		60.0	40.0		100.0	
Perpendicularly split	N	-	2	1	1	4	27.8
	Row %		50.0	25.0	25.0	100.0	
NA/missing	N	-	2	5	-	7	25.0
TOTAL	N	1	19	24	1	45	34.1
	Row %	2.2	42.2	53.3	2.2	99.9	

[1] Figures represent the number of wear locations rather than the number of artifacts.

Crushing occurs most often on the traditional choppers. Some of this wear may have resulted from intentional flake detachment. It also suggests use for pounding and crushing activities distinct from those which produce smoothing.

The fourth and sixth categories (the perpendicularly split cobbles and the assorted fragments) have the fewest worn objects. Most of these artifacts may have been cores rather than tools. This is especially reflected in the latter category where most of the attrition recorded as wear is crushing from percussion blows.

PESTLE

Pestles are cobbles modified by grinding and pecking to form a cylindrical shape. Ethnographic descriptions indicate they were used in conjunction with the hopper mortar basket and base to process food.

The single pestle recovered from Zone 2 displays crushing wear on two straight terminal surfaces (Plate 3-4:b). The wear is consistent with the implied function. Excavation failed to recover any hopper mortars or other support stones from this zone.

BEAD

The single bead recovered from Zone 4 is shown in Plate 3-5:u.

PERIPHERALLY FLAKED COBBLE

This category includes cobbles with flakes removed unifacially or bifacially from the circumference without forming a localized cutting edge. It was intended to include flaked cobbles which did not clearly fit in any other category. Thus, these cobbles exhibit much diversity of size and form.

Two of the artifacts are indeed "peripherally flaked". One is a flat cobble 25 cm in diameter with flakes removed unifacially from half its circumference. The other is a blocky object with the entire periphery removed (Plate 3-6:d).

Four other specimens are cobble fragments with edges or edge segments with bifacial or unifacial retouch, similar to objects in the sixth chopper subcategory. Another is a pebble with two large flakes removed on opposite sides of the same edge. It is a smaller version of artifacts in the first chopper subcategory and could have been used for cutting although no wear was recorded. A sixth artifact is an edge of a flat cobble with no retouch or wear.

The last two artifacts included in the category fit the definition in only the most general sense. The first, from Zone 6, is a large pebble with opposing notches which appear to have been flaked (Plate 3-5:c). Smoothing and striae overlie the flake scars. It appears to be a weight. The last artifact is a cylindrical, longitudinally split cobble. Opposing ends show the removal of at least two large flakes whose scars meet at the center of the non-cortex face. Like the cobble described in the fifth chopper subcategory, attrition probably resulted from an attempt to split this cobble with a hammer and anvil.

The kinds of wear recorded for this category include smoothing, crushing and hinged chipping (Table 3-17). A third of the smoothing is associated with the notched pebble. One location of crushing occurs on the large, flat unifacially retouched cobble. The other traces are associated with the fragments similar to the choppers included in this category.

KEY

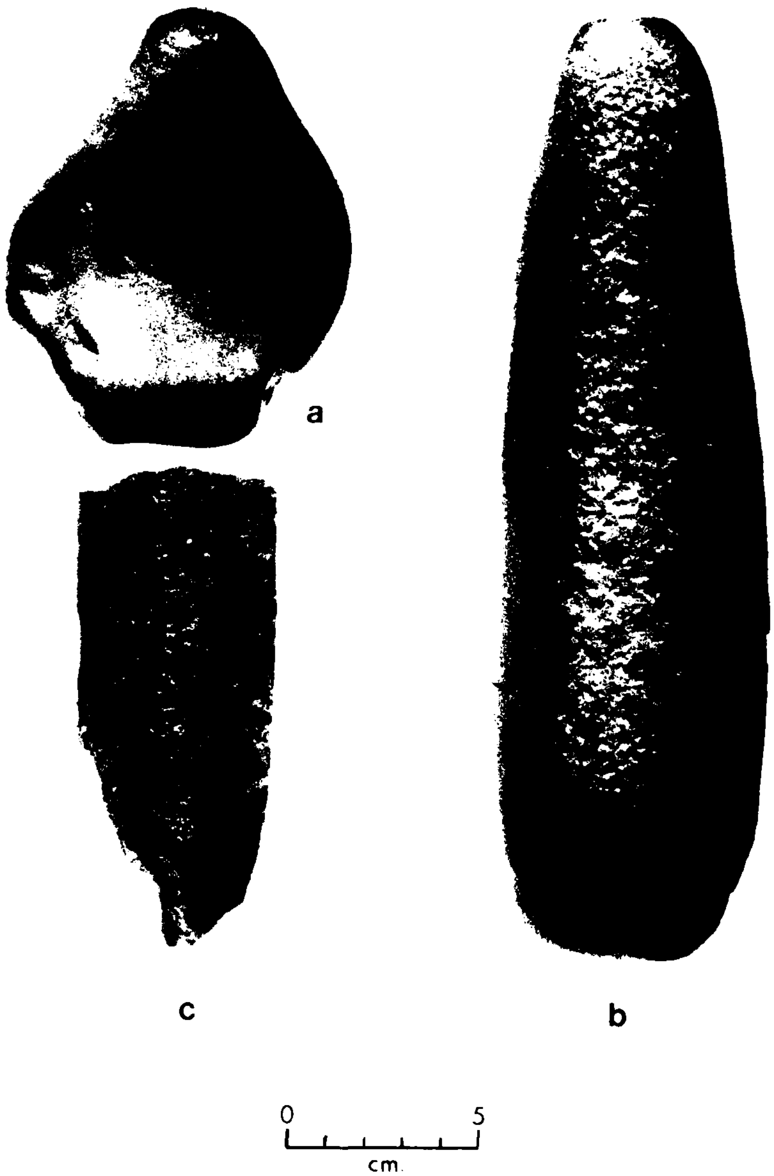
Master Number:
Site:
Tool:
Provenience/Level:
Zone:
Material:

a.
944
45-OK-288
Indeterminate
27S0E/FE30/90
4
Jasper

b.
83
45-OK-287
Pestle
33S2W/FE3/20
1
Basalt

c.
667
45-OK-288
Indeterminate
17S6W/FE59/160
4
Basalt

Plate 3-4. Pestle and indeterminate object, 45-OK-287/288.


a
c
b
0
5
cm.

KEY

Master Number:
Tool:
Provenience/Level:
Zone:
Material:

a.	b.	c.
719	168	149
Core	Core	Peripherally Flaked Cobble
18S1W/FE12/110	0N7W/FE35/210	1S52W/FE45/250
3	6	6
Jasper	Argillite	Coarse-grained Quartzite

d.
360
Core
1N7W/FE35/220
6
Indeterminate

e.	f.	g.
766	795	748
Core	Spokeshave	Core
20S4W/30	20S4W/FE47/160	19S1W/70
1	6	3
Chalcedony	Coarse-grained Quartzite	Jasper

h.	i.	j.	k.	l.	m.	n.	o.
747	396	892	243	28	650	353	508
Burin Spall	Linear Flake	Linear Flake	Linear Flake	Linear Flake	Blade	Blade	Blade
19S1W/40	3N8W/150	20S5W/FE26,UL120	1N3W/220	0N4W/220	16S5W/160	1N7W/180	3S6W/150
2	5	3	6	4	4	5	3
Chalcedony	Jasper	Chalcedony	Jasper	Opal	Chalcedony	Chalcedony	Basalt

p.	q.	r.	s.	t.
38	738	225	399	759
Indeterminate	Biface	Linear Flake	Linear Flake	Linear Flake
0N3W/205	19S2W/FE12/90	2N32W/FE35/210	3N8W/170	19S1W/160
1	3	6	5	4
Silicized Mudstone	Opal	Argillite	Opal	Opal

u.	v.	w.	x.	y.	z.	aa.
957	893	760	698	39	511	350
Bead	Linear Flake	Linear Flake	Linear Flake	Linear Flake	Blade	Blade
27S1E/FE30/90	20S5W/FE26/120	19S1W/FE84/180	18S2W/FE12/100	0N32W/210	3S6W/190	1N8W/FE7/210
4	3	5	3	5	4	5
Indeterminate	Chalcedony	Opal	Chalcedony	Fine grained Basalt	Jasper	Opal

Plate 3-5. Examples of cores, peripherally-flaked objects, spokeshaves, burin spalls, linear flakes, blades, bifaces, and beads, 45-OK-288. OK-288.


a
b
c
d
e
f
g
h
i
j
k
l
m
n
o
p
q
r
s
t
u
v
w
x
y
z
aa
0
3
cm

KEY

Master Number:
Tool:
Provenience/Level:
Zone:
Material:

a.
164
Hammerstone
6N7W/FE35/210
6
Coarse-grained Quartzite

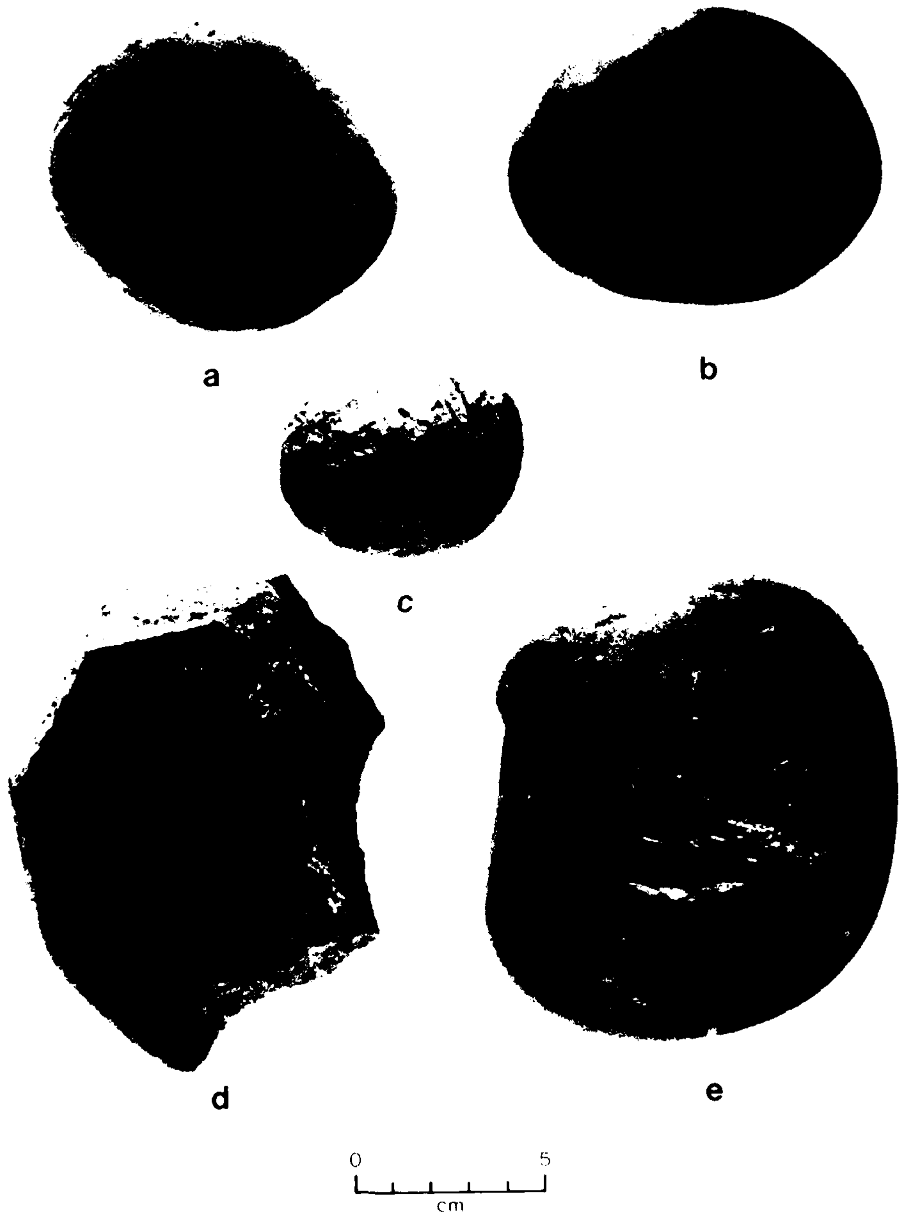
b.
943
Edge-ground Cobble
27S0E/FE30/80
4
Coarse-grained Quartzite

c.
383
Hammerstone
4N7W/FE14/20
1
Granite

d.
77
Peripherally Flaked Cobble
0N6W/230
6
Porphyritic Volcanic

e.
222
Hammerstone
2N3W/170
5
Coarse-grained Quartzite

Plate 3-6. Examples of hammerstones, edge-ground cobbles, and peripherally-flaked cobbles, 45-OK-287/288.


a
b
c
d
e
0
5
cm

EDGE GROUND COBBLE

Edge ground cobbles are small, flat cobbles with all or part of the periphery showing grinding attrition. A bevelled edge is often formed by the intersection of the two ground facets. The implements' function is uncertain although they have been associated with blade production technology (Crabtree

and Swanson 1968) and reduction of basalt. They are considered stylistic markers of Cascade Phase assemblages on the Lower Snake River (Bense 1972:54).

The single edge ground cobble has ground facets forming a 45° bevel on approximately one-third of its circumference (Plate 3-6:b).

Table 3-17. Kind of wear, location of wear, and shape of worn area for peripherally flaked cobbles, 45-OK-287/288.

Kind of Wear (% Total)	Location of Wear (% Total)	Shape of Worn Area (% Total)	Zone				Total
			2	3	4	6	
Smoothed (66.7)	Edge (33.3)	Concave (33.3)	-	-	-	2	2
	Unifacial (16.7)	Straight (16.7)	-	-	1	-	1
	Bifacial (16.7)	Convex (16.7)	1	-	-	-	1
Crushed (16.7)	Terminal Surface (16.7)	Convex (16.7)	-	-	-	1	1
Hinged Chipping (16.7)	Unfacial (16.7)	Straight (16.7)	-	1	-	-	1
Total			1	1	1	3	6

HAMMERSTONES

Hammerstones are unmodified hand-sized cobble implements used for percussive activities (Plate 3-6:a,c,e). The wear may result from pounding stone, bone or wood. Crushing on convex or straight surfaces occurs on 96.6% of the objects. Crushing on two convex and one straight edge is due to continued use after a large piece of the cobble broke off.

ANVILS

Anvils have been arbitrarily defined as large flat cobbles with wear on straight or convex surfaces. Used in conjunction with choppers, hammerstones, mauls, and pestles, the rocks served as supports for butchering and processing of food.

The four anvils recovered from Zones 3, 5 and 6 are planoconvex in cross section. They have flat surfaces with central areas that show crushing and pecking. The peripheral edges of three of the anvils appear to have been trimmed by removing large flakes.

HOPPER MORTAR BASES

Hopper mortars bases have been defined in this analysis as large flat cobbles with concave areas of wear. Ethnographies of Plateau groups indicate they were used in association with the bottomless hopper mortar basket and pestle to process food. The single hopper mortar from Zone 5 shows battering of a circular, central depression formed by natural spalling. The wear supports the traditional interpretation.

CORES

Cores are the source of lithic material which is modified into other objects. As previously noted, a core may be diverted at any point from the reduction sequence and used as a tool if it has some characteristic suitable for the task at hand. According to the project classification, an object is considered a core if it exhibits a prepared platform with at least two flakes removed (Plate 3-5:a,b,d,e,g). As a consequence, small fragments of rock with only a platform remnant and truncated flake scars have been included. Some of the pieces appear to be fragments of larger objects on which post-breakage flake detachment was attempted. Several of the artifacts have multiple platforms with small, blade-like flakes removed from two or more surfaces. The platforms are not opposing, but appear to be placed wherever the bulk of the material allowed further reduction. All the cores are small, reflecting the conservative use of conchoidally flaking material at the site.

BURIN SPALLS

Burins are small chisel-like implements derived from flakes, blades or other object types by removing edges parallel to the long axes of the parent objects. Generally, the burin spall is triangular in cross section; its removal leaves a right angle edge. A burin spall removed from a biface edge has two planes retaining surface flake scars and a single smooth plane resulting from detachment (Plate 3-5:h). According to this analysis, wear is required on at least one end of the spall for it to be classified as a burin.

The burin spall from 45-OK-287/288 shows a single instance of hinged bifacial chipping on a straight, lateral location. The wear complex is associated with an edge angle less than 30 degrees (Table 3-8). Both wear and angle complex imply casual use of the spall for a task different from the incising of wood and bone usually associated with burins.

BLADE

Blades are parallel-sided flakes with one or two parallel arrises on the dorsal surface. The flakes must be at least twice as long as they are wide and more than 1 cm in width (Plate 3-5:m,n,o,z,aa). None of the seven blades display wear, suggesting they are manufacturing by-products rather than purposely produced flake forms.

LINEAR FLAKES

These flakes, like blades, are parallel-sided and twice as long as they are wide. Width, however, is restricted to less than 1 cm. Although this category was created to identify microblades, linear flakes in the assemblage lack the multiple arrises, cross section, and platform angle characteristic of microblades (Sanger 1969). Most are small pressure flakes (Plate 3-5:i-l,q-t, ,v-y). That very few of the 223 flakes show traces of wear supports the technological interpretation. Six of the eight wear complexes recorded are unifacial feathered chipping of straight, concave and convex locations associated with acute edge angles (Table 3-8). There are single instances of bifacial feathered chipping on a straight location and unifacial hinged chipping of a convex edge. Light scraping and cutting are suggested as incidental uses although much of the attrition on these small flakes could be accidental.

RESHARPENING FLAKES

This category includes flakes removed from the worn edges of bifacially and unifacially modified implements. The original object's edge was used as the striking platform so that the resulting flake retains portions of the edge and surfaces of the parent object. Though the term implies that resharpening flakes were detached to rejuvenate a worn location, the category also includes unworn bifacial thinning flakes.

Resharpening flakes are not common in the 45-OK-287/288 assemblage. Only three wear complexes were recorded for the 13 flakes. These consist of hinged chipping unifacially on a convex location and two instances of feathered chipping. Such traces could result from manufacture, use or accident.

BIFACIALLY RETOUCHED FLAKES

This category is composed of flakes displaying intentional bifacial modification of an edge to attain a desired form. Less than half of them display wear, suggesting that many are technological by-products. It may also be that they have not been used for tasks that produce massive wear damage, or used long enough to produce detectable wear. The wear complexes are somewhat diverse (Table 3-18). Feathered unifacial chipping on convex and concave locations is most common. Hinged, unifacial and bifacial chipping on convex and straight locations also occurs. Smoothing of the edge, unifacially and bifacially, and hinged unifacial chipping on convex locations are found equally often. Edge angles are distributed among all three intervals, with the greatest frequency in the medium range followed by a relatively high percentage of acute angles (Table 3-8). The medium and steep angles are associated primarily with unifacial wear.

Again, manufacturing processes are probably responsible for a portion of the wear detected. The prominence of unifacial wear associated with medium angles suggests scraping use. Worn concavities suggest scraping of a pliable material. Bifacial attrition suggests cutting was a secondary use.

Table 3-18. Kind of wear, location of wear, and shape of worn area for bifacially retouched flakes, 45-OK-287/288.

Kind of Wear (% Total)	Location of Wear (% Total)	Shape of Worn Area (% Total)	Zone					Total
			2	3	4	5	6	
Smoothed (21.3)	Edge (7.1)	Convex (7.1)	–	–	–	–	1	1
	Unifacial (7.1)	Convex (7.1)	–	–	1	–	–	1
	Bifacial (7.1)	Convex (7.1)	–	1	–	–	–	1
Feathered Chipping (57.1)	Unifacial (57.1)	Convex (35.7)	1	–	2	1	1	5
		Concave (21.4)	1	–	1	–	1	3
Hinged Chipping (21.3)	Unifacial (14.2)	Convex (7.1)	–	1	–	–	–	1
		Straight (7.1)	–	1	–	–	–	1
	Bifacial (7.1)	Convex (7.1)	1	–	–	–	–	1
Total			3	3	4	1	3	14

UNIFACIALLY RETOUCHED FLAKES

These artifacts differ from the bifacially retouched flakes in that their modifications are unifacial. Over 65% of them have been modified by use, suggesting that functional traces are less likely to have resulted from manufacture than in the previous category.

Over half of the flakes show feathered, unifacial damage on straight, concave, and convex locations (Table 3-19). Unifacial hinged chipping is next most common on convex, concave and straight locations. Smoothing is found unifacially, bifacially and on a point. Edge angles are more often medium than steep or acute (Table 3-8).

The unifacial wear complexes, the medium edge angles, and the infrequent bifacial damage suggest their use for scraping. The damaged concave locations suggest that pliable material was scraped.

Table 3-19. Kind of wear, location of wear, and shape of worn area for unifacially retouched flakes, 45-OK-287/288.

Kind of Wear (% Total)	Location of Wear (% Total)	Shape of Worn Area (% Total)	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Total
Smoothed (15.7)	Unifacial (9.9)	Convex (7.1)	1	2	1	-	1	5
		Straight (1.4)	-	-	1	-	-	1
		Terminal Surface (1.4)	-	1	-	-	-	1
	Bifacial (2.9)	Straight (2.9)	-	-	-	-	2	2
	Point (2.9)	Point (2.9)	-	-	1	-	1	2
Feathered Chipping (61.3)	Unifacial (58.5)	Convex (25.7)	1	5	5	7	-	18
		Concave (14.3)	1	1	5	3	-	10
		Straight (17.1)	-	-	2	10	-	12
		Terminal (1.4)	-	-	-	1	-	1
	Bifacial (2.8)	Convex (1.4)	-	-	1	-	-	1
		Straight (1.4)	-	-	-	1	-	1
Hinged Chipping (22.9)	Unifacial (22.9)	Convex (15.7)	-	3	2	6	-	11
		Concave (2.9)	-	-	-	2	-	2
		Straight (4.3)	-	-	2	1	-	3
Total			3	12	20	31	4	70

UTILIZED FLAKES

This category includes flakes which show evidence of use damage, but no sign of intentional modification. These flakes were probably used for any purpose their characteristics allowed.

Over 75% of the flakes display unifacial feathered chipping on straight, convex or concave locations (Table 3-20). Small frequencies of feathered chipping also occur bifacially and on points. Hinged chipping and smoothing occur on only 16% of the flakes, primarily unifacially on straight, convex or concave locations. They are occasionally found bifacially on straight or convex locations.

Edge angles are found in all three intervals (Table 3-8). In contrast to the other specialized flakes, the acute angles are most common, followed by medium angles.

Although some of the wear probably resulted from manufacture and accidental damage, its uniformity suggests a regular function: the unifacial position and feathered chipping suggest light scraping while the acute edge angles suggest cutting. In both cases, wear on both convexities and concavities suggests that pliable material was being worked.

INDETERMINATES

This category includes various objects of diverse form and uncertain function. All were recovered from a cultural context and exhibit varying degrees of modification. Most are small pieces of CCS or quartzite representing manufacture by-products. Four of the artifacts warrant further discussion.

The first is a small, waterworn cobble with striae or grooves on one face (Plate 3-4:a). The stone was apparently used as a support for cutting. The second is an irregularly shaped tabular quartzite flake with a spokeshave indentation (Plate 3-5:f). The third is an incised gravel-sized piece of silt/mudstone, probably decorative in function (Plate 3-5:p). The last is a cylindrical maul or pestle fragment with extreme damage to one end; the other end is snapped cleanly (Plate 3-4:c).

NON-LITHIC ARTIFACTS

Table 3-21 presents the distribution of non-lithic artifacts by zone. The awls, wedge and pendant appear in Plate 3-7. The flaked long bone category includes splinters of bone that exhibit varying degrees of flaking. We cannot determine if there was a distinct end product intended. More likely the bones represent the splitting of long bones with hammerstones on an anvil for the extraction of marrow. The indeterminate category includes bone fragments showing evidence of burning, striation or flaking. None is complete enough for any other designation. One of the fragments may be the proximal portion of an awl (Plate 3-7:c).

Table 3-20. Kind of wear, location of wear, and shape of worn area for utilized flakes, 45-OK-287/288.

Kind of Wear (% Total)	Location of Wear (% Total)	Shape of Worn Area (% Total)	Zone 1	2	3	4	5	6	Total
Smoothed (8.3)	Edge (0.6)	Convex (0.3)	-	-	1	-	-	-	1
		Straight (0.3)	-	-	-	-	-	1	1
	Unifacial (4.1)	Convex (1.9)	-	-	1	-	2	3	6
		Concave (0.3)	-	-	-	1	-	-	1
		Straight (1.9)	-	-	1	2	2	1	6
	Bifacial (2.7)	Convex (1.5)	-	2	3	-	-	-	5
		Straight (1.2)	-	-	-	3	-	1	4
	Point (0.6)	Point (0.6)	-	-	-	1	-	1	2
	Surface (0.3)	Straight (0.3)	-	-	-	-	-	1	1
Feathered (83.8)	Unifacial (76.5)	Convex (24.4)	1	6	18	19	29	6	79
		Concave (18.5)	-	3	13	20	16	8	60
		Straight (33.6)	2	12	23	28	32	12	109
	Bifacial (6.4)	Convex (3.4)	-	1	3	6	1	-	11
		Concave (1.2)	-	-	3	1	-	-	4
		Straight (1.5)	-	-	1	-	-	4	5
		Irregular (0.3)	-	-	-	1	-	-	1
	Point (0.9)	Point (0.9)	-	-	-	1	1	1	3
Hinged (7.7)	Unifacial (7.4)	Convex (2.8)	-	-	3	3	3	-	9
		Concave (3.1)	-	1	4	1	4	-	10
		Straight (1.5)	-	-	1	1	3	-	5
	Bifacial (0.3)	Straight (0.3)	-	-	-	-	-	1	1
Total			3	25	75	88	93	40	324

Table 3-21. Distribution of non-lithic artifacts by zone, 45-OK-287/288.

Object Type	Zone					Total
	2	3	4	5	6	
Awl	-	-	1	1	-	2
Wedge	-	-	-	-	1	1
Pendant	-	-	-	-	1	1
Flaked Long Bone	-	5	-	12	2	19
Indeterminate	3	3	3	7	1	17
Total	3	8	4	20	5	40

STYLISTIC ANALYSIS

The purpose of the stylistic analysis of projectile points is to identify morphological characteristics which are sensitive to temporal and spatial cultural variation. By correlating sensitive stylistic types with radiocarbon dates, we can develop a local chronology and sequence of human occupation which can be compared with sequences developed in other regions of the Plateau.

We have developed a two stage analysis for projectile points. The first stage involves the identification of morphological types within the project area alone. These types have then been ordered into a temporal sequence on the basis of their radiocarbon dates and their occurrence in project sites. We have had to rely on outside sources for approximate time spans for a few types which do not appear in firmly dated contexts. These exceptions will be noted in the discussion which follows.

The second stage involves the statistical re-definition of the morphological types in terms of established Plateau historical forms. We may thereby evaluate the two systems of classification. As will be seen, the appearance of a point in an unexpected context requires that we reconsider its classification. The comparison also allows us to correlate our results with those of other Plateau archaeological studies and to focus on trends that may represent cultural differences.

This system of analysis has evolved over the past two years as data from individual site analysis has become available. The entire process, system and project-wide results will be reported and evaluated in the summary report (Lohse 1984g).

Eleven dimensions of analysis were established for the identification of morphological types (Appendix B, Table B-28). Intersection of the first four dimensions, blade-stem juncture, plan, stem-edge orientation and size, defines 18 separate types (Figure 3-21). We did not follow through with intersection

KEY
Master Number:
Tool:
Provenience/Level:
Zone:
Material:

a.
762
Wedge
19S12W/FE80/220
6
Bone/Antler

b.
171
Pendant
0N7E/FE35/220
6
Bone/Antler

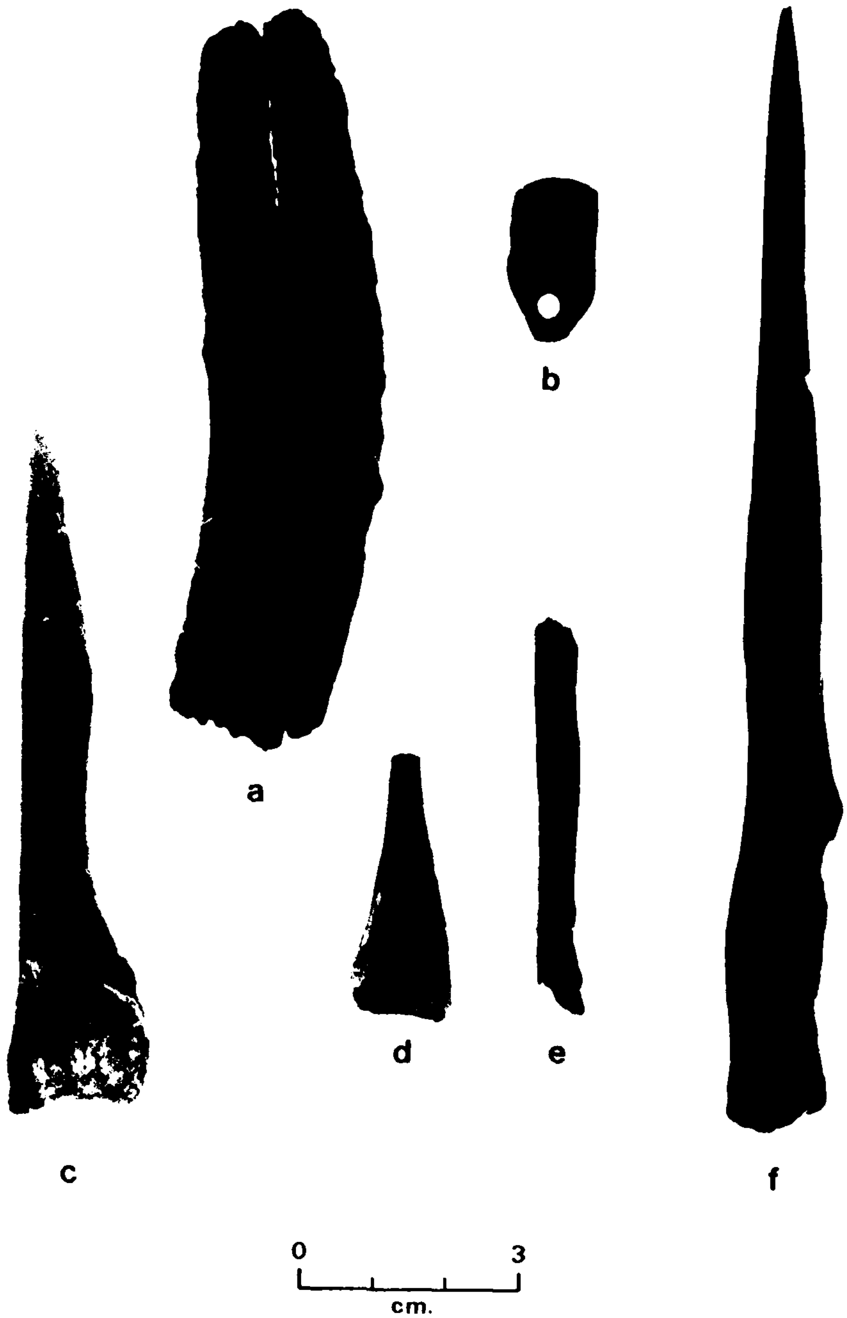
c.
203
Awl
0N9W/150
4
Bone/Antler

d.
66
Indeterminate
0N6W/FE7/200
5
Bone/Antler

e.
815
Indeterminate
20S3W/FE26/120
3
Bone/Antler

f.
91
Awl
0N5W/FE7/200
5
Bone/Antler

Plate 3-7. Examples of bone/antler artifacts, 45-OK-287/288.


a
b
c
d
e
f
0
3
cm.

of the remaining seven variables because it generates so many types that variation rather than uniformity is emphasized. The complete morphological classification of each point is presented in Appendix B, Table B-29.

Projectile points from 45-OK-287 and 45-OK-288 are illustrated in Plate 3-8 and digitized outlines shown in Appendix B, Figures B-7 and B-8. Thirteen of the 18 morphological projectile point types occur in the collection from 45-OK-287/288 (Table 3-22). We do not consider Type 1, the large triangular form, a finished projectile point. It lacks basal modification which would allow it to be hafted to a shaft. Type 1 probably is a knife although we would need to analyze an adequate sample of such artifacts by microscope in order to verify this judgment. Nor can we rule out the possibility that the artifact is a large preform left unnotched.

The distribution of the remaining types among the zones (Table 3-22) generally corresponds to the approximate time spans presented in Figure 3-22. The placement of two Type 9 points in Zone 6 presents a problem because of its temporal distribution, even though this is a category with a small sample size and few reliable contexts in the project area. One of the two specimens (Plate 3-8:ii) could have been assigned instead to Type 6. The shoulders are weakly developed, one more so than the other. The other projectile point, though fragmentary, seems to fit the Type 9 definition (Plate 3-8:hh).

Table 3-22. Distribution of morphological projectile point types by zone, 45-OK-287/288.

Zone	Radiocarbon Date[1]	Estimated Age (Years B.P.)	Morphological Type													Total
			1	9	6	15	7	8	13	10	12	18	17	4	14	
2	473±43 756±67 774±67	400	-	-	-	-	-	-	-	-	-	2	-	-	-	2
3	923±47 1046±69 1064±64 1122±65 1399±112	850	1	-	1	-	2	-	-	1	1	7	-	1	1	15
4	1543±94	1500	-	-	2	-	1	-	1	1	1	1	1	-	-	8
5	4525±126 4641±150	4400 4800	-	-	5	1	1	1	1	-	-	-	-	-	-	9
6		<4800	-	2	1	-	-	-	-	-	-	-	-	-	-	3
Total			1	2	9	1	4	1	2	2	2	10	1	1	1	37

[1] Refer to Appendix A, Tables A-1 and A-2.

In Zone 5, where most of the forms appear at or before 4500 B.P., the older forms predominate. The Type 15 projectile point presents similar difficulties to the Type 9. This also is a category with a small sample size and few contexts. Re-examination of this point (Plate 3-8:y) shows the base to be slightly askew and one shoulder broken and reworked so that its classification is somewhat questionable. Re-classifying it, perhaps as a Type 17 similar to the point shown in Plate 3-8:q, does not resolve the temporal difficulty. Even so, the predominance of the older points affirms our estimate of the zone's chronology.

The remaining zones present few difficulties. Zone 4 contains a variety of both younger and older points as the bracketing radiocarbon dates would lead us to expect (Plate 3-8:q-s,u-x,ee). Zone 3 has a number of types (6, 7, 10 and 12) which can be more closely associated with the lower estimated age limit of the zone. However, the zone is dominated by more recent types (18, 4, 14) (Plate 3-8,c-p). The two points of Zone 2 also are late forms (Plate 3-8:a,b).

In the second stage of the analysis historical types were established on the basis of digitized measurements of 1,200 projectile points from well dated contexts throughout the Plateau (see Appendix B, Figure B-3 and Table B-30 for digitized landmarks). The comparative collection includes 22 historical types from sites from the Fraser River to the Snake and from the Dalles to the Libby Reservoir in Montana (Appendix B, Figure B-2 presents site locations). Project area projectile points were then classified into historical type by discriminant analysis of the same digitized measurements (See Appendix B, Figure B-7).

Table 3-23 presents the relation of morphological types to historical types. We find a good correspondence between the younger morphological types (15, 13, 14, 18 and 4) and the small corner-notched, side-notched and stemmed projectile points characteristic of the later temporal phases. The Nespelem Bar category (a Rabbit Island Stemmed variant) on the other hand includes Types 7, 8, 9, 10, and 12, all shouldered or squared triangular forms. Types 7, 8 and 12 have similar, older ages. The Type 6 points correspond to three different historic types. From this comparison only, it appears we are likely to find instances when each system may discriminate more finely than the other.

Distribution of the historical types among the zones is presented in Table 3-24. We find some of same difficulties that we faced with the morphological distribution and some rather surprising categorizations of individual points. Yet, with the exceptions discussed below, we think the identifications are temporally sound and suggest sequences elsewhere in the Plateau.

Zone 6 again presents us with difficulties in the definition of a Columbia Plateau corner-notched point, a style associated with cultural phases beginning 2,000 years ago. This is the same fragmentary Type 9 point we dealt with in the discussion of the morphological types. Again we reach a similar conclusion that the point is broken and may represent a stemmed form that has not been properly treated by either of the classification systems. We find no basis for adjusting the estimated upper age limit of the zone; we are confident of its context in relation the dates of the overlying Zone 5. Nevertheless, it is unfortunate there are so few points within the zone that we cannot date the lower age limit of the cultural material more precisely.

KEY

Site Number:
Master Number:
Morphological Type:
Historical Type:
Provenience/Level:
Zone:
Material:

a.
45-OK-287
58
Type 18
Wallula Rectangular-Stemmed
33S0E/FE8/30
2
Chalcedony

b.
45-OK-288
860
Type 18
Columbia Corner-notched B
17S6W/80
2
Chalcedony

c.
45-OK-288
691
Type 4
Plateau Side-notched
18S2W/70
3
Chalcedony

d.
45-OK-288
863
Type 18
Columbia Stemmed C
20S6W/FE12/90
3
Chalcedony

e.
45-OK-287
49
Type 18
Columbia Stemmed C
32S0E/FE3/50
3
Jasper

f.
45-OK-288
927
Type 18
Wallula Rectangular-Stemmed
20S5W/FE26/110
3
Jasper

g.
45-OK-288
928
Type 18
Columbia Corner-notched B
21S5W/FE12,UL90
3
Jasper

h.
45-OK-288
781
Type 14
Columbia Corner-notched B
20S4W/FE12/110
3
Jasper

i.
45-OK-288
859
Type 18
Columbia Corner-notched B
21S4W/FE12/100
3
Jasper

j.
45-OK-287
39
Type 18
Wallula Rectangular-Stemmed
31S1W/FE3/60
3
Jasper

k.
45-OK-288
780
Type 18
Columbia Stemmed C
20S4W/FE12/110
3
Chalcedony

l.
45-OK-288
782
Type 10
Columbia Corner-notched B
20S4W/FE12/110
3
Jasper

m.
45-OK-287
93
Type 7
Rabbit Island Stemmed A
41S2E/FE8/70
3
Chalcedony

n.
45-OK-287
120
Type 7
Rabbit Island Stemmed A
46S4W/FE2/60
3
Jasper

o.
45-OK-288
736
Type 12
Rabbit Island Stemmed A
19S2W/FE12/90
3
Jasper

p.
45-OK-288
84
Type 6
Shouldered Lanceolate
0N5W/100
3
Jasper

q.
45-OK-287
124
Type 17
Quilomene Bar Basal-notched
46S7W/FE2/150
4
Jasper

r.
45-OK-288
898
Type 18
Columbia Stemmed C
20S5W/FE47,UL140
4
Jasper

s.
45-OK-288
19
Type 8
Windust C
0N4W/FE47,UL140
4
Opal

t.
45-OK-288
801
Type 7
Rabbit Island Stemmed A
20S5W/180
5
Chalcedony

u.
45-OK-288
423
Type 10
Rabbit Island Stemmed A
5N8W/FE48,UL150
4
Silicized mudstone

v.
45-OK-287
128
Type 13
Quilomene Bar Corner-notched
46S9W/FE2/130
4
Chalcedony

w.
45-OK-288
685
Type 6
Shouldered Lanceolate
17S8W/FE76,UL130
4
Chalcedony

x.
45-OK-288
159
Type 7
Rabbit Island Stemmed A
0N7W/FE5,UL170
4
Jasper

y.
45-OK-288
856
Type 15
Rabbit Island Stemmed B
21S3W/FE47,UL180
5
Jasper

z.
45-OK-288
566
Type 13
Quilomene Bar Basal-notched
10S3W/180
5
Jasper

aa.
45-OK-288
65
Type 8
Rabbit Island Stemmed A
0N8W/FE7/190
5
Jasper

bb.
45-OK-288
398
Type 6
Shouldered Lanceolate
3N8W/160
5
Jasper

cc.
45-OK-288
156
Type 6
Cascade A
0N8W/FE7/190
5
Obsidian

dd.
45-OK-288
374
Type 6
Shouldered Lanceolate
2N27W/FE9,FE10/170
5
Chalcedony

ee.
45-OK-288
934
Type 12
Rabbit Island Stemmed A
26S1E/FE30/90
4
Jasper

ff.
45-OK-288
563
Type 6
Shouldered Lanceolate
10S4W/170
5
Fine-grained Basalt

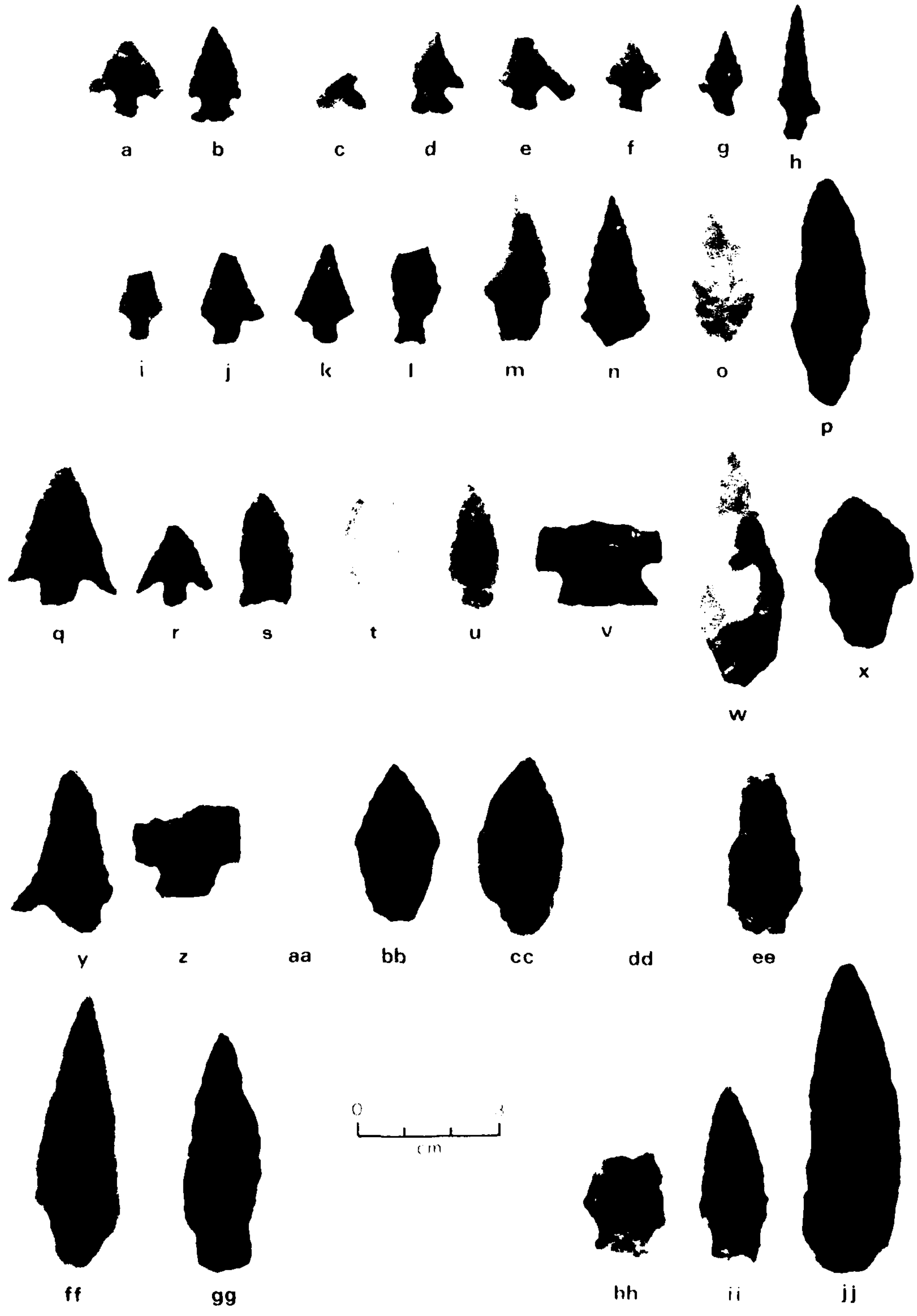
gg.
45-OK-288
451
Type 6
Shouldered Lanceolate
10N7W/FE11/160
5
Jasper

hh.
45-OK-288
445
Type 9
Columbia Corner-notched A
10N8W/FE11/170
6
Jasper

ii.
45-OK-288
908
Type 9
Rabbit Island Stemmed A
21S81W/FE58,UL170
6
Fine-grained Basalt

jj.
45-OK-288
400
Type 6
Shouldered Lanceolate
3N8W/FE42,UL180
6
Argillite

Plate 3-8. Examples of projectile points, 45-OK-287/288.


a b c d e f g h
i j k l m n o p
q r s t u v w x
y z aa bb cc dd ee
ff gg hh ii jj
0
cm

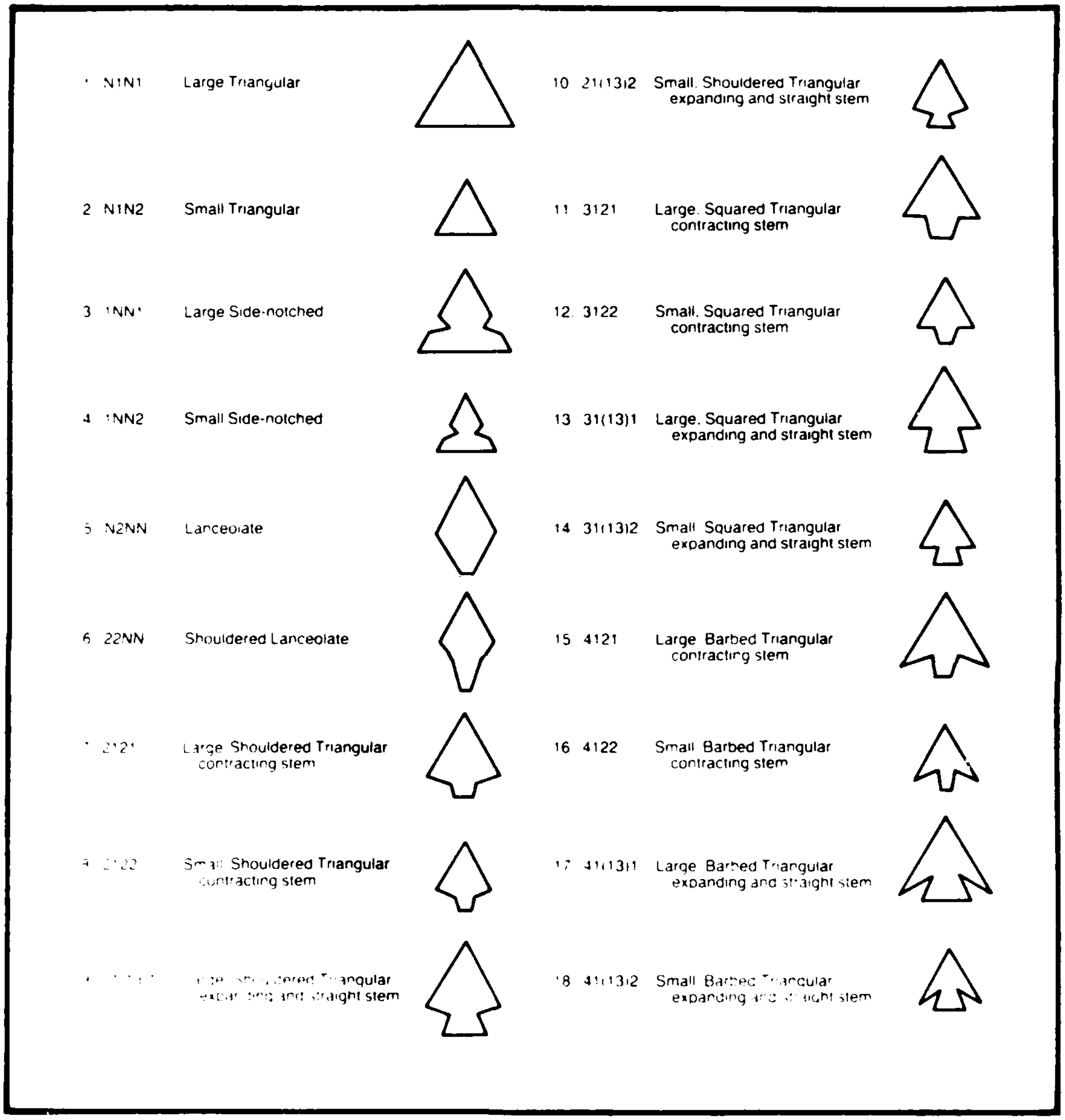


Figure 3-21. Morphological types of projectile points.

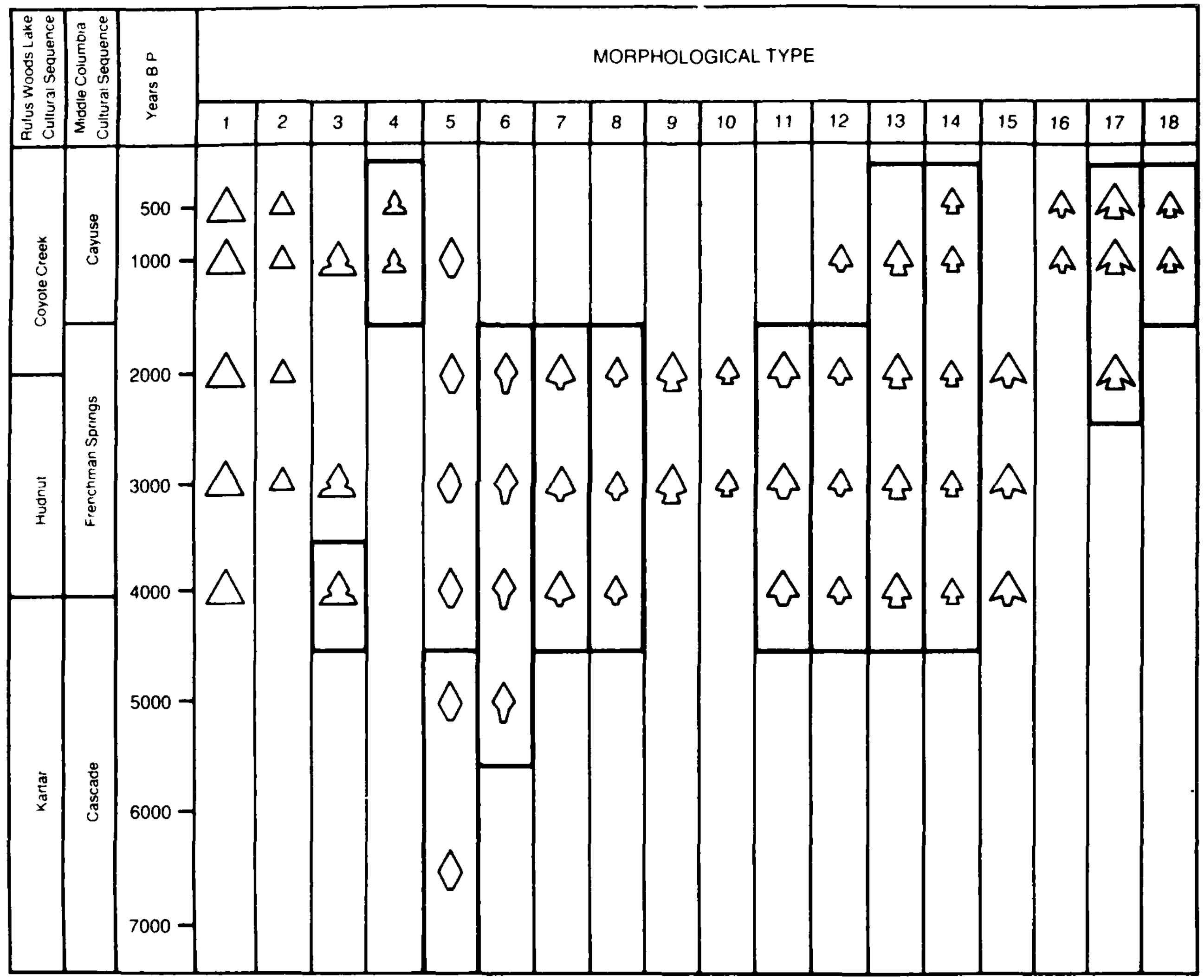


Figure 3-22. Temporal distribution of morphological projectile point types in the project area.

Table 3-23. Relationship of morphological types to historical types, 45-OK-287/288.

Historical Type	Morphological Type and Code													Total
	6	17	7	8	9	10	12	15	13	14	16	18	4	
	22NN	4111	2121	2122	2131	2132	3122	4121	3131	3132	4132	4112	1NN2	
Windust C	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Cascade A	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Shouldered Lanceolate	7	-	-	-	-	-	-	-	-	-	-	-	-	7
Quilomene Bar Basal-notched	-	1	-	-	-	-	-	-	-	-	-	-	-	1
Nespelem Bar	-	-	4	1	1	1	2	-	-	-	-	-	-	9
Rabbit Island Stemmed A	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Quilomene Bar Corner-notched	-	-	-	-	-	-	-	-	2	-	-	-	-	2
Columbia Corner-notched A	-	-	-	-	1	-	-	-	-	-	-	-	-	1
Columbia Corner-notched B	-	-	-	-	-	1	-	-	-	1	3	-	-	5
Wallula Rectangular-Stemmed	-	-	-	-	-	-	-	-	-	-	3	-	-	3
Columbia Stemmed A	-	-	-	-	-	-	-	-	-	-	2	2	-	4
Plateau Side-notched	-	-	-	-	-	-	-	-	-	-	-	-	1	1
Total	9	1	4	1	2	2	2	1	2	1	8	2	1	36

Table 3-24. Historical projectile point tpes by zone, 45-OK-187/288.

Historical Type	Zone						Total
	1	2	3	4	5	6	
Windust C	-	-	-	1	-	-	1
Cascade A	-	-	-	-	1	-	1
Shouldered Lanceolate	-	-	1	1	4	1	7
Quilomene Bar Basal-notched	-	-	-	1	-	-	1
Nespelem Bar	-	-	3	3	2	1	9
Rabbit Island Stemmed A	-	-	-	-	1	-	1
Quilomene Bar Corner-notched	-	-	-	1	1	-	2
Columbia Corner-notched A	-	-	-	-	-	1	1
Columbia Corner-notched B	-	1	4	-	-	-	5
Wallula Rectangular-Stemmed	-	1	2	-	-	-	3
Columbia Stemmed A	-	-	3	1	-	-	4
Plateau Side-notched	-	-	1	-	-	-	1
Total	-	2	14	8	9	3	36

In Zone 5, a Type 13 point is classified as a Quilomene Bar Corner-notched point, a type appearing elsewhere about 2500B.P. (Nelson 1969:119). When we examine this artifact we find another fragmentary piece (Plate 3-8:z) that could be from a reworked large side-notched point or a large stemmed point. Such a redefinition would make it temporally more comfortable. The classification of the problematic Type 15 point as Rabbit Island Stemmed A is also temporally acceptable. The dominant form of Zone 5, however, is the shouldered lanceolate. The association of these points with Cascade and Rabbit Island stemmed forms fits the radiocarbon dates and the association with the late Vantage Phase at Sunset Creek (Nelson 1969) and the Indian Dan Phase at Wells Reservoir (Grabert 1968) (Figure 3-23).

Zone 4 contains points characteristic of earlier and later phases. Most surprising is the classification of a Type 6 as a Windust form (Plate 3-8;s). The artifact is similar in proportion, but smaller in size to the Windust form and is more likely a reworked shouldered or stemmed form (cf., Rice 1972). Its chronological associations certainly do not support the classification. The Type 17 point (Plate 3-8:q) invoked as a possible alternative classification for the Zone 4 Type 15 form is categorized as a Quilomene Bar Basal notched. However, it is more similar to the Rabbit Island Stemmed A form.

Zone 3 is dominated by forms characteristic of the late phase of the upper and middle Columbia sequences. There are three Rabbit Island Stemmed forms, not an unlikely occurrence (Nelson 1969:116), and a proliferation of small corner-notched and stemmed forms characteristic of the Cayuse, Chilliwist and Cassimer Bar Phase on the Middle and Upper Columbia (Figure 3-23). Zone 2 contains two points with similar late phase connotations.

In summary, the sequence of projectile points from 45-OK-287/288 is stylistically similar to those characterizing the equivalent cultural phases shown in Figure 3-23. They affirm the age estimates for each zone which are based primarily on radiocarbon dates.

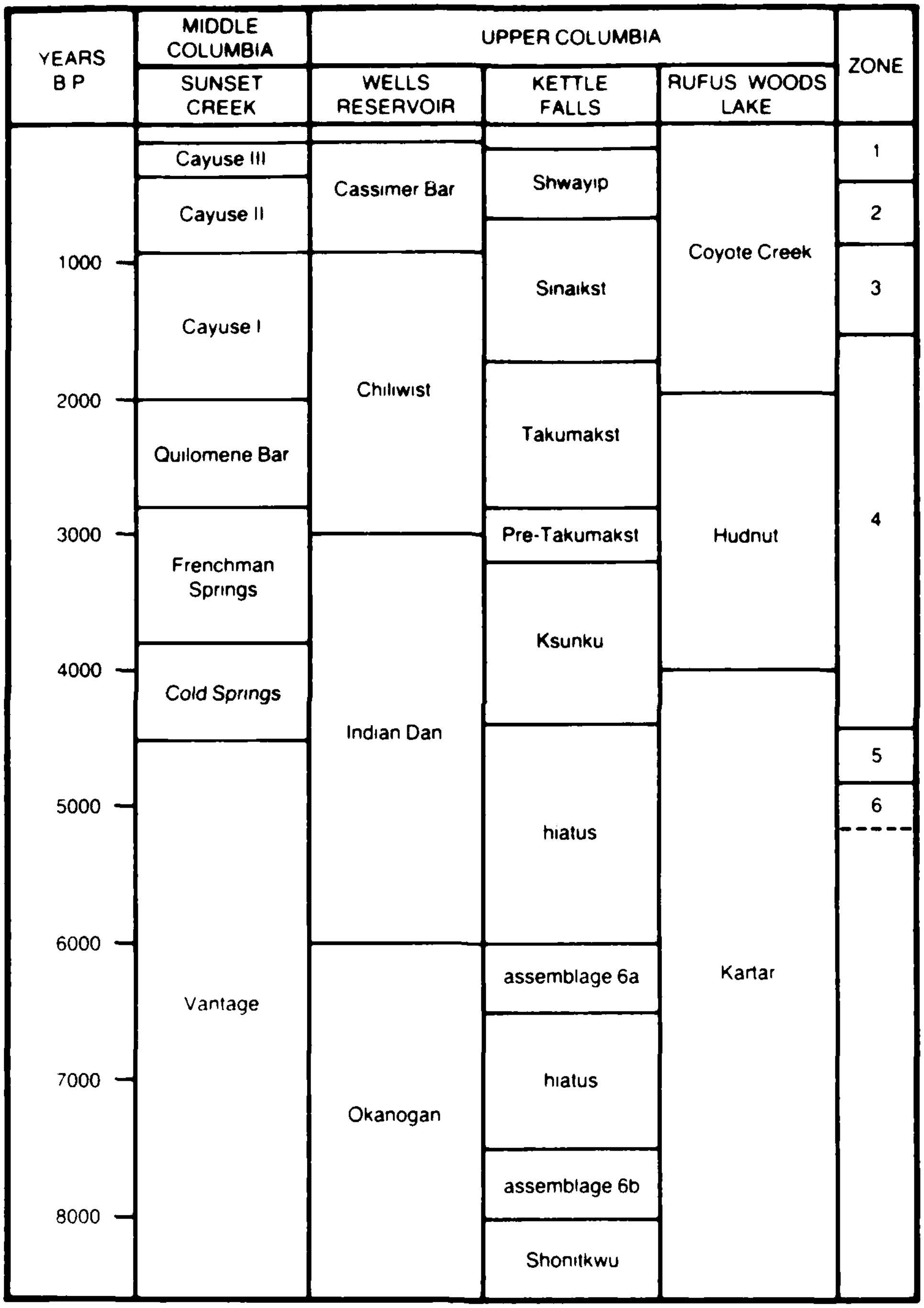


Figure 3-23. Cultural zones at 45-OK-287/288 in relationship to Rufus Woods Lake cultural phases and cultural sequences of nearby study areas. Adapted from Nelson 1969, Grabert 1968, Chance and Chance 1977, 1979, 1982.

4. FAUNAL ANALYSIS

Zoological remains from archaeological sites provide a unique source of data on the ecology and historic biogeography of animal species living in the area, and on utilization of faunal resources by human occupants. This chapter describes the faunal assemblage recovered from 45-OK-287/288, and summarizes the implications of the assemblage for understanding the archaeology of the site.

FAUNAL ASSEMBLAGE

Tables 2-3 and 2-4 summarizes the distribution of faunal remains for the site. The vertebrate assemblage consists of 56,125 elements weighing 13,663 g, of which 1,559 specimens, or about 3% of the assemblage, are identifiable. This indicates the highly fragmented condition of the assemblage. Of the identified assemblage, 1495 elements (98%) are mammalian, 17 (1%) are reptilian, 1 (<1%) is amphibian, and 15 (1%) are fish. The invertebrate assemblage consists of 139 mussell shell fragments, weighing a total of 399 g. Table 4-1 presents the taxonomic composition and distribution of the vertebrate remains.

SPECIES LIST

MAMMALS (NISP=1,461)

Marmota flaviventris (yellow-bellied marmot) -- 5 elements.

All marmots remains have been tentatively assigned to the species *M. flaviventris* on the basis of present distribution. This species is the only marmot now living in the project area, and is a common resident of talus slopes. Marmots were exploited as a small game resource by ethnographic inhabitants of eastern Washington (Ray 1932; Post 1938). Their presence in this faunal assemblage may indicate prehistoric exploitation.

Thomomys talpoides (northern pocket gopher) -- 32 elements.

Thomomys talpoides is the only geomyid rodent in the project area. Because pocket gophers are extremely fossorial and there is very little evidence that they were utilized prehistorically or ethnographically, their presence in this assemblage may be considered fortuitous.

Table 4-1. Taxonomic composition and distribution of vertebrate remains, 45-OK-287/288.

Taxa	Zone 1		Zone 2		Zone 3		Zone 4		Zone 5		Zone 6		Site Total	
	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP[1]	MNI[2]
MAMMALIA (NISP=1,495)														
Sciuridae														
Marmota flaviventris	-	-	-	-	-	-	4	1	1	1	-	-	5	1
Geomyidae														
Thomomys talpoides	-	-	-	-	-	-	13	2	1	1	18	2	32	3
Heteromyidae														
Perognathus parvus	-	-	-	-	3	1	1	1	-	-	1	1	5	1
Castoridae														
Castor canadensis	-	-	-	-	-	-	1	1	1	1	-	-	2	1
Cricetidae	-	-	1	-	1	-	-	-	-	-	-	-	2	-
Neotoma cinerea	-	-	-	-	1	1	-	-	-	-	-	-	1	1
Ondatra zibethicus	-	-	-	-	-	-	4	1	15	3	1	1	20	3
Canidae														
Canis spp.	-	-	-	-	-	-	2	1	5	1	-	-	7	1
Cervidae	-	-	-	-	1	-	1	-	3	-	-	-	5	-
Odocoileus sp.	1	1	13	2	108	3	54	1	52	2	28	-	252	3
O. hemionus	-	-	-	-	5	1	-	-	-	2	-	-	5	1
O. virginianus	-	-	-	-	3	1	6	1	12	-	-	-	21	3
Bovidae	-	-	-	-	2	-	4	-	1	-	1	-	8	-
Antilocapra americana	-	-	11	1	37	2	7	1	35	1	2	1	92	3
Ovis canadensis	-	-	4	1	16	1	358	1	4	1	8	1	391	2
Bos sp.	-	-	1	1	-	-	-	-	-	-	-	-	1	1
Deer-Sized	23	-	46	-	277	-	120	-	153	-	24	-	643	-
Elk-Sized	2	-	-	-	1	-	-	-	-	-	-	-	3	-
REPTILIA (NISP=17)														
Chelydridae														
Chrysemys picta	-	-	-	-	-	-	-	-	17	-	-	-	17	-
AMPHIBIA (NISP=1)														
Ran[illegible]e/Bufonidae	-	-	-	-	1	1	-	-	-	-	-	-	1	1
PISCES (NISP=15)														
Salmonidae	-	-	2	-	5	-	4	-	-	-	4	-	15	-
TOTAL	26		78		481		578		300		85		1,528	

[1] Number of identified species.
[2] Minimum number of individuals.

Perognathus parvus (Great Basin pocket mouse) -- 5 elements.

Perognathus parvus is the only heteromyid rodent known in the project area. Like the pocket gophers, P. parvus is most likely present as a result of natural agents of deposition.

Castor canadensis (beaver) -- 2 elements.

Beaver is a native inhabitant of a wide variety of river habitats in Washington (Dalquest 1948). There is ethnographic evidence that beaver were exploited (Post 1938), presumably for their pelts and as a food resource, although neither is explicitly stated. Beaver teeth are known to have been used by the Coeur d'Alene to incise wood, bone, antler, and soft stone (Teit 1930).

Cricetidae -- 2 elements.

There are a number of cricetid rodents in the project area. It was not possible to determine the species of these elements.

Neotoma cinerea (woodrat) -- 1 element.

According to Ray this animal was not eaten because of its unpleasant odor (Ray 1932:90). This element probably occurs in this site assemblage due to natural causes.

Ondatra zibethica (muskrat) -- 20 elements.

Muskrats are residents of cattail marshes, ponds, and the banks of slow-moving streams throughout the project area (Maser and Storm 1970). Muskrats were exploited by ethnographic residents of eastern Washington during the winter months (Ray 1932). Although muskrats are active year-round, the waterproof pelt of the species is at its prime during the winter months. There is no ethnographic record that the meat of this animal was eaten, although it is considered edible in other parts of the country (Ingles 1965:294).

Canis spp. (wolf, coyote, or dog) -- 7 elements.

Both Canis latrans (coyote) and C. familiaris (domestic dog) are common in the project area today. C. latrans is an indigenous species, and C. familiaris has great antiquity in the northwest (Lawrence 1968). C. lupus (wolf) is also known to have been a local resident in the past, but has been locally extinct since about 1920 (Ingles 1965). It was not possible to determine the species of these elements.

Odocoileus sp. -- 242 elements.

Two species of deer may be represented by these assemblages, *Odocoileus hemionus* and *O. virginianus*. Deer are thought to have represented a major food resource to the prehistoric inhabitants of eastern Washington (Gustafson 1972), as they did for the ethnographic cultures (Post 1938; Ray 1932). Species level identifacations were determined by discriminant analysis.

Odocoileus hemionus (mule deer) -- 5 elements.

Odocoileus virginianus (white-tailed deer) -- 18 elements.

Antilocapra americana (pronghorn antelope) -- 91 elements.

Although the pronghorn antelope is present today in Washington as an introduced species (Ingles 1965), antelope remains are common in both historic and prehistoric archaeological sites, especially in the arid part of the Columbia Basin (Gustafson 1972, Osborne 1953). There are ethnographic records of hunting practices associated with antelope procurement (Ray 1932; Post 1938).

Bos/Bison (cow or bison) -- 1 element.

Bos taurus (domestic cow) and *Bison bison* (American bison) have both inhabited the project area. Bison are known from project area assemblages dated between A.D. 500 and A.D. 1550. They have been reported ethnographically but never were observed in this area by European settlers (Schroedl 1973). Cattle were introduced into eastern Washington in 1834 (Cotton 1904). The close skeletal similarity between *Bos* and *Bison* makes it extremely difficult to distinguish between them (Olsen 1960).

Ovis canadensis (mountain sheep) -- 391 elements.

Mountain sheep occur in archaeological sites in eastern Washington with some regularity. The presence of this species is somewhat difficult to interpret, however, because references to it in the ethnographic literature are so scarce. Moreover, when competition with man and domestic stock for range became severe during historic times, the habitat preference of this species appears to have changed (Manville 1980). Mountain sheep are known ethnographically to have been exploited both for meat and as a source of bone for tools (Spinden 1908).

REPTILIA (NISP=17)

Chrysemys picta (painted turtle) -- 17 elements.

Painted turtle is the only turtle currently living in the project area. _Clemmys marmorata_ (western pond turtle) has been reported in the eastern part of Washington in the ethnographic literature, but there is no way to ascertain if taxonomic identification is accurate. _C. marmorata_ now occur only on the west side of the Cascades and in the southern part of the state. On the basis of present distribution, all turtle remains have been assigned tentatively to _C. picta_.

AMPHIBIA (NISP=1)

Bufonidae/Randidae -- 1 element.

This specimen is a dessicated carcass, complete with dried skin. No evidence suggests that it is in the site assemblage because of human agency.

PISCES (NISP=15)

Salmonidae (salmon, trout, whitefish) -- 15 elements.

These vertebrae could belong to any one of at least eight species of salmonid fish known in the project area. All fish vertebrae with parallel-sided fenestrated centra were assigned to this family.

DISCUSSION

The distribution of butchering marks and burned elements observed in the faunal assemblage is shown in Appendix C. A total of 147 elements, representing five taxa, exhibit one or more butchering marks and/or burning. Seven of these elements are categorized as artifacts and are discussed in Chapter 3. The remaining 140 elements are mainly artiodactyl elements (_Odocoileus_, _Antilocapra_, _Ovis_). One marmot bone is burned, and one canid bone displays a flake scar. The distribution of butchering marks and burned bone across taxa is summarized in Table 4-2.

Butchering marks and burning do not appear to be associated with any particular element(s) in this sample but occur in varying frequencies on most skeletal elements of artiodactyls. The lack of clear patterning may be an effect of the small size of this sample. If we make a zonal comparison of the frequency of marks on various elements we again discover little patterning, again probably as a result of small sample size.

The presence of butchering marks and the frequency of burned bone indicate that deer, antelope, and sheep probably were the main mammalian food source at this site. It is also possible that beaver, muskrat, and marmot were used for food, furs, or as material for tools. None of these taxa appear in the analysis of butchering, possibly because they are represented by very few elements each. None of the nonmammalian species represented (toads/frogs, turtles, and fish) appear in the analysis of butchering. Turtles and fish are known ethnographically as food resources. Ray (1936:90) cites an informant who stated that frogs were not eaten because they were "disgusting looking animals," and the single individual in this assemblage shows no evidence of use.

Table 4-2. Butchering mark and bone distribution by taxon, 45-OK-287/288.

Taxon	Total	Zone 2			Zone 3			Zone 4				Zone 5			Zone 6		
		S[1]	F[2]	B[3]	S	F	B	S	F	SF[4]	B	S	F	B	S	F	B
Antilocapra	9	–	–	1	1	3	–	–	–	–	–	1	3	–	–	–	–
Ovis	5	–	–	1	–	2	–	–	2	–	–	–	–	–	–	–	–
Odocoileus	19	–	–	–	–	6	–	2	5	–	1	–	2	–	–	1	2
Canis	1	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–
Marmota	1	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–
Deer-Sized	104	–	2	7	–	7	16	3	21	1	9	1	29	5	–	1	2
Sheep/ Antelope	1	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–
TOTAL	140	–	2	8	1	18	17	5	29	1	10	2	34	6	–	2	4

[1] Striae
[2] Flake
[3] Burned
[4] Both striae and flakes

Two kinds of faunal data may be used as indicators of season of site occupation. The first is age at death of individual, based on known season of birth for the species. We have estimated the age of death for 11 deer mandibles by reference to the criteria described by Robinette et al. (1957) and Severinghaus (1949). The age of two bighorn sheep mandibles has been determined by referring to the criteria described by Cowan (1940). Individuals in both taxa generally give birth in May or June (Ingles 1965). The second source of data indicating season of site occupation is the presence of seasonally active taxa. Twenty-two elements from two seasonally active taxa were recovered: Marmota flaviventris and Chrysemys picta. Marmots enter estivation as early as June and go into hibernation in August or September (Ingles 1965; Dalquest 1948). They emerge in March. Painted turtles hibernate from late October until March or April (Stebbins 1966; Ernst and Barbour 1972).

The season of occupation indicated by each of the four taxa (Odocoileus, Ovis, Marmota, Chrysemys) at this site are presented by zone in Table 4-3. The range of months indicated by deer and sheep teeth has been extended to include several months because individual variation in wear pattern from which age is assessed increases with age and varies depending on location and forage type.

In Zone 6 only two individuals are represented which may be used as seasonal indicators; both appear to have died in the spring. Taxa represented in Zones 4 and 5 indicate spring and fall use of the site. In Zone 3 the seasonal indicators all are deer, which appear to have been hunted during the spring and fall. A single deer mandible in Zone 2 seems to have been taken during the summer.

Table 4-3. Seasonal Indicators, 45-OK-287/288.

Zone	Taxon Element	Age	Season of Death (Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec)
2	Odocoileus (mandible)	4 yr 2 mo	Jun – Sept
3	Odocoileus (mandible)	4 yr 6 mo	Oct – Dec
	Odocoileus (mandible)	3 yr 6 mo	Oct – Dec
	Odocoileus (mandible)	1 yr 4 mo	Aug – Nov
	Odocoileus (mandible)	3 yr 4 mo	Aug – Nov
	Odocoileus (mandible)	2 yr	Apr – Jul
4	Ovis (mandible)	3 yr	Apr – Jul
	Odocoileus (mandible)	3 yr 10 mo	Feb – May
	Odocoileus (mandible)	2 yr 6 mo	Oct – Dec
5	Odocoileus (mandible)	3 yr 4 mo	Aug – Nov
	Odocoileus (mandible)	3 yr	Apr – Jul
6	Ovis (mandible)	3 yr	Apr – Jul
	Odocoileus (mandible)	11 mo	Mar – Jul

SUMMARY

The fauna from 45-OK-287/288 are representative of the fauna expected in the project area. The exception of sheep and antelope, all taxa represented currently live in the site area. Sheep and antelope commonly are found in prehistoric archeological sites in the project area. The high proportion of white-tailed deer relative to mule-deer in this site is important because the two species are not usually distinguished in archaeological assemblages from north central Washington. It generally has been assumed that archaeological deer from this region are mule deer (cf., Chance et al. 1977).

Elements from small artiodactyls (deer, sheep, antelope) form the largest single group; elk-sized elements form a small component. Most of the assemblage is extremely fragmented, indicating intensive use and/or poor preservation of these taxa. Our analysis of butchering indicates that small artiodactyls were a major food resource at this site.

A small number of elements of other taxa (marmots, beavers, canids, turtles, and salmonids) are ethnographically known to have been utilized by people living in the project area. Their low frequency of occurrence, however, limits the inferences we might make about the reasons for their appearance.

5. BOTANICAL ANALYSIS

Botanical studies, sometimes termed paleoethnobotany, concern analysis of vegetable materials found in archaeological matrices (Dimbleby 1967; Renfrew 1973; Dennel 1976; Ford 1979). These materials provide valuable information concerning the resource base of the peoples who inhabited a site. With lithic and faunal materials, they give us the means for making inferences about the peoples' patterns of subsistence, as well as interpreting site features. The presence and condition of specific kinds of fruit seeds and flower parts, for instance, can suggest seasonality of site use.

THE BOTANICAL ASSEMBLAGE

The botanical assemblage from 45-OK-287/288 is represented by 20 flotation samples extracted from 30.8 kg of sediment taken from Analytic Zones 1 through 6 (Table 5-1). An asterisk is used to indicate the units, features, and flotation samples of 45-OK-287. In addition, 30 radiocarbon samples with a weight of over 300 g were identified (Table 5-2). Most of these were taken from occupation debris in Zone 3. The flotation samples produced 1.40 g of charred and partially charred materials from features. Two flotation samples contained modern bitterbrush seeds (Purshia tridentata), chewed and left in rodent burrows. These do not appear in our tables, although they will be discussed with reference to an archaeological bitterbrush cache from Zone 1. All flotation samples were subjected to water separation from which standard subsamples, 2.0-1.0 mm at 0.10 g, were drawn.

The botanical remains are distributed among 15 families, 20 genera, and approximately 14 species of plants. Three of these, the common sunflower (Helianthus annuus), red cedar (Thuja plicata), and western white pine (Pinus albicaulus or P. monticola) are not native to the Rufus Woods Lake region. The remainder are present today within 10 km (6 miles) of the site.

Table 5-1 shows the botanical assemblage divided into four basic categories (conifer, hardwood, edible material, and other) by weight and number of appearances. Wood accounts for 73% of the botanical materials by weight. Nearly all of the wood is hardwood species. Sage (Artemisia tridentata), bitterbrush, and mock orange (Philadelphus lewisii) are important in Zone 3 and above. Conifer wood, mostly pine and fir, is more important below Zone 3. Red cedar, an important conifer in radiocarbon samples, occurs only within the housepit debris of Zone 3.

Edible material (seed fragments and tissue) comprise 3% of the assemblage. Six of 27 flotation samples, or 22%, contained "edible" plants--plants which the ethnographies indicated were considered edible. Those

Table 5-1. The botanical assemblage by flotation weight (g) and number of occurences (#), 45-OK-287/288.

Material	Zone 1		Zone 2		Zone 3		Zone 4		Zone 5		Zone 6		Total
	g	#	g	#	g	#	g	#	g	#	g	#	g
	(N=1)		(N=6)		(N=9)		(N=1)		(N=6)		(N=4)		
Conifer (10%)													
Ponderosa pine	-	-	-	-	-	-	-	-	<0.01	1	0.01	2	0.01
White pine	-	-	-	-	<0.01	1	-	-	-	-	-	-	<0.01
Yellow pine	-	-	-	-	0.01	3	<0.01	1	0.02	2	<0.01	1	0.03
Douglas fir	-	-	<0.01	1	0.01	2	-	-	<0.01	1	-	-	0.01
Pinaceae	-	-	-	-	0.01	1	-	-	-	-	-	-	0.01
Red cedar	-	-	<0.01	1	0.03	3	-	-	-	-	-	-	0.03
Bark	-	-	-	-	<0.01	1	-	-	<0.01	2	-	-	<0.01
Cone	-	-	-	-	-	-	-	-	-	-	<0.01	1	<0.01
Pitch	-	-	-	-	-	-	-	-	0.01	1	-	-	0.01
Other wood	-	-	<0.01	1	0.02	1	-	-	0.02	2	-	-	0.04
Hardwood (63%)													
Sage	<0.01	1	0.22	6	0.02	4	-	-	<0.01	2	-	-	0.24
Rabbitbrush	-	-	0.02	1	-	-	-	-	-	-	-	-	0.02
Bitterbrush	<0.01	1	0.30	6	<0.01	2					0.04	1	0.34
Serviceberry/ Hawthorn	-	-	-	-	<0.01	1	-	-	-	-	-	-	<0.01
Mock orange	-	-	-	-	0.28	3	-	-	-	-	-	-	0.28
Birch/Alder	-	-	-	-	<0.01	1	-	-	-	-	-	-	<0.01
Willow/Poplar	-	-	<0.01	1	-	-	-	-	-	-	-	-	<0.01
Other wood	-	-	<0.01	1	-	-	-	-	-	-	-	-	<0.01
Edible Material (2%)													
Seeds	-	-	0.01	2	0.02	2	-	-	<0.01	1	-	-	0.03
Other	-	-	<0.01	1	<0.01	1	-	-	<0.01	1	-	-	<0.01
Other Tissue (25%)													
Seeds	0.09	1	0.02	1	0.01	2	0.01	1	0.02	2	<0.01	1	0.15
Grass	-	-	<0.01	2	0.02	4	-	-	-	-	-	-	0.02
Lichen	-	-	-	-	0.10	1	-	-	-	-	-	-	0.10
Nonwoody other	<0.01	1	0.03	2	0.01	4	<0.01	1	0.03	5	0.01	2	0.08
TOTAL	0.09		0.60		0.54		0.01		0.10		0.06		1.40

definitely present include serviceberry (Amelanchier alnifolia), common sunflower, and knotweed (Polygonum sp.). Four additional edibles--bastard toad-flax (Comandra umbellata), mallow (Malvaceae), shining sumac (Rhus sp.), and hawthorn (Crataegus sp.) or cherry (Prunus sp.)--were represented by incomplete seeds. Three flotation samples contained tissue which resembles that from fleshy fruits or berries.

Table 5-2. Wood assemblage by weight and number of occurrences in radiocarbon samples (N=30), 45-OK-287/288.

Wood	Weight (grams)	Number of Occurences
Conifer		
Larch (Larix)	4.90	1
Pine (Pinus)	35.07	9
Douglas Fir (Pseudotsuga)	3.02	2
Red Cedar (Thuja)	222.15	13
Cones	2.20	1
Bark	0	0
Other Wood	4.40	1
Hardwood		
Maple (Acer)	1.30	1
Serviceberry (Amelanchier)	2.39	1
Sage (Artemisia)	9.28	4
Rabbitbrush (Chrysothamnus)	2.42	1
Hawthorn (Crataegus)	1.44	1
Mockorange (Philadelphus)	0.10	1
Bitterbrush (Purshia)	18.04	6
Willow (Salix)	0.65	1
TOTAL	307.36	

Other nonwoody tissue comprise 25% of the botanical array by weight. Over half of it consists of a charred bitterbrush seed cache and portions of a lichen (Letharia vulpina). Both plants may have been used as dye (see below). Other items include bulrush seeds, grass stems, and a final residual category of stem fragments, leaf and flower bud parts that cannot be identified to family. Since grasses and other herbaceous materials are delicate, their presence indicates samples with good preservation.

Table 5-2 shows the radiocarbon wood assemblage. We had not originally planned to include radiocarbon data because we reckoned it would be difficult to compare different kinds of samples. We did, however, pick five radiocarbon samples to analyze as a check against flotation sample woods. Three of these turned out to be western red cedar, and one was a sample of western white pine. The closest probable source for both woods is 120 km (75 miles) to the east, near Inchelium. Since we had not found these woods in our flotation samples and it seemed important that we learn as much as possible about them, we examined 30 radiocarbon samples.

These provided information about four woods not found in the flotation samples: larch (Larix occidentalis), maple (Acer glabrum), hawthorn (Crataegus sp.) and willow (Salix sp.). In addition, they enabled us to identify cedar and western white pine in flotation samples which originally had been put into the "other" conifer category.

In contrast to flotation samples, however, carbon samples created an incomplete picture of the botanical assemblage--only one out of 30 held any nonwoody tissue. Nor did these samples accurately indicate the relative importance of a particular wood in the assemblage. Table 5-2, for instance, shows that conifers outweigh hardwoods seven to one in the radiocarbon samples--the reverse of the flotation sample results. Some of this bias is due to three very large radiocarbon samples of cedar from a housepit floor. By contrast, pine is scattered through nearly all levels, zones and features in flotation samples. Radiocarbon samples, then, may add wood taxa to the flotation results and confirm trends noted in the flotation samples, but they do not provide an accurate picture of the total botanical assemblage.

The entire assemblage of flotation and radiocarbon material is presented below arranged alphabetically by family, genus, and species. Possible uses are suggested from information supplied by ethnobotanical literature. We include seasonality data when it is available.

ACERACEAE (Maple Family)

Acer glabrum Torr. (Rocky Mountain maple, Douglas maple)

A single radiocarbon sample of this wood, weighing about 1 g, was taken from Feature 26, Analytic Zone 3. Feature 26 is associated with two reliable dates, 1122±65 B.P. (TX-4031) and 1046±69 B.P.(TX-4030).

Douglas maple is a small tree or bushy shrub that may grow to 10 m in moist locations. Specimens can be found in the middle reaches of draws and at elevations above 500 m (1,600 ft).

This species of maple was considered good fuel, as well as good construction material for bent wood items such as hoops, tongs, snowshoe frames, and small items such as tool handles and tent pegs (Turner et al. 1980:59).

ASTERACEAE (Compositae, Daisy Family)

Artemisia tridentata Nutt. (sagebrush, big sagebrush)

Sage is common at the site and is found in 30% of the samples. It was found in four carbon samples, and 13 flotation samples. Fifteen of these come from the three upper zones, where the sage appears with bitterbrush. Sage wood is not mechanically strong and so it probably was not used in the manufacture of tools; rather it would have proved a good fuel, and so it was often used (Turner et al. 1980:79).

Chrysothamnus nauseosus (Pall.) Britt. (rabbitbrush)

Rabbitbrush was found in one flotation sample and one carbon sample. In both cases the wood occurred with bitterbrush and sage. Twigs were present, and at least two fragments of unexpanded buds came from the samples found inside a subsurface pit (Feature 23) dated at 473±43 B.P. (TX-4028). This may indicate late summer occupancy.

Rabbitbrush is a small, slender, gray-green shrub found among sage and bitterbrush. It buds in late August and flowers from September to October. Its woody structure is nearly identical to that of sage, but it does not grow as large. The stems, while useful tinder because they are numerous, would not provide sustained heat. They burn faster than sage or bitterbrush, a fact noted during a local brushfire in our area.

The plant was used to smoke hides and to make a medicinal infusion for women and livestock (Ray 1932:217; Turner 1979:185-186; Turner et al. 1980:83). Since the plant, like sage, is known to be toxic to livestock (Lewis and Elvin-Lewis 1977:56-57), its efficacy as an internal medicine is open to question. Among natives of the American southwest, its buds and flowers were used to make a fast yellow dye, notable because it did not need a mordant (Robbins et al. 1916:45; Vestal 1952:49-50).

Helianthus annuus L. (sunflower, common sunflower)

Discovery of two partial sunflower achenes (Plate 5-1;a) came as a total surprise, largely because Feature 26, in which they were found, is dated to about 1,000 years ago. The common sunflower generally is thought to have reached Washington State in historic times. We expected to find evidence of the edible native spring sunflower, Balsamorhiza sagittata, at such an early date, but not the fall species.

The more complete of the two specimens is 1.6 mm wide and at least 1.8 mm long (Plate 5-1;a right, b). Charring has exposed longitudinal fiber bundles (Plate 5-1;b,c) by stripping away portions of the pericarp, which has short hairs. A few hairs can be seen on the distal end of a modern H. annuus achene charred for comparative purposes (Plate 5-1;c, right).

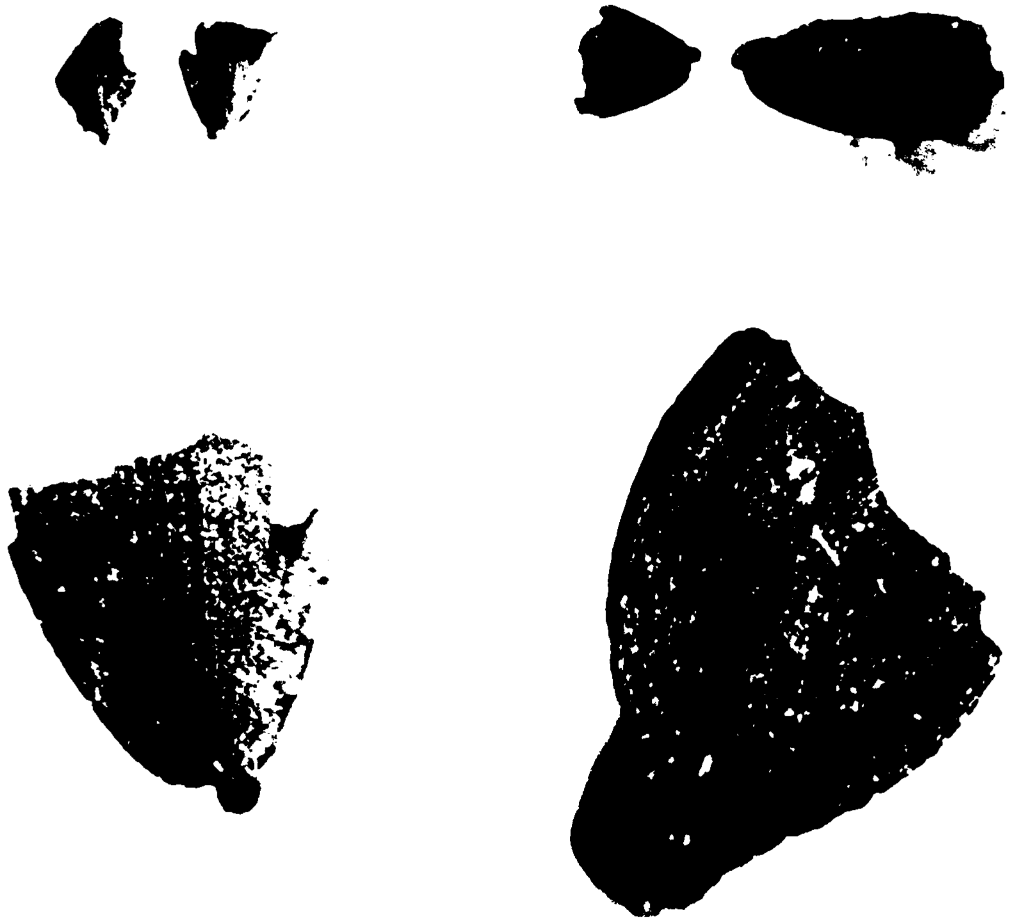


Plate 5-1. Carbonized seeds from 45-OK-288. (a) Fragments of Sunflower (Helianthus annuus) achenes (9x). (b) Sunflower fragment showing basal end and longitudinal tiber bundles (25x). (c) Archaeological (left) and modern ruderal Sunflower (right) (9x). (d) Smartweed (Polygonum sp), detail showing surface punctate striations (25x).

If the archaeological seed had been broken precisely in half, its charred length would have been 3.6 mm, but since seeds shrink under heat, a compensation factor must be added to derive the probable measurements of the original seed. Addition of a conservative factor, 11% to 22% (Helser 1953, quoted in Yarnell 1978), indicates a length of from 4.0 to 4.6 mm for the seed before burning. This length would fall within the range of the reconstructed form of wild sunflower, from 4.5 to 5.0 mm (Yarnell 1978:291).

The archaeological specimen, however, probably is not broken in half; the missing part probably is longer than the part recovered. The total charred length probably was about 4.2 mm, and the uncharred length would have been from 4.7 to 6.0 mm. This size falls within the range of H. annuus lenticularis, the ruderal (feral domestic) sunflower that colors our roadsides in late summer. It is larger than the range of the wild sunflower seeds and smaller than the range of most of the earliest domesticated sunflower achenes found in archaeological sites (Yarnell 1978:291, Table 1), which date to the first millenium B.C. The shape of our specimens also suggests the ruderal form. We will not be able to identify these seeds with complete assurance, however, until we have a larger population to examine.

The Sanpoil-Nespelem Indians were known to collect the spring sunflower, but whether or not they collected portions of the common sunflower is controversial. The controversy surrounds the identification of plants collected by Ray, as well as native names published with his Latin binomials (Ray 1932:100,103,104). Turner (et al. 1980:80) suggests that plants that Ray has called the common sunflower (H. annuus) probably are Balsamorhiza sagittata. Internal evidence shows that she is at least partially correct. The common sunflower is an annual with no harvestable root; whereas the spring sunflower, a perennial, has large roots with sufficient storage capacity to produce the first edible shoots of spring.

Whether Ray was also mistaken about stored seeds being Helianthus is not as easily ascertained. Ray states that the seeds were collected in the "fall" (1932:104); Helianthus seeds ripen in August. Balsamorhiza seeds, by contrast, ripen in June. Weather conditions might change the maturity date a little, but not enough to push that date into fall. At the moment, however, we are not certain whether the plants he took in the field were Helianthus or Balsamorhiza.

The appearance of Helianthus from an uncontaminated flotation sample (purity of 81%) in a securely dated feature is of interest whether or not ethnographic parallels exist. The home of the wild form from which domesticated sunflowers descended is thought to be on the Colorado Plateau (Yarnell 1978:291). Although it is possible that our seeds may be as small as the wild form, it is not likely. This means that they are either intermediates between wild and domesticated sunflowers or that they are the descendants of domesticates turned feral, as are those in our landscape today. Wild or ruderal, these specimens direct our attention eastward.

CUPRESSACEAE (Cypress Family)

Thuja plicata Donn. (western red cedar)

Red cedar is found in five flotation samples and in twelve carbon samples, about 35% in all. Cedar is highly localized in Zone 3. All except two samples are from Features 26 and 12 in this zone; 220 g of cedar were concentrated between Unit Level (UL) 90 and UL 130 in two adjoining 2-m^2 excavation units. Ninety-seven percent of the cedar (213 g) consisted of three sections of a board or plank. Two dates, taken from two portions of the plank, indicate that it became part of the feature sometime after 1064±69 B.P. (TX-4030) or 1122±65 B.P. (TX-4031).

All of the samples, whether from flotation or radiocarbon collection, appear to be bole (trunk) wood. Nearly all are in excellent condition, and several are not completely carbonized. This incompletely carbonized material shows that in this environment some tissues can survive burial for at least a thousand years without having been burned.

Cedar is an excellent construction wood where lightness, strength and durability are demanded. It is decay resistant (Lewis and Elvin-Lewis 1977:360). Because of its uniform texture, cedar can be split easily. Such attributes make it highly unlikely that such wood would be collected primarily for fuel.

Cedar logs were pulled from the river to be made into canoes and to provide planks for semisubterranean houses, and staves for self bows, and cooking utensils (Post and Commons 1938:56,60; Ray 1932:31,119). Informants claimed that paddles always were constructed out of cedar because of its lightness (Ray 1932:119; Post and Commons 1938:56). Floats and net weight holders commonly were of cedar. Frequent expeditions to the area around Republic appear to have been arranged in order to collect cedar roots. No doubt the energy expended to gather such items was balanced by the quality of cedar root baskets, the most durable kind produced (Post and Commons 1938:62). While the ethnographies do not state that wood was collected as well, the possibility must remain open.

CYPERACEAE (Sedge Family)

Scirpus acutus Muhl. ex Bigel. (bulrush, tule)

Three seeds were recovered from the site. All are from Flotation Sample 1*. Tule was the principal mat-making material of the area (Turner et al. 1980:37). Thus far, no stem material has been identified at the site.

Goose Lake, 5 km to the northwest, is the nearest present reliable source for tules of good quality.

HYDRANGEACEAE (Hydrangea Family)

Philadephus lewisii Pursh. (mock orange)

Mock orange charcoal comes from three flotation samples from Pit Feature 10* and a radiocarbon sample from Feature 36 in Zone 3. At present, mock orange bushes are found in the rocky outcrop a few meters from the site. Mock orange was a preferred wood for bows and snowshoe frames (Ray 1932:87-88, 121) and for digging sticks, arrows, and harpoon shafts (Turner et al. 1980:108).

PINACEAE (Pine Family)

The pine family is well represented at 45-OK-288. It occurs in 39% of the samples and in all but one analytic zone. Most of this is ponderosa pine (Pinus ponderosa) which tolerates dry conditions better than any other conifer in the region. Occasional individuals dot the river terrace. Mostly, however, these trees are found above 600 m (1800), about an hour's walk from the site. Another pine that may be represented is lodgepole pine, P. contorta. While contorta can be distinguished from ponderosa in bole wood, the two are difficult to distinguish in samples which contain mixed branch and trunk material. If there is uncertainty about the composition, a mixed sample is designated as yellow pine to include both woods. Woods are similar in structure and working properties and could be used for many of the same activities interchangeably. Yellow pine must have been popular through the ages; it is found in 14 features at the site.

Pines have other uses as well: cambium and seeds were consumed, and pitch made a water-proof cement and a base for medicinal salves and ointments. Boiled branch tips and needles served as internal medicine and as external washes (Turner et al. 1980:32.34; Ray 1932:221). The wood was a major material for dugouts and fire-drills (Ray 1032:119; Post and Commons 1938:56,59). Pine boats would not have been as light as cedar ones, but the material would have been more available.

Pinus monticola Dougl. ex. D. Donn. (western white pine).

Two samples of partially carbonized white pine were found in Features 12 and 26 (Zone 3), for a total of 1.31 g. Like cedar, this pine is not local. According to forester David Townsend of the Colville Confederated Tribes, the nearest modern source is near Inchelium. Although soft pine is not mentioned in the local ethnographic sources, Turner's informants state that natives in the Arrow Lakes area used the tree for dugouts (Turner et al. 1980:29).

Pseudotsuga menziesii (Mirb.) Franco. (Douglas fir)

Five samples of fir came from Features 7, 36, and 26 in Analytic Zones 5 and 3, and Feature 1* from Zone 2. At present, Douglas firs grow among ponderosa pines within two hour's walk from the site. A few trees also can be seen among the pines that grow along a protected section of the opposite shore 1.6 km (1 mile) upstream.

Fir was a preferred material for harpoon and spear shafts, because long, straight staves could be made that would not warp or absorb water (Post and Commons 1938:55-56). Fir boughs provided flooring and temporary shelter material in dwellings and sweat lodges and were used as scrubbing material during sweats. Fir needles were combined with cedar root to make vegetable dye in basketmaking. Bough tips, needles and bark were said to be useful in reducing fevers and alleviating a variety of other complaints. In the summer, some trees exuded a rare sugar, which was avidly gathered (Turner et al. 1980:34-35).

Larix occidentalis Nutt. (western larch, tamarack)

A sample of larch was found in a radiocarbon sample in Analytic Zone 3. Although larch is locally available, it has not been observed below 550 m (1800 ft). At present, trees nearest the site are 11-12 km (7 mi) due north along Kartar Road in the upper Condon-Harrison-Coyote Creek drainage.

The wood does not appear to have been valued highly as construction material among the Okanogan, although it was used as fuel. The sap and gum from bark and needles had a number of uses. The gum was chewed fresh or dried and powdered as a base for face paint. Needles made a flavorful spring tea and tonic. Applied externally, the tea was said to relieve arthritis, and it was used as an antiseptic wash for cuts and abrasions (Turner et al. 1980:25-27). Gum issuing from vessels under the bark contains the sugar-substitute Pyrone, used in enhancing bakery products in the U.S. (Lewis and Elvin-Lewis 1977:216).

Other Material.

Traces of conifer bark, cone, and pitch were found in five flotation samples from Analytic Zones 3, 5, and 6. About 0.04 g of conifer which could not be identified further were noted from Zones 2, 3, and 5.

POACEAE (Gramineae, Grass Family)

Grass, though delicate tissue, is fairly common in the flotation samples. Grasses were found in six flotation samples and one carbon sample from Analytic Zones 5, 3, and 2. Except for the sample of dropseed in Zone 3, none are large enough for identification. Like some woods, one of three samples from Zone 3 was incompletely carbonized.

Sporobolus cryptandrus (Torr.) Gray. (sand dropseed)

A small quantity of dropseed grass stem was found in Zone 3 (Feature 12). Grasses often are difficult to identify from culm (stem) tissue unless ligules are present. In this case, both the presence of ligules and a culm aided in identification. Dropseed plants are small, usually under 70 cm, and inconspicuous in the landscape. Although the caryopses (seeds) are free-threshing, they are so tiny they would prove uneconomical to gather. Ethnographic sources are mute on this grass, although small-stemmed grasses in general would be good tinder and moccasin stuffing material.

POLYGONACEAE (Buckwheat Family)

Polygonum L. (knotweed, smartweed)

A knotweed achene was found in Feature 26 (Zone 3). Single seeds are not usually given separate treatment. This one deserves special consideration because it was found with two sunflower achenes (*Helianthus annuus*). The association of sunflower and knotweed is not unusual in archaeological deposits in other parts of the country. Though presently considered a weed, knotweed was collected and eaten in the past in the Midwest and abroad (Asch and Asch 1977:330-331; Renfrew 1973:180-183). Seeds mature throughout the summer.

Our specimen is trigonous (three-angled) in cross section and narrowly ovate in plan with a blunt tip. It is 2.4 mm long, 1.2 mm wide, and 1.15 mm thick. The surface appears dull at low binocular power, but at 60x it exhibits a pattern of longitudinally striated punctations. The pattern can be observed in Plate 5-1;d. Of the three dozen species present in the Pacific Northwest, the choice can be narrowed to three: *P. achoreum* Blake, *P. erectum* L. and *P. hydropiper* L. On the basis of size and surface sculpting, the best choice is *P. hydropiper*, described by two authorities as dull, striate, and puncticulate (minutely punctate) (Hitchcock et al. 1964:155; Montgomery 1977:166). The best match in size and shape are *P. erectum* and *P. achoreum* (Hitchcock and Cronquest 1964:145; Martin 1954:516; Montgomery 1977:165). We will need more achenes to identify correctly this polygonum to species.

The only smartweed reported in the ethnographic literature is the amphibius form, water knotweed (*P. amphibium* L.). The roots were steeped in hot water and consumed for colds (Turner et al. 1980:113).

ROSACEAE (Rose Family)

Amelanchier alnifolia Nutt. (saskatoon, serviceberry)

The seeds and wood of serviceberry have been found in flotation and carbon samples in Analytic Zones 3 and 2. A single piece of mainstem was retrieved as a carbon sample from Feature 23 in Analytic Zone 2. A few tiny pieces that may also be serviceberry wood (or hawthorn) were taken from a flotation sample in Zone 3. Serviceberry wood is as dense and presumably as decay resistant as bitterbrush (Purshia). Thus its absence from zones lower than Zone 4 should not be attributed to decay or abrasion.

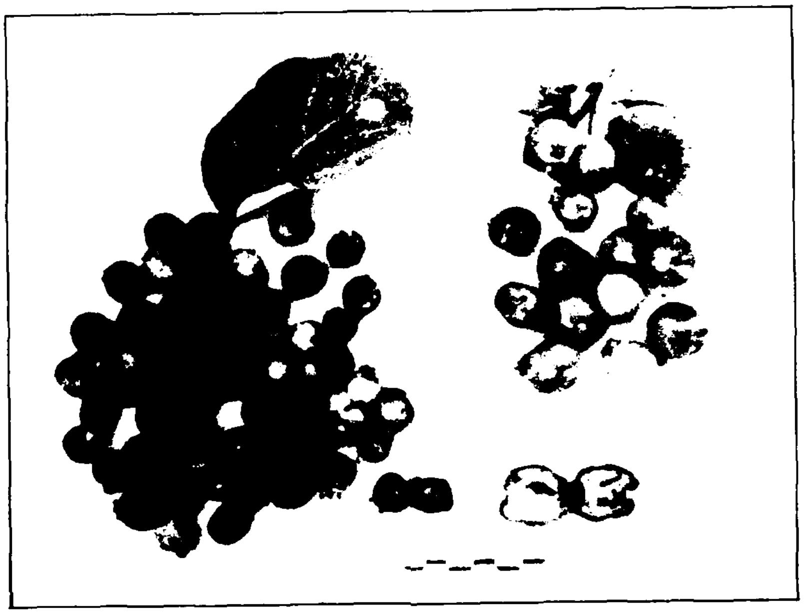
Serviceberry fruits still are gathered by Native Americans. Shrubs cover draw bottoms and form thickets along streams and the bottoms of talus slopes. Although occasional solitary bushes may be found on open terraces and hillsides, the shrubs tend to be found in a community of useful plants such as hawthorn, bitter cherry, mock orange, squaw currant, and Oregon grape, among others. According to Turner (1978:188-182; Turner et al. 1980:122-123), up to eight varieties were known to Indians, while Northwest botanists recognize only three. Serviceberry plants hybridize freely, particularly in areas disturbed by fire and human activities (Erichsen-Brown 1979:166-169).

Our comparative collection includes two varieties, collected in the Nespelem and Coyote Creek areas. One type corresponds to the "second-best" or "third-best" saskatoon (Turner et al. 1980:120). It has large, red fruits, white flesh, and large seeds,(5.32±0.4 mm by 2.75±0.3 mm). The other kind, "first" or "very best" saskatoon, has smaller berries with red flesh and small seeds (4.0±0.4 by 2.2±0.5 mm). Fruits of both kinds are shown in Plate 5-2;a. The archaeological seeds, from Feature 27 in Zone 2, appear to be of the "best" kind (Plate 5-2;b). Students who have eaten this variety rate it highly and can tell it from others. The fruits dry well. Samples formed into cakes and dried in the sun lose about 72% of their weight but remain pliant and tasty after six months.

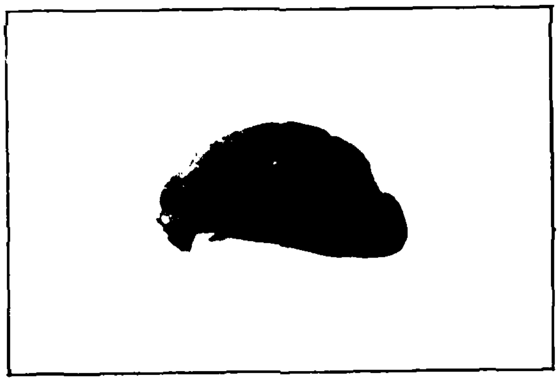
Seasonality data were gathered in the summers of 1981 and 1982, which were somewhat wetter and cooler than previous years. In both years, prime berries were available by the last week in June. Berries were still available on July 15, but the season was over by about the 20th.

During the serviceberry harvest, both currants (Ribes spp.) and Oregon grape (Berberis sp.) also were available. A number of varieties of currants grow in the project area; like serviceberries, some are more flavorful than others. Those wishing to collect any or all of these fruits near the river or in draws would have to have done so within the three to four week period surrounding the first of July. Women not otherwise occupied in fish drying activities reportedly went on berrying expeditions that varied in length from one day to several (Post 1938:25; Ray 1932:101).

Serviceberries were dried whole, mashed into cakes, and dried or pulverized to make salmon pemmican (Ray 1932:101). Often they were used with other foods, such as bitterroot, Lewisii rediviа, and salmon eggs (Post 1938:25).



a



b

Plate 5-2. Serviceberry (Amelanchier alnifolia).
(a) "best kind", left; and "second best kind", right.
(b) Archaeological serviceberry achene (3.6 mm x 1.9 mm).

Serviceberry wood was used for arrowshafts and digging sticks (Post and Commons 1938:53,58).

Crataegus L. (hawthorn, thornberry haw)

Hawthorn is not common in the assemblage of the site. Hawthorn wood was found in one carbon sample in Feature 36 (Zone 3), and a probable seed fragment was found in a flotation sample from Feature 12 in the same zone. Two species are native to the region (Hitchcock and Cronquest 1961, Vol. 3:100-101). One has red fruits (C. columbiana Howell), and one has blue-black fruits (C. douglasii Lindl.) that persist on bushes until winter. Both species have thorns that make handling branches hazardous. Hawthorn probably was never a major fuel. Turner states that the wood of the black haw occasionally was used for digging sticks, mauls, wedges, and clubs, and thorns were used for a variety of purposes (1979:234; Turner et al. 1980:125).

We expected that the durable seeds of hawthorn would appear in flotation samples, but we have not yet identified these seeds positively. We have, however, found portions of thick-walled seed coats (bony endocarp) that strongly resemble those of Crataegus seeds in thickness, density, and other details. One of these is from Feature 12 in Zone 3.

Turner and others report that the fruits were not highly regarded (Turner et al. 1980:123-125; Elmendorf 1936), yet many groups reportedly stored the fruits in a variety of ways--dried, pounded in cakes, or mixed with meat. Haws may be picked in August, but they become edible later and would be good fall or early winter food.

Haws also have medicinal qualities. Several species have been known to lower blood pressure. All are hypotonic and have antiarrhythmic activity (Lewis and Elvin-Lewis 1977:193). In addition, the bushes are known indicators of past habitation sites (Erichsen-Brown 1979:155).

Purshia tridentata (Pursh) DC. (bitterbrush, greasewood)

Bitterbrush charcoal appeared in 10 flotation samples and 6 carbon samples, 30% of all samples at 45-OK-287/288. Most of the charcoal appeared in Zone 3 and above. Three flotation samples from Zones 1, 2, and 3 had bitterbrush seeds with charcoal, suggesting the wood was burned in summer.

Bitterbrush usually was found with sagebrush. There are two exceptions. Bitterbrush was the only wood in the sample from Zone 6 and in one carbon sample from Zone 3. Bitterbrush appears to have been sought as fuel at about the same time as sage became popular. The sage/bitterbrush combination began to outstrip pine about 1,000 years ago and remained important into historic times.

Bitterbrush charcoal has no obvious breakage or cleavage planes. Archaeological pieces tend to be blocky and roughly isodiametrically shaped. In this, bitterbrush resembles serviceberry wood. Sage, by contrast, tends to separate into thin, rectangular plates at the annual rings and break across the rays. The net result is that bitterbrush preserves better and weighs more than sage per unit volume.

Charred and uncharred bitterbrush seeds are numerous at the site. Two modern rodent caches of chewed seeds, for instance, were taken as flotation samples (Flotation samples 7 and 8). Another cache, charred and unchewed, was found in Zone 1 in the northern part of the site. It contained over 500 seeds with sage and bitterbrush wood in association. Five more seeds were recovered from Zones 5, 4, 3, and 2 along with various woods and tissues.

Bitterbrush seeds, however, have not been ethnographically recorded as human food. The archaeological seeds that we have found definitely are charred, and many have tiny explosive bulges and craters on their surfaces (Plate 5-3;b). These imply that the seeds either were fresh or had been soaked when they were burned. These characteristics might indicate seasonality. Bitterbrush seeds disperse swiftly once ripe. This year (1982) the seeds were harvestable around June 25. Mature seeds dropped within two weeks of that date. By July first, the branches were largely bare except for immature or stunted fruits, which never ripened fully. The USDA Forest Service, which plants bitterbrush, cautions that timing is important in seed collecting because a "crop can be lost during one severe storm" (USDA 1974:687). The cache in Zone 1, then, probably was collected in late June or early July, although it could have been used at any time after that.

Although bitterbrush bark was once a useful textile and the wood was an important fuel, only two uses for the seeds are reported: crushed seeds were used in treating constipation and hemorrhage (Ray 1932:217) and in making a dye (Chamberlain 1892, reported in Turner 1979:242).

SALICACEAE (Willow Family)

Salix sp. (willow)

One example of willow wood was found among a mixed wood radiocarbon sample in Analytic Zone 2. Willow had numerous uses but it is mentioned as a fuel only in reference to special-purpose smoking fires, such as those for hides and meat drying. The context in which willow was found, as well as the small amount, suggests it was part of general camp trash.

Willow is the original aspirin. Leaves, bark, root all contain salicin, which can be made into analgesic teas. The bark can be used in poultices to reduce wound swelling and to stanch bleeding. Dried, shredded bark has numerous uses. It can be made into rough lashing, fine cordage, bandages,

Plate 5-3. Bitterbrush (Purshia tridentata). Carbonized achene (5.0 mm).

Plate 5-4. Cedar plank (Thuja plicata), from Zone 3, 45-OK-288. Missing piece removed for radiocarbon sample.

diaper paddings, and textile material (Post 1938:21; Post and Commons 1938:67-68; Turner et al. 1980:135-136; Ray 1932:31,36,38). Entire branches formed makeshift ties or made more elaborate constructions, such as traps, hide stretchers, sweat lodge frames, and the like, items requiring flexible strength (Post 1938:18, 38, 67; Post and Commons 1938:42).

Salix/populus (willow/poplar)

A small amount of willow or poplar (wil/pop) charcoal was extracted from a pit feature, Feature 6*, from Zone 2. Most of the charcoal is probably willow. The distinction between the two generally is difficult to make when samples are small in size or partially eroded.

SANTALACEAE (Sandalwood Family)

Comandra umellata (L.) Nutt. (bastard toadflax)

Part of a Comandra nutlet was found along with bitterbrush seed fragments and two other unknown seeds in pit Feature 6* dated to 628±50 B.P. (TX-4038).

Bastard toadflax, a rather inconspicuous plant of semi-arid steppe environments, has edible berrylike fruits. However, the flowers apparently were used as a pleasant nibble in our area (Turner et al. 1980:138). Presence of this as well as other seeds in the feature indicates early summer burning.

USNEACEAE

Letharia ? (wolf "moss," wolf lichen)

A portion of a lichen which appears to be that of Letharia, possibly L. vulpina (L.) Hue was extracted from a declivity in a granitic rock from Zone 3 (Flotation sample 8*) and treated with a preservative that made identification difficult. At lower elevations, wolf lichen grows on old sage and bitterbrush stems; higher up, it grows on conifer trunks. It was used as a yellow dye by Okanogan-Colville peoples at one time (Turner et al. 1980:15). The lichen was not found in a cultural feature, and its inclusion in Zone 3 may be entirely natural.

Fifteen flotation samples and one carbon sample contained herbaceous tissue in addition to the taxa listed above. Three flotation samples contained charred tissue which strongly resemble outer walls of fleshy fruits from features in Zones 2, 3, and 5.

Finally, unknown or partial seed fragments are found in Zones 6, 5, 3, and 2. A possible charred sumac embryo (Rhus sp. from the Anacardiaceae), a fragment of seed coat resembling hawthorn or cherry, a composite achene (probably sage, Artemisia sp.) and two unknown entire seeds were taken from features in Zone 2. Hawthorn or cherry seed coat was taken from a feature in Zone 3. A partial seed that may belong to the mallow family (Malvaceae) was found in Zone 5. A trace of birch or alder (Birch/alder from the Betulaceae) was found in Zone 3.

SUMMARY BY ZONE

Botanical material from 45-OK-287/288 are summarized below by analytic zone, beginning with the oldest zone. Table 5-3 shows the average percentage of archaeological carbon, depth below unit datum, and radiocarbon dates of archaeological carbon contained in flotation samples by zone.

Table 5-3. Average percentage of archaeological carbon in flotation samples by zone, 45-OK-287/288.

Zone	Average % by Weight	Approximate Depth B.U.D. (m)	C14 Dates
1	5.000		
		.5	
2	1.000		473±43 628±50 756±67 774±67
		1.0	
3	0.100		923±77 1046±69 1122±65
		1.5	
4	0.010		1543±94
		2.0	
5	0.003		4525±126 4641±150
		2.5	
6	0.002		

ZONE 6

Zone 6 is represented by four flotation samples (17-20) taken from an occupation layer (Feature 80) and two subsurface pits (Features 82, 77). The four range in depth from U.L. 190 to U.L. 240 and are the oldest remains at the site. The samples yielded about 0.06 g of carbon in 6,000 g of soil (carbon:noncarbon ratio of .002%), and the carbon purity varied from 99% on the occupation layer to 33-66% in the subsurface features. The results of analysis are shown in Table 5-1. The largest amount of identified material by weight was bitterbrush wood, which came from the occupation layer. Pine wood, however, which weighs less than bitterbrush, was found in all three flotation samples from pit features, along with cone, seed, and herbaceous stem fragments. The seed coat, which is similar to that of bitterbrush seed, cannot be identified positively. The most common wood in Zone 6, then, is yellow pine.

ZONE 5

Analytic Zone 5 is represented by six flotation samples (3, 4, 5, 6, 12, and 13) and by four radiocarbon samples (7, 8, 9 and 10). All except one of these samples were extracted from an occupation surface (Feature 7). Ponderosa pine dates the top of the feature at 4525±126 B.P. (TX-4027), and pine and conifer cone fragments date the middle at 4641±150 B.P. (TX-3800). The carbon samples consist of 24.6 g of pine and cone fragments and 1.2 g of Douglas fir. The amount of archaeological carbon from the flotation samples was relatively small--about 0.1 g of carbon from 6,000 g of soil. Table 5-1 shows the results.

Conifer is clearly the most important wood by weight and number of appearances. Sage is the minority species. Remarkably, seeds and nonwoody tissues weigh as much as the woods. Two of the seeds are nonedible bitterbrush achenes, and one is an edible but weedy species of mallow. The large sample of nonwoody remains--bits of dicot stems and storage tissue--indicates that preservation is relatively good. The surviving pieces, however, are so small that they cannot be identified more precisely. Some of this tissue may be from edible plants; some scraps strongly indicate fruit wall coverings, and others suggest storage cells such as those found in fruits or storage roots.

ZONE 4

Little is known about Zone 4 botanically. The zone is represented by one flotation sample (2) and four carbon samples (25, 27, 29, 32). The flotation sample was taken from U.L. 150 in a semicircular ring of rocks (Feature 72). It yielded a trace (<0.01 g) of yellow pine, one complete bitterbrush seed (0.01 g), and bits of parenchymoid tissue. The carbon to soil ratio was 0.001%. The combined weight of the carbon samples is 10.8 g. More than 60% of that is ponderosa pine; the remainder is undifferentiated hard pine. Both branch and bole wood are represented. In addition, a trace of small-stemmed grass was found with one carbon sample. Portions of one pine sample are incompletely carbonized. All of these remains are associated with a single radiocarbon date of 1543±94 B.P. (TX-4029).

ZONE 3

Zone 3 has more samples than any other zone at the site--nine flotation samples (2*, 3*, 4*, 9, 10, 11, 16, 21) and 16 carbon samples (11, 13, 14-17, 28, 33, 35-42). These samples yielded the site's most interesting botanical remains. They represent a structure floor (Features 12, 26, 36 and 38/58) as well as two subsurface pits (Features 10 and 22).

The flotation samples produced 0.33 g of archaeobotanical remains from 11.7 kg of soil for a carbon ratio 0.10%. The flotation assemblage (Table 5-4) consists of 16% conifer, 56% hardwood, 4% edible material including sunflower seeds, and 24% herbaceous material. The percentages of red cedar, edible material, and grass are high from Structure 1 flotation samples.

Table 5-4. Botanical assemblage of Zone 3 by feature, flotation weight and number of occurrences (#), 45-OK-287/288. Samples with incompletely carbonized material indicated by $^{+}$.

Material	Hearth Feature 10[1] (N=2)		Pit Feature 22 (N=1)		Floor[1] Feature 12 (N=1)		Floor[1] Feature 26 (N=2)		Hearth Feature 53 (N=1)		Flotation Sample 8		Total
	g	#	g	#	g	#	g	#	g	#	g	#	g
Conifer (16%)													
White pine	-	-	-	-	-	-	<0.01^{+}	1	-	-	-	-	<0.01
Yellow pine	-	-	0.01	1	<0.01	1	-	-	<0.01	1	-	-	0.01
Douglas fir	-	-	-	-	-	-	0.01	1	0.01	1	-	-	0.02
Pinaceae	-	-	-	-	-	-	-	-	0.01	1	-	-	0.01
Red cedar	-	-	-	-	0.01^{+}	1	0.02^{+}	2	<0.01^{+}	1	-	-	0.03
Bark	-	-	-	-	<0.01	-	-	-	-	-	-	-	<0.01
Other wood	-	-	-	-	0.01	1	0.01	0	-	-	-	-	0.02
Hardwood (56%)													
Sage	-	-	-	-	<0.01	1	0.02	2	<0.01	-	-	-	0.02
Bitterbrush	-	-	-	-	<0.01	1	0.01	2	-	-	-	-	0.01
Serviceberry/ Hawthorn	<0.01	1	-	-	-	-	<0.01	1	-	-	-	-	<0.01
Mock orange	0.28	3	-	-	-	-	-	-	-	-	-	-	0.28
Birch/alder	-	-	-	-	<0.01	1	-	-	-	-	-	-	<0.01
Other wood	-	-	-	-	<0.01	1	-	-	-	-	-	-	<0.01
Edible Material (4%)													
Seeds, 4	-	-	-	-	0.01	1	0.01	1	-	-	-	-	0.02
Other	-	-	-	-	<0.01	1	-	-	-	-	-	-	<0.01
Other Tissue (24%)													
Seeds, 1	-	-	-	-	-	-	<0.01	1	-	-	-	-	<0.01
Grass	-	-	-	-	0.02^{+}	1	<0.01	2	-	-	-	-	0.02
Lichen	-	-	-	-	-	-	-	-	-	-	0.10	1	0.10
Nonwoody other	-	-	-	-	0.01	1	<0.01	2	-	-	-	-	0.01
TOTAL	0.28		0.01		0.06		0.08		0.02		0.10		0.55

[1] Structure 1

The radiocarbon samples produced an astonishing 234 g of carbonzied and partially carbonized wood (Table 5-5), most of which (220 g) is western red cedar. Note that some cedar and all of the white pine and Douglas fir from features associated with the housepit are partially carbonized. Partially charred cedar, white pine and grass is found among the flotation samples (Table 5-4) as well. The presence and condition of these exotic woods suggests contemporaneity among the features of the housepit.

Table 5-5. Radiocarbon woods of Structure 1, Zone 3, by feature, weight (g) and number of occurrences (#), 45-OK-287/288. Samples with incompletely carbonized wood are indicated by an $^{+}$.

Wood	Floor Feature 12		Floor Feature 26		Floor Feature 36		Hearth Feature 38/58		Rock Alignment Feature 37		Total	
	g	#	g	#	g	#	g	#	g	#	g	#
Conifer												
White pine	1.03^{+}	1	-	-	-	-	-	-	-	-	1.30	1
Douglas fir	-	-	1.82^{+}	1	-	-	-	-	-	-	1.82	1
Larch	4.90	1	-	-	-	-	-	-	-	-	4.90	1
Red cedar	215.89^{+}	5	0.31^{+}	6	-	-	1.00^{+}	1	2.80+	2	220.00	14
Hardwood												
Sage	-	-	-	-	1.44	1	-	-	-	-	1.44	1
Bitterbrush	-	-	-	-	0.86	1	-	-	0.84	1	1.70	2
Hawthorn	-	-	-	-	1.44	1	-	-	-	-	1.44	1
Mock orange	-	-	-	-	0.10	1	-	-	-	-	0.10	1
Maple	-	-	1.30	1	-	-	-	-	-	-	1.30	1
TOTAL	222.09		3.34		3.84		1.00		3.64		234.00	

The carbon samples have an abundance of exotics, and only three (sage, bitterbrush, and mock orange) of nine species grow at the site today. The flotation samples contain exotics as well, but they are more reflective of local flora. Hardwoods become important in the site's zonal assemblage for the first time. Mock orange, which appears in a hearth feature (Feature 10*) unassociated with Structure 1, makes up a large portion of the hardwood category. Sage and bitterbrush charcoal is found on the floor and in the hearth of the housepit with yellow pine, larch and fir. These may have been used as fuel. Portions of the cedar, probably not an important fuel wood, show signs of manufacture. The three largest samples (213 g) may well have been taken from a single board (Plate 5-4). The largest section, over 1 m long and about 25 cm wide by 2-2.5 cm thick, was removed from a tree at least 100 years old. Two shorter sections (one was removed for radiocarbon dating in the photo) form an angle of approximately 60° with the long piece. Most of the wood rests on an occupation surface at U.L. 110, but one piece emerges into U.L. 100, that is the piece rests on a sloping structure floor and occupies two unit levels. The short pieces have been dated at 1046±69 B.P. (TX-4030) and at 1122±65 B.P. (TX-4031). Portions of the wood are noncarbonized. At least one edge has been smoothed or abraded. The surface shows parallel striations at an oblique angle to the long axis of the grain.

All three pieces were taken from stock commonly known as "quarter sawn" or "radial cut" lumber. In such lumber, the annual rings are aligned at an angle of 45° or more to the widest board surface. Boards cut or split in this manner do not cup or twist when dry, as other cuts can (Panshin and de Zeeuw 1970:38, 208-210, 334-337). Radially cut cedar expands and contracts fairly uniformly in all directions and stays flat. These three pieces are from the most mechanically stable region of the tree.

The photo reveals the cupping of the upper surface of the longest section. It is worn in the middle, and the wear pattern follows the grain for at least 20 cm. As far as can be discerned, the concavity and wear are not due to natural factors such as warping or decay. For the most part, the wood cells are decay and distortion free. Recovered near a worn stone, or mortar, the piece may have been used in food preparation.

The zone's nonwoody remains are also distinctive; they are more easily identified here because the amount of carbon is so much larger than at lower levels (Table 5-1). Despite the zone's few flotation samples, the well-preserved carbon enables us to formulate an ideal of the relationship of woody to nonwoody tissue. Wood comprises 73% of the total weight, edible tissue and other herbaceous tissue about 27%.

Among the edible seeds are two sunflower (Helianthus annuus) achenes and one smartweed (Polygonum sp.) achene from Feature 26. Helianthus is not generally thought to have been present in the area before Euroamerican contact. Because this is probably the ruderal form and is found with smartweed, the sunflower seeds probably arrived from the east, where the sunflower was domesticated before 2000 B.P. (Yarnell 1978:Table 1). Portions of a probable hawthorn or cherry seed were found in Feature 12 just above Feature 26 in Structure 1. Feature 12 contains a large sample of herbaceous tissue--bits of broad leaves, stems and stem ends. A trace of tissue resembling fruit coat also occurs. Its presence supports the inference that the seed fragment is indeed hawthorn or wild cherry. The only other seed fragment in Structure 1 is a portion of a probable bitterbrush achene which may have been introduced with bitterbrush wood.

The grass is a mixture of sand dropseed (Sporobolus cryptandrus) and other small-stemmed grasses. Some are not completely carbonized, yet another indication of the good preservation on the floor of the housepit.

Good preservation exists outside the housepit as well. Bits of lichen, probably wolf "moss" (Letharia sp.) found at a depth of 138 cm b.u.d. in 46S10W* are not completely carbonized. Three flotation samples from a small firepit, Feature 10 from 32S0W*, contain stem and twig wood of mock orange as well as a trace of hawthorn or serviceberry wood. A radiocarbon date of 1399±112 B.P. (TX-4037) dates the feature. The samples are not only remarkable for their purity (84-99%) but also for preservation of tiny stem parts.

Mock orange is not a good fuel plant. It is rare to find viab'e wood with a diameter of over 6 cm, and most stems seem to range between 1 and 3 cm in diameter. A fire sustained with mock orange, though possible, would require a concerted gathering effort. More easily gathered fuels such as hawthorn, serviceberry, sage, pine, and greasewood grow within walking distance of the site; it is unlikely that mock orange would be used as fuel when these were available. Its wood, however, does have a pleasant odor, and this may be why it was burned.

ZONE 2

Six flotation samples (1*, 5*, 6*, 7*, 14, and 15) and five radiocarbon samples weighing approximately 30 g (19, 21, 22, 23, and 44, Table 5-6) represent Zone 2. Over 0.54 g of archaeobotanical flotation material examined from 9.4 kg of sediment had an average carbon ratio of 1.0%. The flotation samples had high purity ratios, from 84% to 96%, and none showed evidence of bioturbation. The zonal assemblage (Table 5-1) is comprised of 1% conifer, 89% hardwood, mostly bitterbrush and sage, 2% edible material, and 8% herbaceous tissue. Edible remains consist of serviceberry seeds, sumac seed, a trace of possible fruit tissue and portion of a bastard toadflax nutlet. All of these indicate mid-summer burning. Other items such as three bulrush seeds, a composite achene (Artemisia sp.) a bitterbrush seed fragment and rabbitbrush twig ends and flowerbuds indicate late summer-early fall burning. These remains are distributed between three hearths (Feature 1*, Feature 6*, and Feature 27) and an occupation surface, Feature 23.

Table 5-6. Woods from radiocarbon samples, Zone 2, 45-OK-287/288.

Material	Weight (g)	Number of Occurences
Conifer		
Pine	0.47	1
Cedar	2.15	2
Hardwoods		
Serviceberry	2.39	1
Sage	8.69	3
Rabbitbrush	2.42	2
Bitterbrush	12.98	3
Willow	0.65	1
TOTAL	29.75	13

The occupation surface is represented by three radiocarbon samples containing serviceberry, sage, pine, cedar, willow, and bitterbrush. Hearth Feature 27, associated with the surface, contains a diversity of wood and seed types as well as traces of small-stemmed grass, bark, and rabbitbrush twigs and buds. Wood consists of a great amount of bitterbrush--84% by weight from two flotations samples--some sage and rabbitbrush, and a little cedar, yellow pine, and willow. Edible material includes two charred serviceberry seeds, a portion of a possible sumac seed and a dense seed coat fragment, possibly from hawthorn or cherry. Carbonized remains taken from the flotation sample with the seeds gave an age range of 473±43 B. P. (TX 4023). The seeds and rabbitbrush buds indicate summer-early fall burning for this hearth.

A second hearth, Feature 1*, has botanical remains indicative of fall burning--three bulrush seeds and a composite achene (probably Artemisia tridentata). Other botanical remains included bitterbrush, sage and a trace of Douglas fir, as well as a fairly large amount of herbaceous tissue. The hearth yielded a radiocarbon date of 774±67 B.P. (TX-4035)

The bulrush seeds are mature specimens, which would have been formed in middle to late summer. They are not accompanied by leaf or epidermal tissue suggestive of matting or pit-lining material. The large amount of parenchyma tissue is not bulrush. This presents a problem: we expect burned bulrush stems at sites, but not unaccompanied seeds. Still, the presence of the seeds gives us a temporal index. Tules or bulrushes are best for mat-making when they mature in the fall; mature stems are likely to bear mature seed heads. The heads are so light that a harvester would probably not lop them off at the collection site.

The items in Feature 1* represent a mixture of different types of activities. The fuel is a mix of local desert shrub and upland coniferous wood. The bulrush seeds are unaccompanied by stem tissue; and the remaining herbaceous tissue goes with nothing else. The assemblage appears to be camp trash deposited in a pit or hearth.

Three flotation samples and a radiocarbon date of 628±50 B.P. (TX-4038) come from Hearth Feature 6*. The local fauna have not contaminated the samples, although one sample revealed some human disturbance. Because the site of one flotation sample was exposed for at least a week before the bagging of the sample, modern seeds could have blown into the unit (several were present in the flotation sample).

The volume of carbonized remains increases dramatically from top to bottom of the feature (0.3%; 0.6%; 4.8%). It is rare to encounter so much carbon in a teature. The individual pieces are large, and the entire assemblage from midpoint to the bottom looks as if it had been burned and left in place.

As in Feature 1*, the principal fuels are sage/bitterbrush. Sage constitutes approximately 66% of the mixture and bitterbrush about 32% by weight. (The proportions are reversed in the previously discussed feature.) Bitterbrush would produce a quick, hot fire with some acrid smoke, while sage would produce a slower burning fragrant fire. Dead material would lessen the amount of smoke, and sage would sustain the fire longer. Sage bark, for instance, has been used as a "slow match" because it burns steadily (Turner 1979: 182, 242). The wood presumably reacts the same way.

Willow (Salix sp.), present in the top of the feature, but not in the lower two flotation samples, contributes about 5% of the wood mix there. A soft, light wood, willow burns quickly and does not give off much heat.

In addition to wood, other charred materials were found in the middle and lower portions of the pit (the upper third was solid wood charcoal). Principal among these are a few fragments of a small-stemmed grass (diameter 0.08 mm), one entire mature bitterbrush seed that would have ripened from mid-June to mid-July, half of a bastard toadflax nutlet, and two tiny unknown seeds. The toadflax berry is edible and would have been ripe in mid-summer near the site.

ZONE 1

Zone 1 is represented by a single flotation sample, Flotation Sample 1, which contained a nearly pure concentration of bitterbrush seeds. Although bitterbrush achenes occur with some frequency in flotation samples from the site, so many charred ones are highly unusual. Over 500 were extracted from 100 g of soil, giving the flotation sample the site's highest carbon ratio (5%).

Since seeds from rodent caches in Flotation Samples 7 and 8 also are not unusual at the site (there were two), one might question the origin of Flotation Sample 1. These particular seeds, however, do not appear to be like rodent cached seeds: they are completely charred and show no signs of having been opened or chewed, as did rodent cached seeds at the site, nor did they occur with any fecal material. Further, they had a purity rating of over 96%, contrasted with the two rodent cache flotation samples with ratings of 0-1%.

These seeds, then, along with the wood that charred them, probably were deposited by humans. They were gathered in late June or early July and were either processed fresh or soaked before they were used. The assemblage of Zone 1 thus suggests human collection of seeds.

6. FEATURE ANALYSIS

Diverse cultural features dating from about 4800 years ago to historic times were recorded at 45-OK-287/288. Bounded, discrete features such as firepits and trash pits, as well as large, diffuse occupational strata, are examples of this variety. For the most part, compact living surfaces are rare; the nature of the cultural activities which took place on the site--that is, relatively short-term, non-intensive activities--coupled with the active depositional history apparently precluded the formation of well-defined activity surfaces and areas. The two major exceptions to this are the single, large occupation surface and its associated concentrations of bone and FMR in Zone 5, 45-OK-288, and the shallow structure recorded in Zone 3, 45-OK-288.

We will describe the individual cultural features recorded at the combined sites by analytic zone, before proceeding to a more general discussion of changes in site function over time. Cultural features from 45-OK-288 are distributed over six analytic zones, while the few features from 45-OK-287 occur only in Zones 2 and 3. An asterisk will be used to indicate the units and features of 45-OK-287. Tables 6-1, 6-2, and 6-3 summarize the provenience, dimensions, material classes, tool types, and faunal species identified for each feature and provide a volume estimate.

ZONE 6

Three thick occupation strata make up the cultural features of Zone 6; all three are found in 45-OK-288 (Figure 6-1). Three pits are associated with the third occupation layer. These features probably pre-date 4500 B.P., since Zone 5 is securely dated to that time.

The first cultural stratum (Feature 35) is a complex combination of a natural cobble layer and cultural material. Approximately 30 cm thick, it covers as much as 32 square meters (eight excavation units) in the northeast corner of the site. Only the heaviest accumulation (0-2N,6-8W) was distinguished by a feature number, however. Some spatial differentiation was noted among these four units. The largest number of debitage and FMR were in 0N6W, while large numbers of FMR, debitage, and bone occurred in 0N8W. Manufactured objects, especially cobble choppers, were most frequent in 2N6W, although that unit had the lowest density of other material. The significance of this distribution is difficult to determine and, given the thickness of the deposit and lack of identifiable surfaces may not represent contemporaneous activities.

Table 6-1. General contents of features, 45-OK-287/288.[1]

Feature by Zone (Field number)	Provenience		Dimensions	Thickness	Debitage	Tools		Bone		Shell		FMR		Estimated Volume (m^3)
	Unit	Area				Lithic	Bone	#	wt (g)	#	wt (g)	#	wt (g)	
Zone 6														
Occupation Layer (F35)	0N6W	100-110	>2 x 2-m	30	295	54	2	889	173	-	-	64	10,935	2.500
Occupation Layer (F74)	16S8W	210-230	>2 x 2-m	30	14	2	-	65	22	19	2	38	9,955	.300
Occupation Layer (F80)	18S2W	210-250	>2 x 2-m	30-35	3	-	1	133	84	-	-	11	3,675	1.200
Pit 6-A (F84)	18S2W	240-250	25cm diameter	15	-	-	-	-	-	-	-	4	2,790	.100
Pit 6-B (F82)	18S2W	230-240	45cm diameter	20	1	3	-	28	10	-	-	10	5,515	.018
Firepit 6-1 (F77)	18S2W	190-210	50-55cm diameter	20	11	1	-	135	24	-	-	10	2,650	.050
Zone 5														
Occupation Surface A Floor (F7, 51, 61)	0N6W, 2N6W	190-220	7.5 x >4-m	30	856	68	14	5,953	1,680	2	10	184	36,367	3.250
Bone Concentrations (F15, 16, 17, 18, 19 24, 25, 83)	0N6W, 0N8W	200-205 180-190	10-25cm diameter each	2-5	33[2]	5	2	2,009	445	-	-	-	-	.230
Firepit 5-A (F54)	2N6W	190-205	80cm diameter	15	74	7	-	692	121	-	-	38	9,025	.100
Bone Concentration (F64)	18S2W	170-180	2 x 2-m	10	31	3	1	624	812	-	-	57	8,225	.500
Firepit 5-2 (F44)	6S10W	210-230	50 x 25-cm	37	11	-	-	42	8	-	-	10	2,100	.250
Tool Cluster (F33)	8S16W	270-290	>1 x .5-m	10	10	10	-	16	9	-	-	6	1,150	.400
Zone 4														
Occupation Layer (F59)	16S8W	140-170	>2 x 2-m	37	61	10	-	2,772	980	2	-	108	42,485	.625
Firepit 4-1 (F60)	16S8W	160	25cm diameter	10	-	-	-	129	166	-	-	2	870	.050
Firepit 4-2 (F50)	16S6W	140-150	75 x 85-cm	17	5	-	-	140	69	-	-	32	5,110	.090
Firepit (?) 4-3 (F72)	2N28W	140-150	1m diameter	15	-	-	-	34	7	-	-	22	5,560	.150
Zone 3														
Structure 1 Floor (F12, 36)	16S8W,18S2W, 20S4W,20S8W	approx. 100-130	4.6 x 4.8-m diameter	35	378	69	2	4,346	1,250	-	-	147	16,294	2.350
Rock Alignment (F37)	18S2W	90-100	0.5 x 0.5-m	15	18	2	-	107	21	-	-	47	10,690	.020
Firepit 3-1 (F38, 53)	18S2W	110-130	>0.5m diameter	30	44	6	-	455	76	-	-	20	1,810	.030
Firepit 3-2 (F39)	16S8W	100-120	>70cm diameter	20	4	1	-	367	183	-	-	25	7,380	.010
Bone-filled Depression (F26)	20S4W	110-130	>1.0 x 0.75-m	5-10	206	40	4	5,532	2,350	-	2	209	37,849	1.800
Firepit 3-3 (F22)	6S10W	130-140	160 x 80-cm	23	12	-	-	34	3	-	-	38	17,410	.150
Firepit 3-4[3] (F10[3])	32S0W	60- 90	45cm diameter	35	-	2	-	15	2	-	-	1	100	.260
Zone 2														
Occupation Surface (F29, 69)	22S8W 20S8W	40 40- 60	>3 x 0.5-m	15-20	16	-	-	639	385	-	-	5	5,080	.350
Occupation Surface (F23)	26S0W	20- 60	>2 x 2-m	20	12	2	-	48	12	-	-	39	3,660	.500
Pit 2-A (F27)	26S0W	50- 70	46cm diameter	20	7	1	-	50	10	-	-	19	1,840	.030
Occcupation Surface (F12[3])	26S2W	40- 50	>1 x 2-m	10	3	1	-	31	39	-	-	15	7,400	.100
Firepit 2-1[3] (F1[3])	18S0W	10- 40	1.5m diameter	15	3	-	-	4	1	-	-	53	48,905	.117
Firepit 2-2[3] (F6[3])	32S0W	10- 40	1.4-2m diameter	30	11	4	-	10	6	-	-	219	169,782	.550
FMR Scatter (F11[3])	48S2W	40	>1 x 1-m	10	5	-	-	75	16	6	12	24	10,090	.050
Beach Leg														
Earth Oven	-	-	2 x 1.5-m	15	52	3	-	62	7	-	-	170	88,000	.450

1 The historic feature from Zone 1 is not included in this table.
2 23 from F83 alone.
3 Feature from 45-OK-287.

Table 6-2. Occurrence of stone and bone tools in features, 45-OK-287/288.

Feature by Zone	Tool Type[1]																								
	UTL	URT	BRT	RES	BSP	BIF	PPT	BAS	TIP	BLA	GRA	SCR	COR	TKN	HAM	CHO	PFC	ANV	SPO	IND	AWL	PEN	WED	FLB	IND
Zone 6																									
Occupation Layer (F35)	6	1	1	-	-	-	-	-	-	-	-	-	3	1	11	23	2	1	1	1	-	1	-	1	-
Occupation Layer (F74)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Occupation Layer (F80)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Pit 6-8 (F82)	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-
Firepit 6-1 (F77)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Zone 5																									
Occupation Surface A																									
Floor (F7, 51, 61)	18	4	1	-	1	4	1	-	-	-	1	5	1	4	4	2	-	1	1	2	1	-	-	7	6
Bone Concentrations	2	1	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	2	-
Firepit 5-A (F54)	1	-	-	-	-	-	-	-	-	-	-	1	-	-	2	-	-	-	1	-	-	-	-	-	-
Bone Concentration (F84)	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1
Tool Cluster (F33)	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-	-	-	-	-	-	-
Zone 4																									
Occupation Layer (F59)	1	-	-	-	-	1	-	-		1		-		1	3	-	-	-	-	1	-	-	-	-	-
Zone 3																									
Structure 1																									
Floor (F12, 36)	12	2	-	2	-	13	8	-	1	-	-	-	2	2	-	-	-	1	-	1	-	-	-	-	2
Rock Alignment (F37)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Firepit 3-1 (F38, 53)	2	-	1	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Firepit 3-2 (F39)	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Bone-filled Depression (F26)	6	2	3	-	-	6	3	-	1	-	-	1	-	4	1	1	-	-	-	1	-	-	-	3	1
Firepit 3-4* (F10*)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Zone 2																									
Occupation Surface (F23)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Pit 2-A (F27)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Occupation Surface (F12*)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Firepit 2-2* (F6*)	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
TOTALS	55	11	6	2	1	26	13	-	2	1	1	9	6	14	25	36	2	3	3	7	1	1	1	13	10

[1] Tool Code Key

Flake Tools
- UTL - Utilized Flake
- URT - Unifacially Retouched Flake
- BRT - Bifacially Retouched Flake
- RES - Resharpening Flake
- BSP - Burin Spall

Formed Tools
- BIF - Biface
- PPT - Projectile Point
- BAS - Point Base
- TIP - Point Tip
- BLA - Blade
- GRA - Graver
- SCR - Scraper
- COR - Core

Large Tools
- TKN - Tabular Knife
- HAM - Hammerstone
- CHO - Chopper
- PFC - Peripherally Flaked Cobble
- ANV - Anvil
- SPO - Spokeshave
- IND - Indeterminate

Bone Tools
- AWL - Awl
- PEN - Pendant
- WED - Wedge
- FLB - Flaked Long Bone

Table 6-3. Faunal species by feature, 45-OK-287/288.

Feature by Zone	Deer	Deer-sized	Pronghorn	Mountain Sheep	Sheep/Antelope	*Canis* sp.	Beaver	Muskrat	Salmon	Turtle	Frog	Pocket Mouse	Pocket Gopher
Zone 6													
Occupation Layer (F35)	-	5	1	-	-	-	-	-	-	-	-	1	-
Occupation Layer (F74)	1	-	-	-	-	-	-	-	1	-	-	-	-
Occupation Layer (F80)	1	1	-	2	-	-	-	-	-	-	-	-	-
Pit 6-B (F82)	1	-	-	-	-	-	-	-	-	-	-	-	-
Firepit 6-1 (F77)	9	1	-	1	-	-	-	-	-	-	-	-	-
Zone 5													
Occupation Surface A (F7, 51, 61)	18	75	26	-	-	4	1	14	-	17	-	-	-
Bone Concentrations (F15, 16, 17, 18, 24, 83)	17	25	3	-	-	-	-	-	-	-	-	-	-
Firepit 5-1 (F54)	1	4	1	-	-	-	-	-	-	-	-	-	-
Bone Concentration (F64)	1	5	-	3	-	-	-	-	-	-	-	-	-
Zone 4													
Occupation Layer (F59)	6	34	1	345*	-	1	-	-	-	-	-	-	-
Firepit 4-1 (F60)	3	5	-	-	-	-	-	-	-	-	-	-	-
Firepit 4-2 (F50)	-	2	-	-	-	-	-	-	-	-	-	-	-
Zone 3													
Housepit 1													
Floor (F12, 36)	22	66	5	1	-	-	-	-	1	-	-	-	-
Rock Alignment (F37)	-	1	-	-	-	-	-	-	-	-	-	-	-
Firepit 3-2 (F39)	14	13	4	-	-	-	-	-	-	-	-	-	-
Bone-filled Depression (F26)	51	182	17	6	1	-	-	-	2	-	1	-	2
Zone 2													
Occupation Surface (F29, 69)	2	13	3	2	-	-	-	-	-	-	-	-	-
Occupation Surface (F23)	-	1	-	-	-	-	-	-	-	-	-	-	-

* 331 of these are fragments of a single horn core.

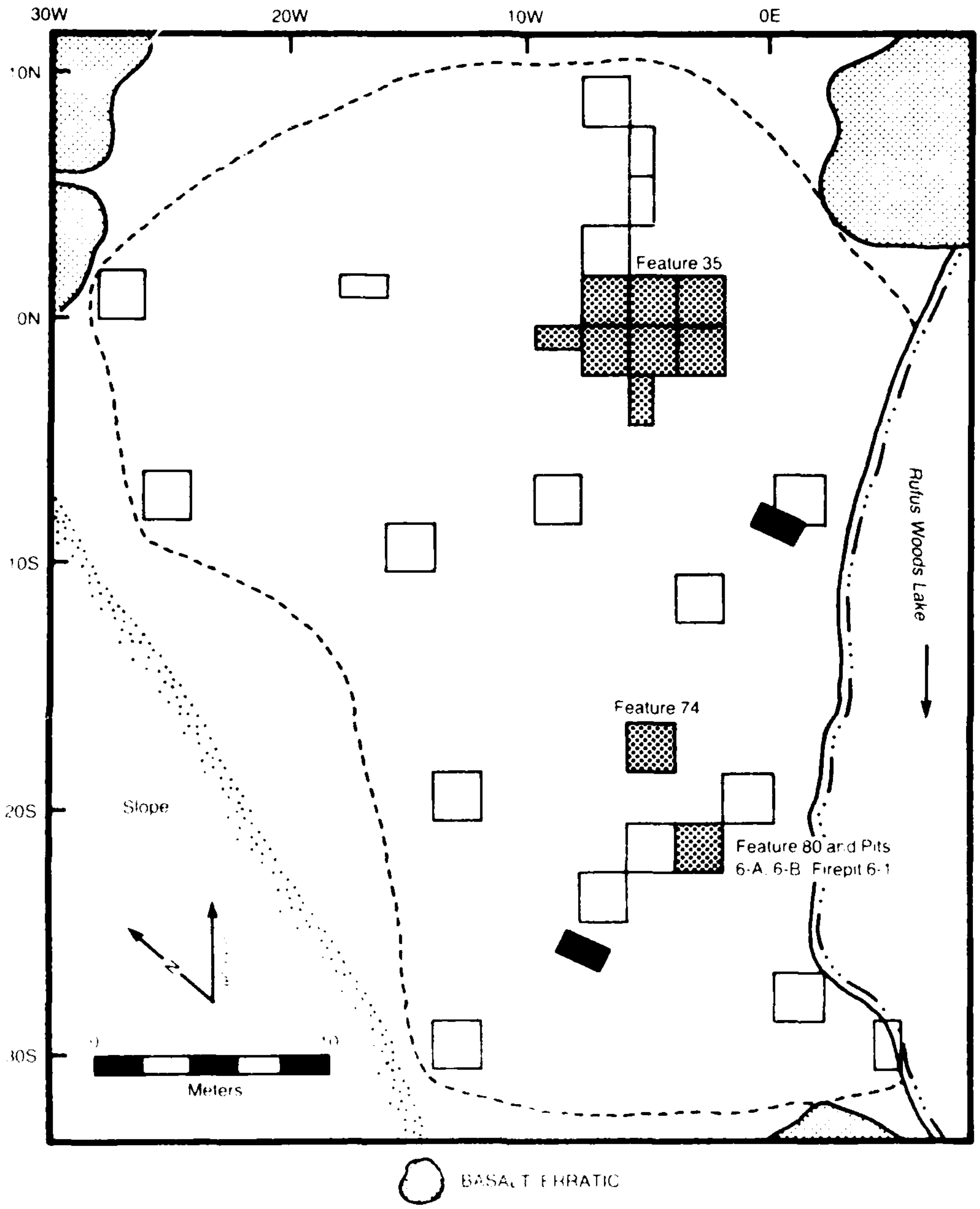


Figure 6-1. Features in Zone 6, 45-OK-288.

Although nearly 900 bone fragments were collected, only five deer-sized bone, one pronghorn, and one piece of pocket gopher bone were identified. Most of the bone were highly fragmented--this may have resulted from mixing within the parent cobble stratum as well as from human activity.

Cobble choppers, hammerstones, and flake tools make up the stratum's tool assemblage; one-third (26) of the tools are cobble choppers. While the density of FMR and bone is lower in this occupational stratum than in the second one, or in the major occupational surface in Zone 5, the density of worked or manufactured objects is higher than in either. This indicates that, although it currently appears as an undifferentiated cultural layer, this occupational stratum was the scene of primary activity, perhaps bone processing.

The second cultural stratum (Feature 74) is a concentration of FMR, with some bone and shell, in 15S-7W, approximately 30 cm thick. Atypically, this feature contained no formed tools or identifiable bone; other materials are summarized in Table 6-1. Because of its depth and location, this feature may be considered part of the third occupation stratum.

The third cultural stratum (Feature 80) is a charcoal-stained layer, 30-35 cm thick, exposed in 18S2W. As can be seen in Table 6-1, this stratum has the lowest artifact density of any feature at the site; however, three pits containing abundant material originate within this layer.

Pit 6-A (Feature 84) is the oldest of the three pits; it originates at 238 cm b.u.d. It is also the smallest (25 cm diameter, 15 cm deep). The interior was darkly stained, but contained only four FMR clustered at the bottom. Its small shape and cylindrical profile argue against its use as a firepit, but it may have held a container for stone boiling or been used some other way for cooking.

Pit 6-B (Feature 82) is also a small, straight-sided pit; it originates at 225 cm b.u.d. (Plate 6-1) Unlike Pit 6-A, Pit 6-B was lined with rocks forming a small rectangular space. Only three rocks were fire-modified. A few tools also occurred. Although the pit contained charcoal, closer examination proved much of it to be rounded or eroded conifer charcoal, suggesting secondary deposition of charcoal in the pit. This and the relative lack of FMR again are evidence against Pit 6-B being a firepit; instead, it appears to hold trash.

Firepit 6-1 (Feature 77), the youngest and largest of the three pits originating in this occupation stratum, is 20 cm deep and 50-55 cm in diameter. The depression was dug against a large rock in the western wall of the unit. The matrix was stained very black, and four fire-modified rocks (one, a hammerstone) were recovered.

In sum, three of the six cultural features in Zone 6 are cultural strata without recognizable occupation surfaces. Three pits--a firepit and two cooking or trash pits--originated at different levels within a single cultural stratum.

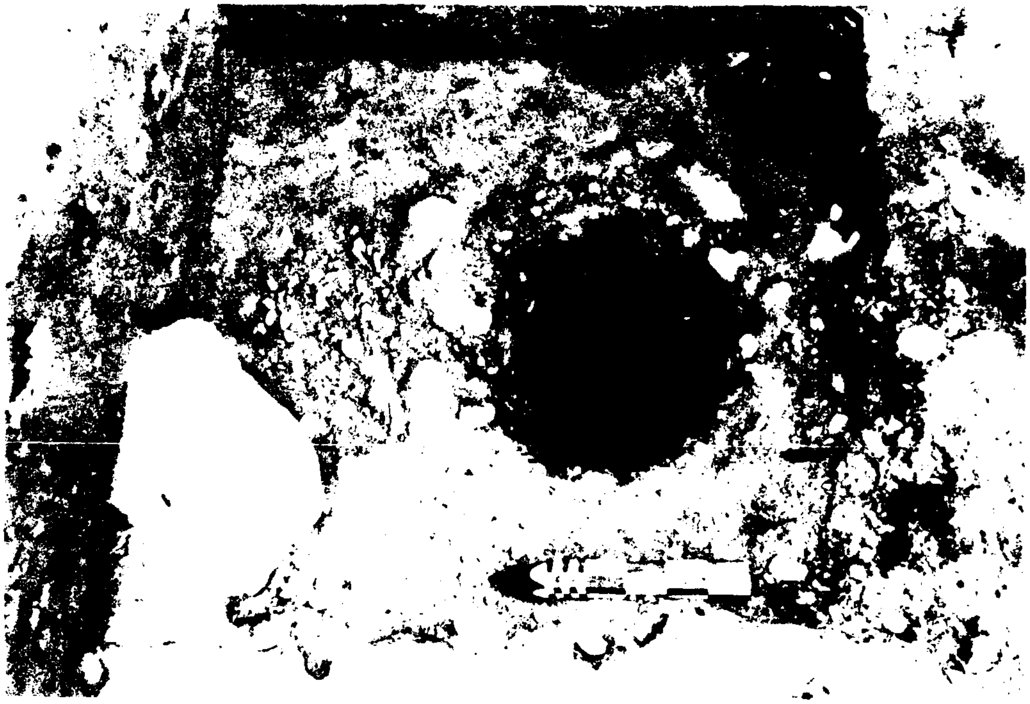


Plate 6-1. Pit 6-B, deep, straight-sided pit in Zone 6, 45-OK-288.

ZONE 5

Zone 5 contains a large, discrete occupation surface, securely dated to around 4,500 years ago, two smaller artifact clusters, and a pit (Figure 6-2).

Occupation Surface A (Feature 7) contains eleven field-assigned features, including eight bone clusters (Features 15, 16, 17, 18, 19, 24, 25, and 83), a cluster of FMR (Feature 51), a firepit (Feature 54), and a charcoal-stained area (Feature 61) (Plate 6-2). Figure 6-3 shows the boundaries of the occupation surface and the location of its associated features. Occupation Surface A is irregular in shape and consists of a central area of intense staining, bone clusters, and the firepit; a peripheral area of lesser amounts of debris and staining; and an outer zone containing very little material.

Firepit 5-A (Feature 54) is the largest feature in the central area of Occupation Surface A. It is an irregularly shaped area (80 cm across) containing bone and FMR in reddish, burned soil. Several tools were also recovered (Table 6-2). There is no sign that this feature was an excavated pit, although the several large FMR and burned soil do indicate its function as a hearth. It appears to have been more a burning area and may or may not have been outlined by rock. The abundance of tools and unburned, identifiable bone either indicates reuse of the area after the burning, or some mixing with other deposits.

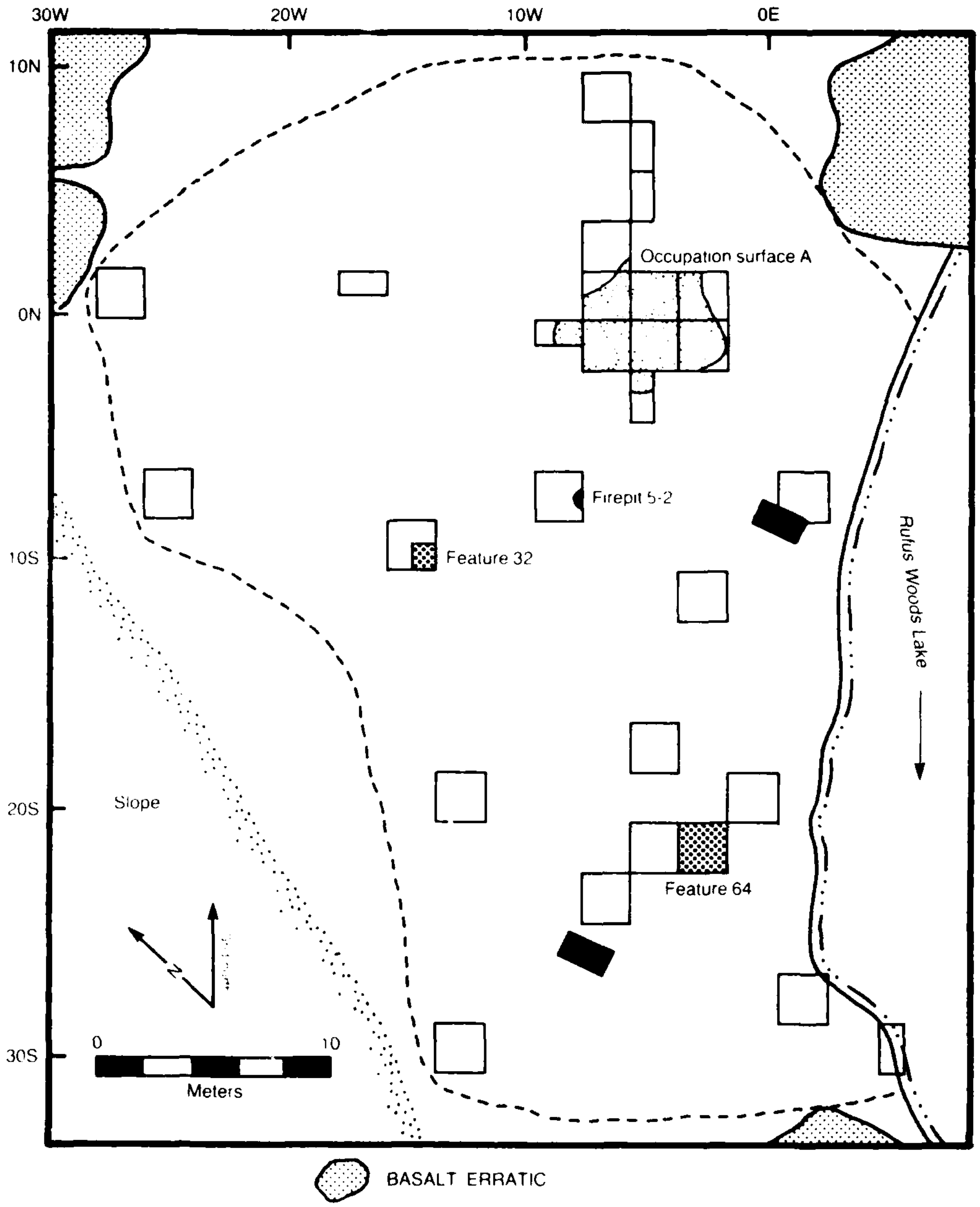


Figure 6-2. Features in Zone 5, 45-OK-288.

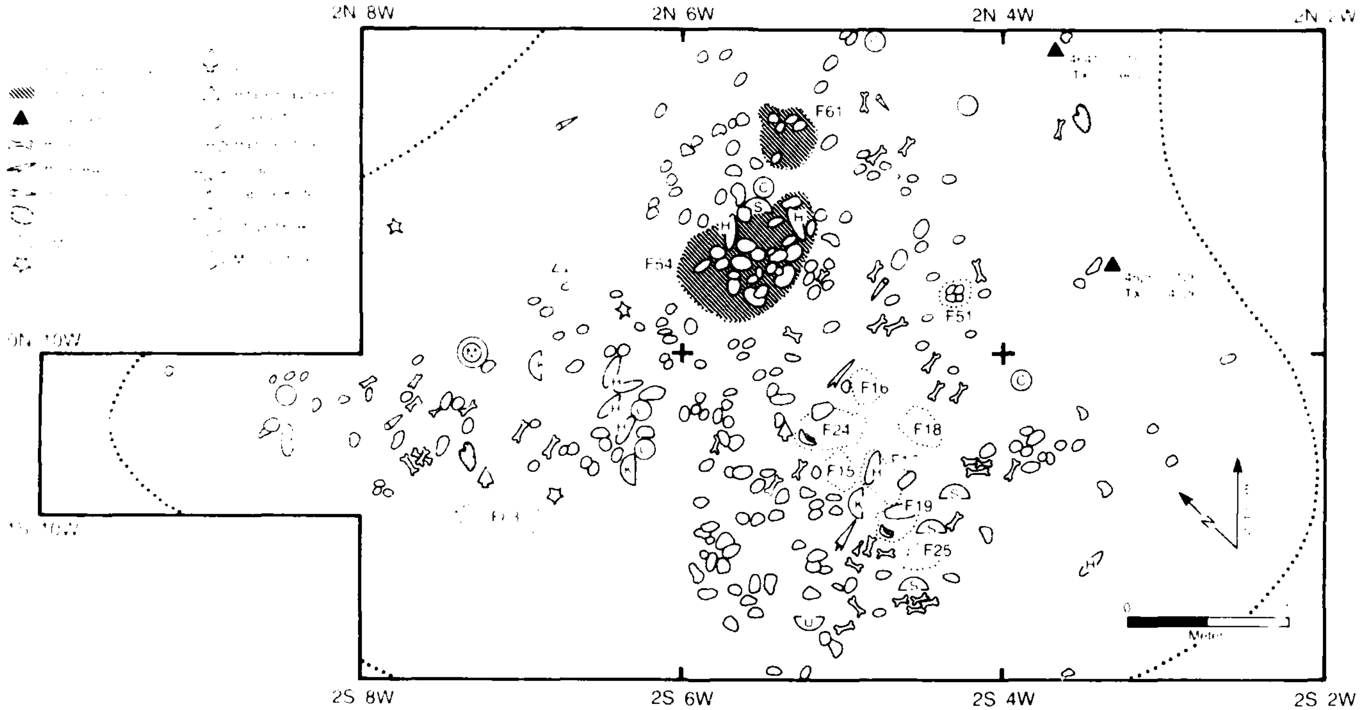


Figure 6-3. Plan map of Occupation Surface A and associated features, 45-OK-288.

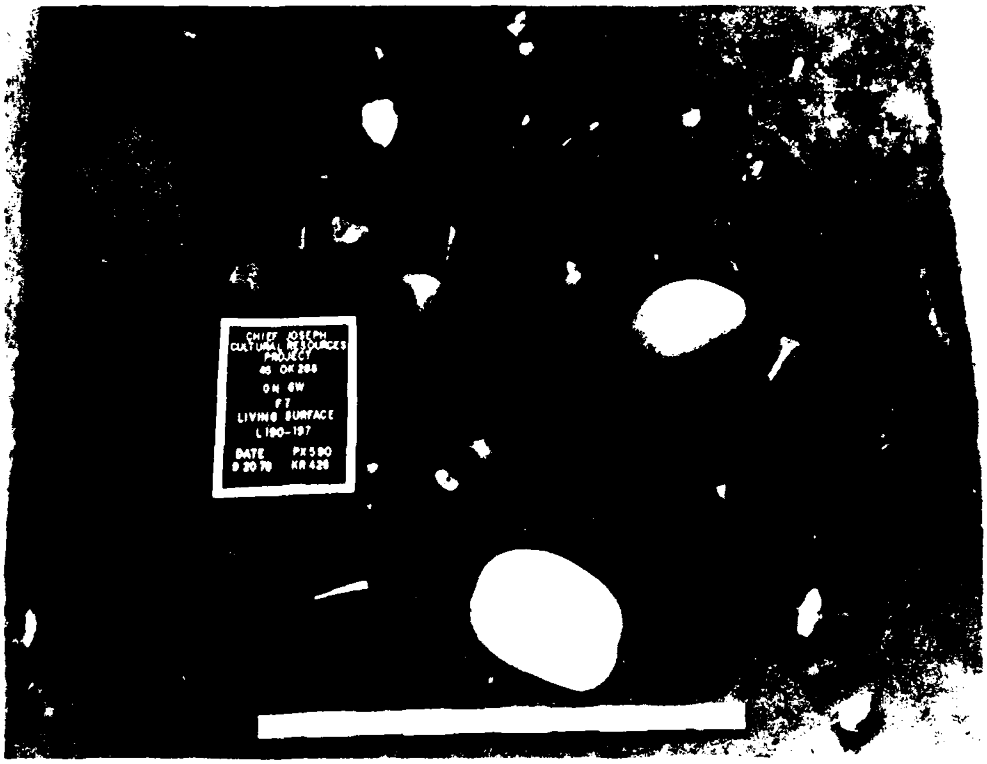


Plate 6-2. Feature 7, Occupation Surface A, 45-OK-288.

South and west of Firepit 5-A, in the central part of Occupation Surface A, are seven of the eight bone clusters recorded as features. In general, these were very thin, small clusters, whose boundaries were often difficult to define. As a group the bone clusters contain over 1,400 bone fragments (Table 6-1); some have been identified as antelope, deer, or deer-sized (Table 6-3). At least one antelope and one deer are represented. None of the identified bones were burnt, although five (out of 30) exhibit butchering marks. South of the hearth, then, was an apparent meat processing area. The occurrence of pounding and cutting tools within and around the bone clusters support this contention. Additionally, scraping and perforating tools (scrapers and awls) suggest hide processing in this same area.

North of Firepit 5-A is an oval charcoal stain (Feature 61; 40 cm across, 10 cm deep), containing 51 fragments of unidentifiable bone, a few pieces of debitage, and four FMR. This is probably not a firepit; it contained no wood charcoal. A flotation sample did produce two charred bitterbrush achenes (see Chapter 5).

The rest of the central portion of Occupation Surface A contains very high quantities of bone, debitage, and FMR. Figure 6-4 shows the distribution of the greatest density of these materials. The distribution of bone and debitage are similar, forming a C- or L-shape, with Firepit 5-A in the center. The distribution of FMR is more linear and may not be a product of cultural placement. The bone is highly fragmented, but contains a variety of species, including deer, pronghorn, muskrat, canids, and turtle. None of the identified bone carried butchering marks.

Outside of the central portion of Occupation Surface A, only two features were recorded. One is a bone cluster (Feature 83) which lies west of the other bone clusters; the other is a tight cluster of four FMR (Feature 54) found east of Firepit 5-A. The two radiocarbon dates for Occupation Surface A were taken from the east edge of the peripheral area. The oldest radiocarbon date at 45-OK-288 (4641±150 B.P., TX-3800) was taken from a sample of yellow pine and conifer cone material in an area of intense staining along the north wall of the excavation block. The second date (4525±126 B.P., TX-4025) confirms the validity of the first.

In sum, Occupation Surface A is an exterior living surface dating to around 4,500 years ago. Secondary butchering and meat processing are the major activities indicated; hide processing may have occurred as well.

South of Occupation Surface A, and not directly associated with it, are three other features in Zone 5. A collection of nine cobble tools (Feature 33), along with some bone fragments and FMR (Table 6-1), were recorded in 8S16W. This cache was not clearly related to any cultural surface or stratum; lacking such a context, we cannot determine its function. Firepit 5-2 (Feature 44) was recorded in 6S10W. It is oval in shape (approximately 50 x 25 cm) and 37 cm deep. The base of the pit was covered by six FMR; below them, the matrix was orange and baked. Other rocks occurred in the pit fill. Very little other material was recovered (Table 6-1). A scatter of bone and FMR (Feature 64), recorded in 18S2W, is the last of the three Zone 5 cultural features outside of Occupation Surface A. Small bone fragments were especially abundant in this concentration; four tools also occurred (Table 6-2). although only a portion of it was exposed. This feature may represent an occupation surface, although only a portion of it was exposed.

Analytic Zone 5, then, contains a large occupation surface which demonstrates patterns of meat processing and butchering 4,500 years ago, and a few, less intense signs of other activity areas.

ZONE 4

The four features in Analytic Zone 4 include a thick occupation stratum (Feature 59), two associated firepits (Features 50 and 60), and an isolated

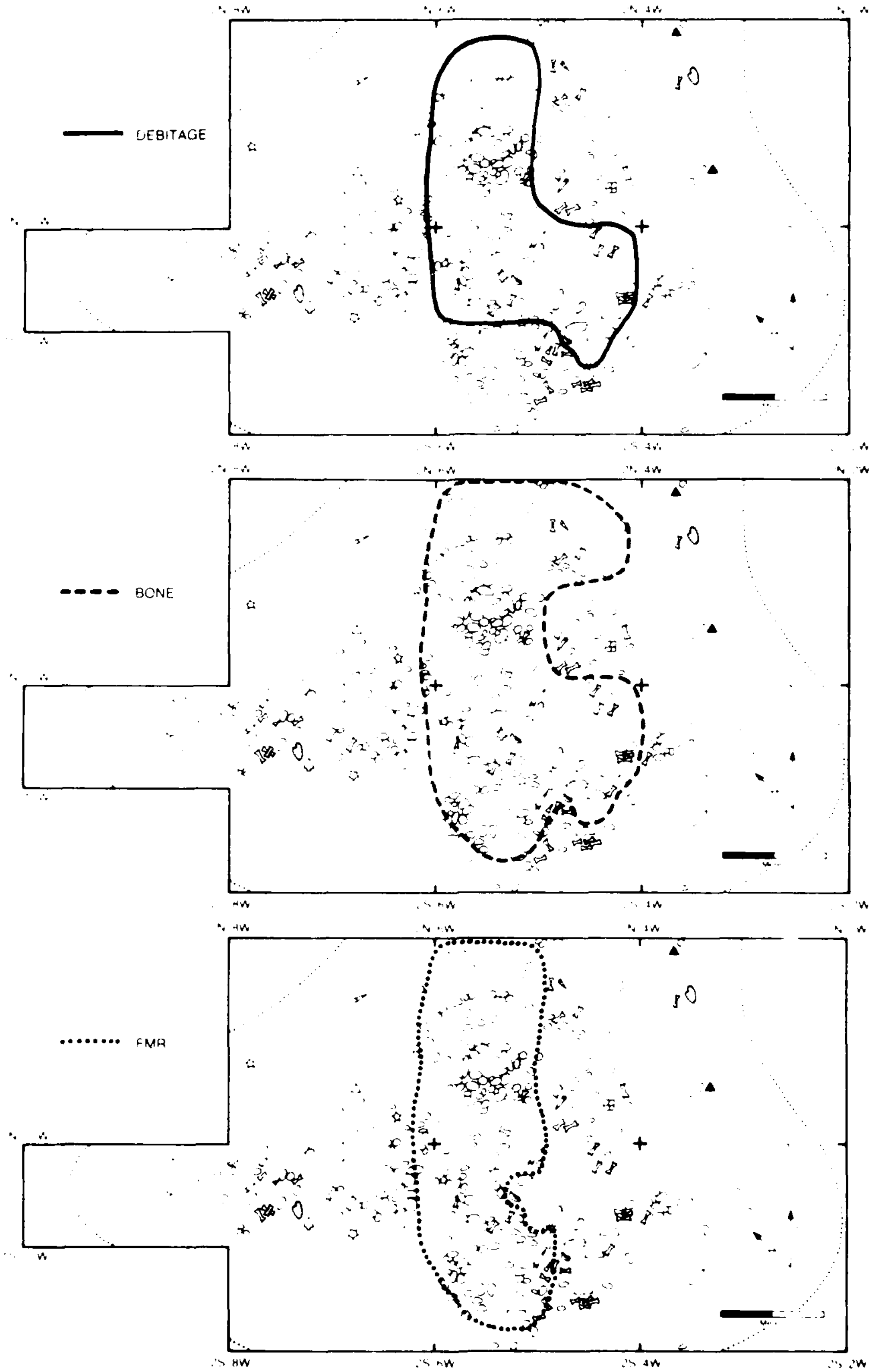


Figure 6-4. Distribution of high density areas, debitage, bone, and FMR, Occupation Surface A, Zone 5, 45-OK-288. See Figure 6-3 for key.

FMR cluster (Feature 72). All occur at 45-OK-288. Figure 6-5 shows their locations.

The occupation layer was recorded in 16S6W, immediately below the floor of Structure 1 (Analytic Zone 3). It was 37 cm thick. Firepit 4-1 (Feature 60) originated near the middle of the stratum; Firepit 4-2 (Feature 50) originated near the top. The relationship of these two features is illustrated in Figure 6-6. Within the occupation layer itself, cultural debris is scattered with no apparent pattern. However, seven of the nine lithic tools recorded for this stratum (Table 6-2) were found in the lower half, apparently associated with Firepit 4-1. Radiocarbon samples, also taken from the lower half of the stratum, were of incompletely charred wood. One of these yielded a date of 1543±94 B.P. (TX-4029), about 3,000 years younger than the dates from Zone 5.

Firepit 4-1 (Feature 60) is a circular cluster of bone and FMR about 25 cm in diameter and 10 cm thick. The 120 bone (probably deer; Table 6-3) lay directly on top of the rock concentration. Because of the abundance of charred ponderosa pine in this area, we take this rock concentration to be an eroded firepit.

Firepit 4-2 (Feature 50) originates at the top of the cultural layer. It is nearly square in plan view with steeply sloping sides, 75 x 95 cm at its surface and 45-55 cm at the middle. It is 17 cm deep. The interior contained intensely stained pockets of charcoal and orange soil. Many of the bone fragments were burned; only two were identifed as deer-sized (Table 6-3). The large number of FMR (Table 6-1) suggests that this pit may have been rock-lined.

The fourth feature (Feature 72) in this zone is a semicircular arrangement about one meter in diameter of rocks in charcoal. More than half of the 44 rocks appeared burned. If this was a firepit, it was neither used repeatedly nor for a prolonged time. No tools occurred within the rock cluster, but a large anvil was embedded in the southern wall of the unit at the same level.

ZONE 3

An intensive occupation at 45-OK-288 is indicated by the presence of a shallow structure, dated to around 1100 B.P. Within this structure, several activity areas and pits were identified. Two other pits, one at 45-OK-287, are also recorded within Zone 3. Figures 6-7 and 6-8 show the location of the Zone 3 features.

Structure 1 is an extremely shallow, circular dwelling with a floor area of about 17 m^2 (4.6-4.8 m diameter). As the profile in Figure 6-9 shows, the walls of Structure 1 are gently sloping; the profile is saucer-shaped. The floor continues to slope slightly to the center where it is 35 cm below the rim. The Structure 1 floor, recovered as Features 12 and 36, is a thick band of dark soil containing charcoal, numerous artifacts, bones, and fire-modified rock.

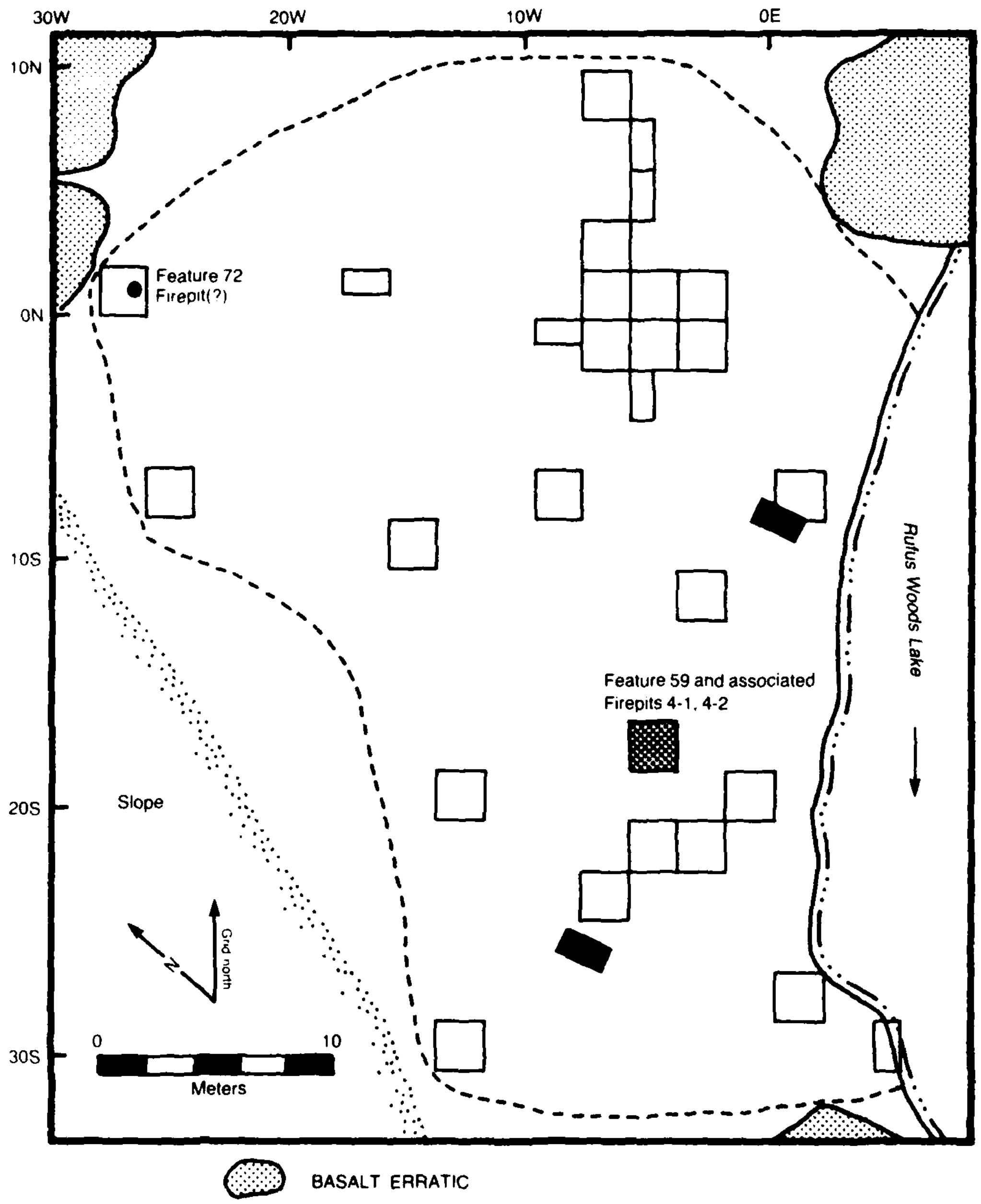


Figure 6-5. Features in Zone 4, 45-OK-288.

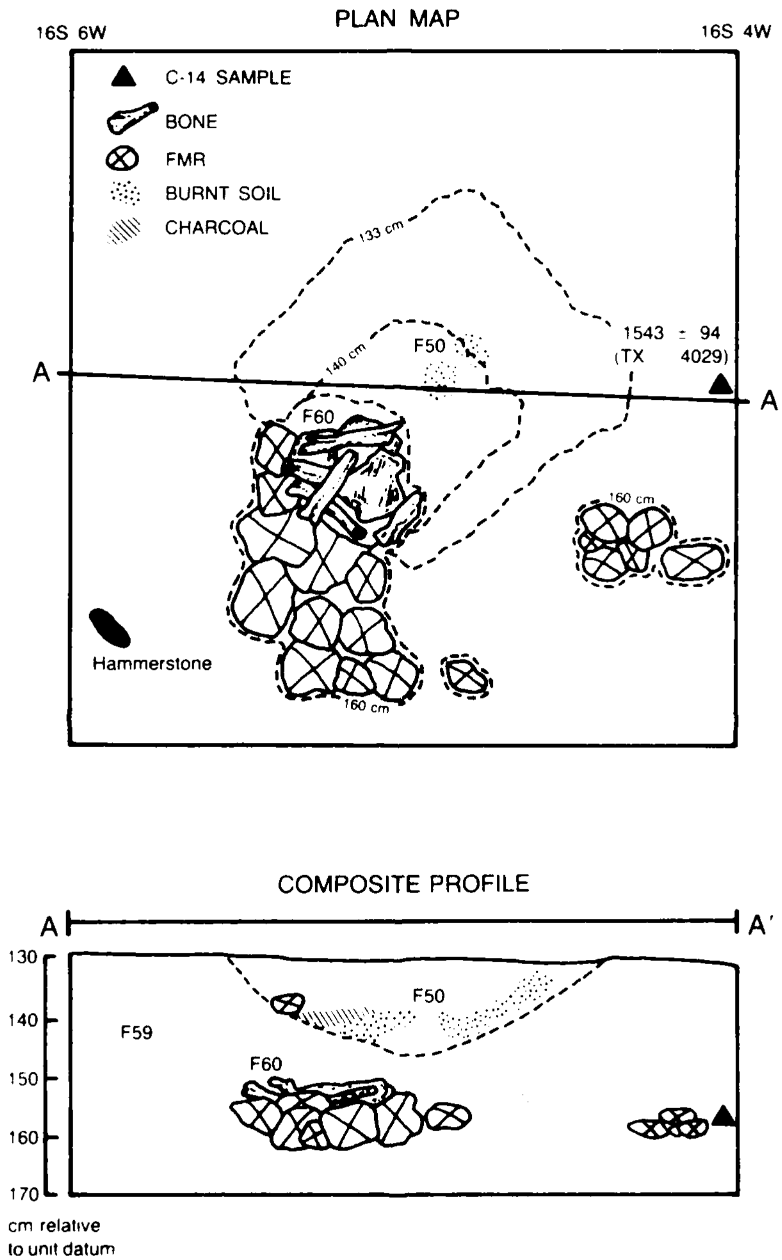


Figure 6-6. Firepits 4-1 and 4-2 plan and profile, 45-OK-288.

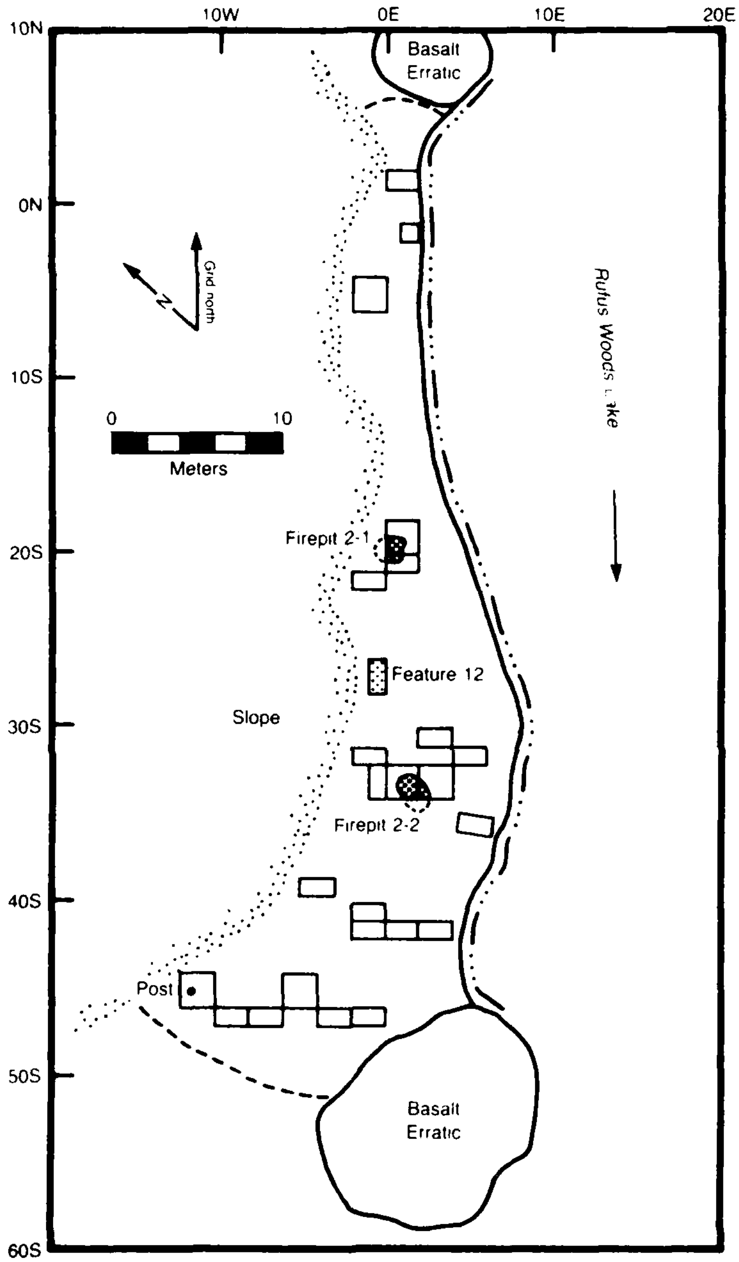


Figure 6-7. Features in Zone 3, 45-OK-287.

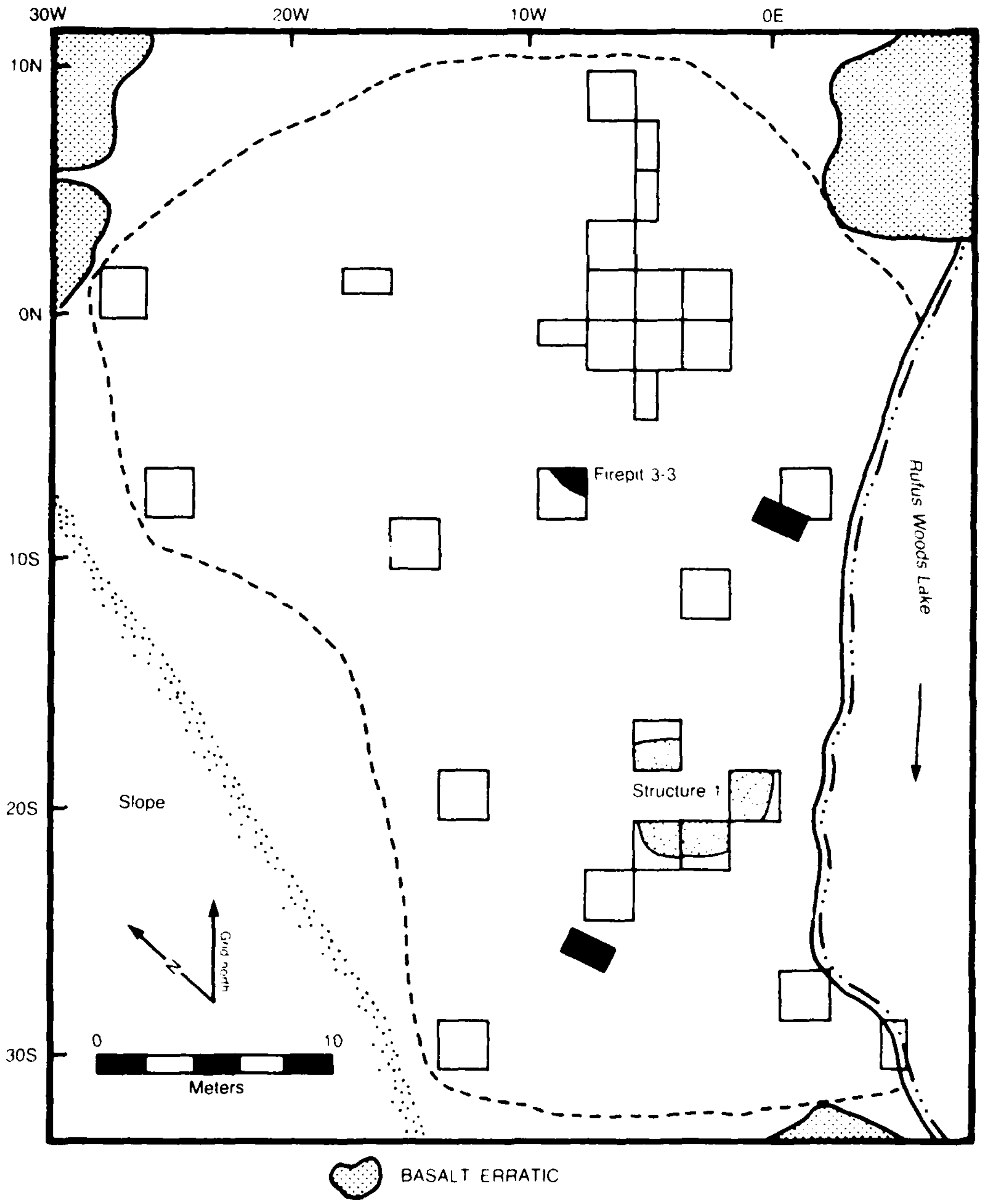
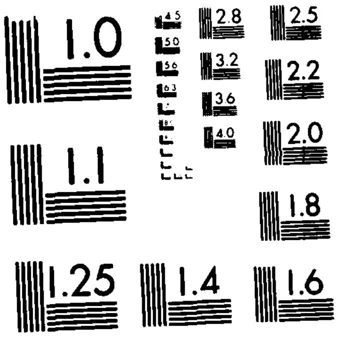


Figure 6-8. Features in Zone 3, 45-OK-288.

AD-A162 760 ARCHAEOLOGICAL INVESTIGATIONS AT SITES 45-OK-287 AND 45-OK-288 CHIEF JOSE (U) WASHINGTON UNIV SEATTLE OFFICE OF PUBLIC ARCHAEOLOGY C J MISS ET AL. 1984 3/4

UNCLASSIFIED DACW67-78-C-0106 F/G 5/6 NL



MICROCOPY RESOLUTION TEST CHART

NATIONAL BUREAU OF STANDARDS

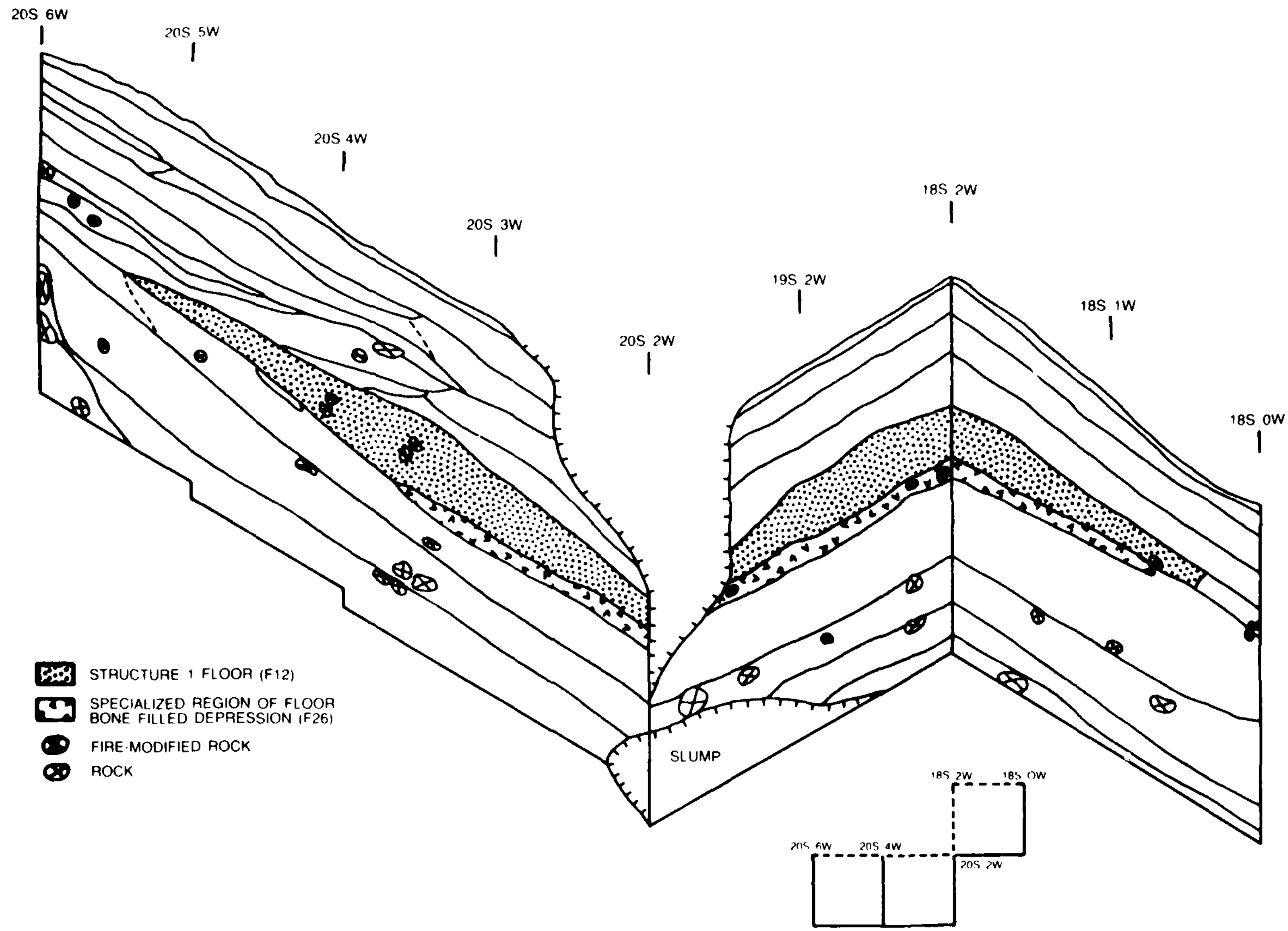


Figure 6-9. Stratigraphic profile of Structure 1, 45-OK-288.

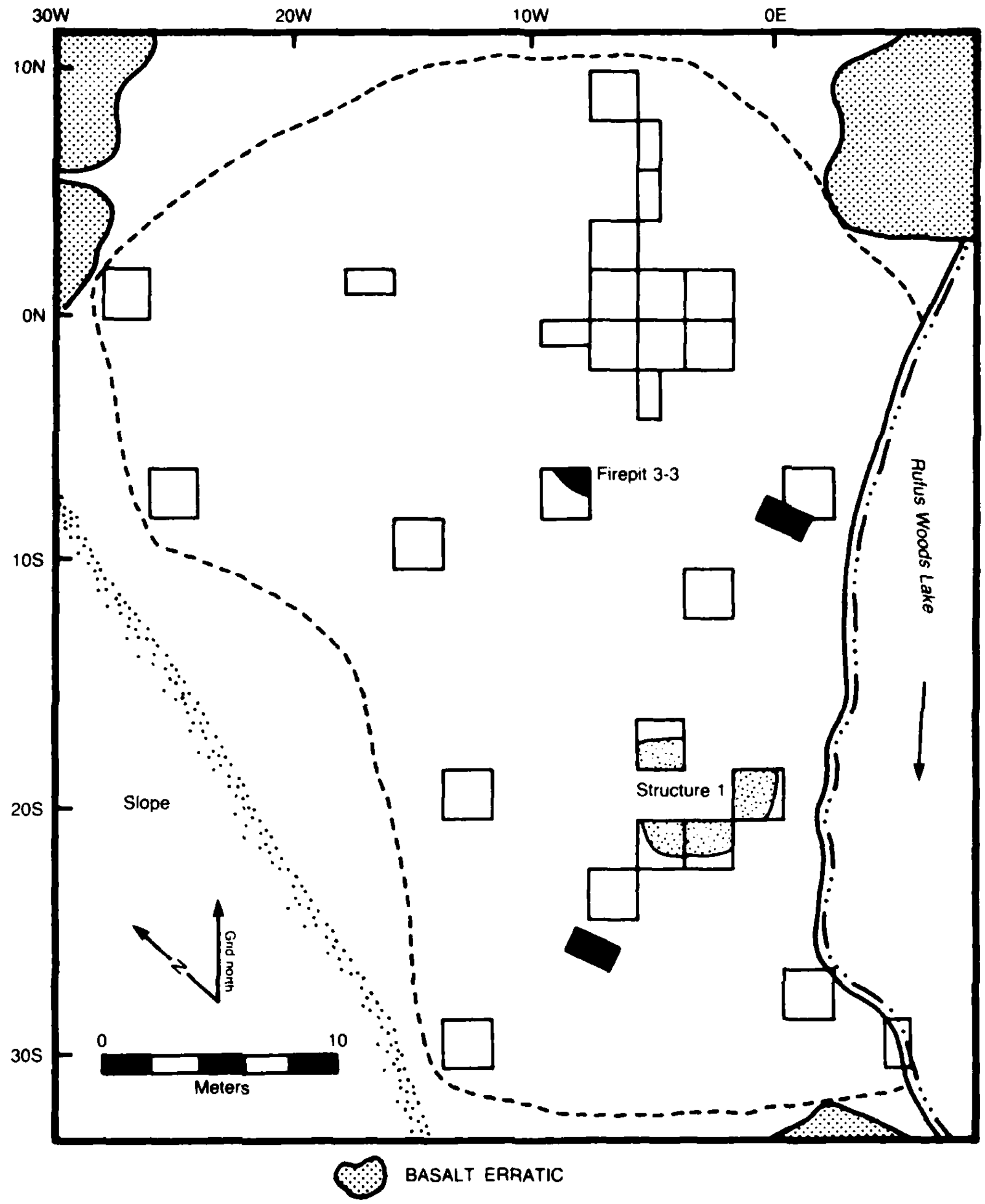


Figure 6-8. Features in Zone 3, 45-OK-288.

Within the floor, four other features were recorded (Figure 6-10). An aligned cluster of FMR (Feature 37) runs from the eastern lip of the structure towards the floor's center. The 50 rocks were touching each other. Little material was found among them, although some artifacts and charcoal were recovered along the sides. The alignment stops abruptly at the eastern margin of the bone-filled depression (Feature 26) in the southeast corner of the housepit. The floor surface to the north of the rock alignment is nearly bare of artifacts, aside from a few rocks and very small bone fragments. It is possible that the alignment marks a side entryway.

Firepit 3-1 (Features 38, 53) was recorded toward the center of the depression in 18S2W (Figure 6-10). Less than one-third of it was exposed during excavation, so its size and shape are unknown. It is about 30 cm deep. The fill consists primarily of bone, some FMR, and charcoal and burned soil. More than one episode of _in situ_ burning is indicated.

In the southwest corner of the structure is a large depression (Feature 26) filled with bone. The depression slopes up 6-10 cm where it adjoins the rock alignment. The larger bone within the depression form a 60° angle with the rock. This depression appears to be a processing area of already butchered meat situated just within the entryway of the dwelling. Botanical materials from this depression include exotic woods like cedar and white pine, and sunflowers and bitterbrush (see Chapter 5). The latter two suggest that Structure 1 was occupied in mid- to late-summer.

There are no references in the archaeological literature to dwellings built on surfaces or in shallow depressions as early as about 1100 B.P., although similar structures, called "summer mat lodges," are described in the ethnographic literature. Ray's informants state that these were rectangular, flat-roofed structures of matting over thin frames, and that they were commonly aligned in rows with the doors facing toward the river (1932:34). In or attached to the house on the down wind side were fish drying racks. Hearths were always out of doors. The dwelling at 45-OK-288 may have been subrectangular and there is good evidence of a hearth indoors. The alignments of rock and bone suggest an entryway facing the river. The limited sampling outside of the feature did not reveal any attached structures but a sparse activity area about 15 m to the north could be evidence of food drying or hide tanning.

Firepit 3-2 (Feature 39) is located in 16S6W. This is a rectangular cluster of fist-sized FMR, measuring 45-25 cm. This cluster was piled on the floor of a shallow depression. The soil was orange and burnt, and a pocket of white ash was noted. A bone concentration of nearly 1000 fragments lay north and east of the firepit (the bone were recorded as part of Feature 36, the floor). While the rocks and soil are evidence of _in situ_ burning, there is no build-up of charcoal or other indications of prolonged firing.

The floor itself yielded two radiocarbon dates of 1046±69 B.P. (TX-4030) and 1122±65 B.P. (TX-4031). Several activity areas are suggested by the distribution of various tools, bone and FMR. Around the bone-filled depression (Feature 26) in 20S4W are concentrated many projectile points, most of the identified bone from the floor, and a considerable number of what we might view as fine cutting tools--bifaces and utilized flakes. One meter to

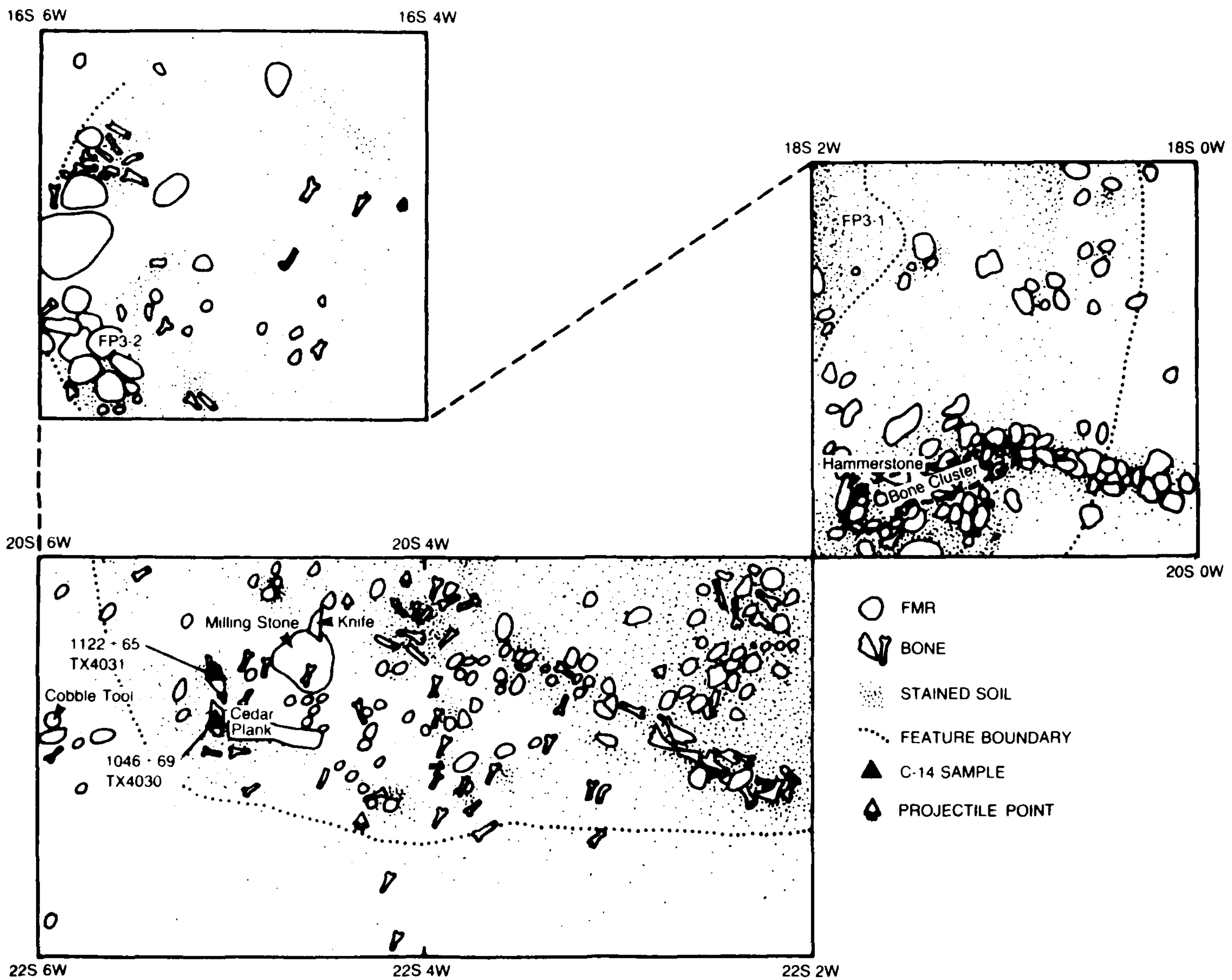


Figure 6-10. Plan map of Structure 1 floor and associated features, 45-OK-288.

The second occupation surface (Feature 23) was excavated within a single 2 x 2-m unit (26S0W). It too is about 20 cm thick, and sloped east towards the beach. Occupational debris was scattered over the west half of the feature where it emerged on beach deposits. Material was not abundant (Table 6-1) nor discernibly patterned. A small pit (Feature 27) originated within this surface. This pit (Pit 2-A) was circular (46 cm diameter) and parallel-sided (20 cm deep). It contained a great deal of charcoal from many kinds of woods: cedar, yellow pine, willow, rabbitbrush, bitterbrush, and sage. Terminal buds believed to be rabbitbrush indicate late summer occupation, as does a wild cherry or hawthorn seed coat (see Chapter 5 for more detailed discussion). Fire-modified rock were deposited on top of the charcoal; a few bone fragments were scattered throughout. Since the walls and floor of this pit show no signs of staining or firing, we cannot be sure it was a firepit. The fill seems to be merely accumulated camp garbage dumped into this pit, whose original function is unknown. Charcoal from it is dated at 473±43 B.P. (TX-4028).

Plate 6-3. Firepit 3-4, Feature 10*, Zone 3, 45-OK-287.

The third occupation surface (Feature 12*) was recorded in a 1 x 2 x .10-m area in 26S2W* at 45-OK-287. This feature consisted of an amorphous scatter of granitic FMR and bone; no tools were found. It is probably part of a larger occupation layer.

Two pits also occurred in this zone at 45-OK-287. The first (Firepit 2-1, Feature 1*) is a shallow, irregularly outlined pit in 18-20S0W*. It is approximately 1.5 m in diameter and 15 cm deep. The pit was exceptional for the west, the amount of bone decreases, and cedar wood is found, along with a large complement of cutting and chopping tools--two tabular knives, a chopper, scraper, and a few bifaces and utilized flakes. The first area seems to be for the cutting and fleshing of already-butchered deer bone, including perhaps the removal of embedded projectiles. In the second area bone and plant materials may have been pounded and chopped.

The area of meat processing in 20S4W appears to continue into 18S2W where a high percentage of identified bone and projectile points occur. Again, large numbers of heavy stone tools and cedar wood occur just east of this area near the rim, repeating the pattern to the west. The path to the entryway occurs just north of this concentration of bone and tools.

Botanical samples from the floor of Structure 1 are more fully described in Chapter 5. They contain cedar, pine, sage, bitterbrush, hawthorn (?), and grass. Budding material and the presence of a seed coat suggest summer or fall residence.

In sum, Structure 1 is a shallow dwelling, nearly 5 m in diameter. Deer hunting and processing was a primary activity, judging from the distribution and constituents of the faunal assemblage. However, unique to the features at 45-OK-288, salmon and shellfish also were taken.

A shallow, oval pit (Feature 22) was partially excavated in 6S10W. Only 20% of the pit was exposed, but it may have been 160 x 80 x 23 cm. Since the pit contained 35 FMR in the portion exposed, charred yellow pine, and only a few bone fragments and waste flakes, we take this pit to be a large firepit (Firepit 3-3).

Another firepit (Firepit 3-4; Feature 10*) was recorded in 32S0W* and 32S2W* at 45-OK-287 (Plate 6-3). It is a cylindrical pit with a flat floor. A carbon sample dates to 1399±122 B.P. (TX-4037), earlier than radiocarbon dates for Zone 3 in 45-OK-288. This is the oldest radiocarbon date at 45-OK-287. The pit, measuring 45 cm across by 35 cm deep, was lined with modified and unmodified rock. Three botanical samples yielded nearly pure samples of mock orange wood, a fuel which gives more smoke than heat. Although it held little in the way of bone and no vegetal material, this firepit appears to have been a special purpose cooking or smudge pit that was used for a short period, perhaps only once.

ZONE 2

Cultural features in Zone 2 include two occupation surfaces at 45-OK-288, and another surface, two fire-pits, an FMR scatter, and the remnants of an historic wooden post at 45-OK-287 (Figures 6-11 and 6-12). Radiocarbon samples from 45-OK-288 date this zone from roughly 800-450 B.P.; the historic post is intrusive.

The older of the two occupation surfaces (Features 29 and 69) at 45-OK-288 dates to 756±67 B.P. (TX-4026). It is a 15-20 cm thick layer of bone, lithic debitage, and FMR. Only the northwest section of this feature, a 3 x exposed, no determination of activity areas or spatial patterning can be made.

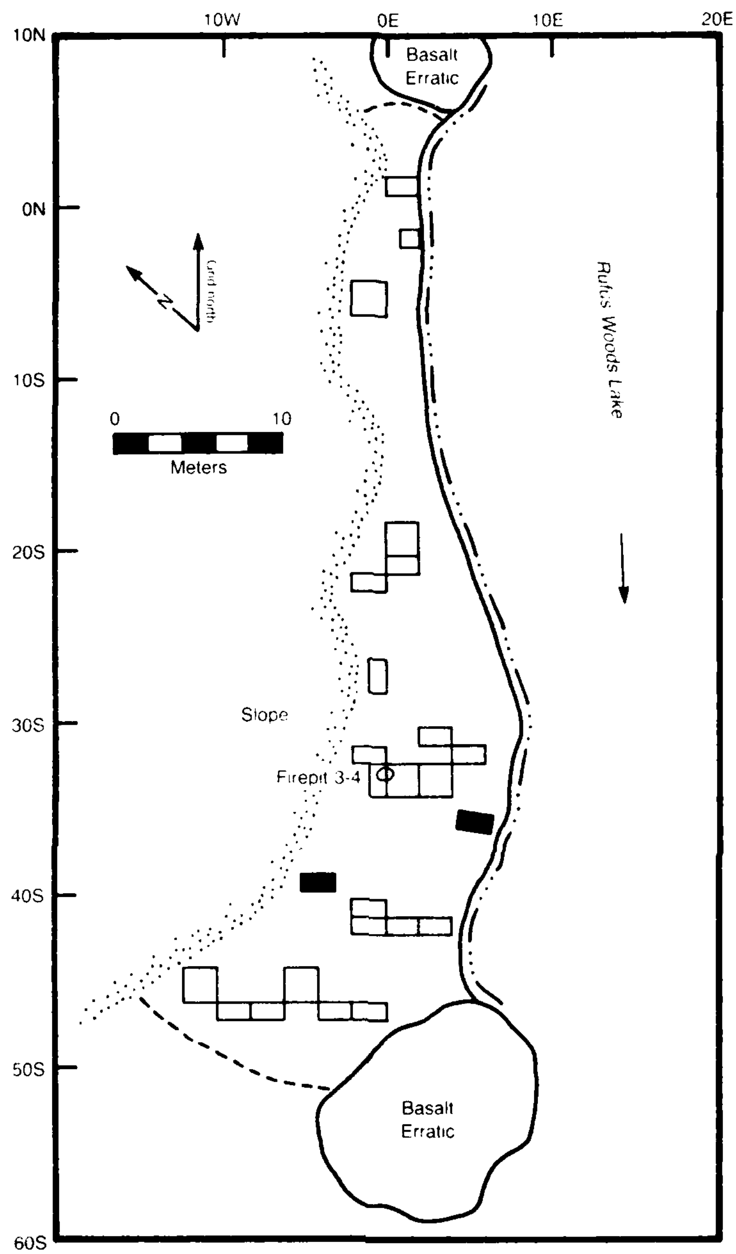


Figure 6-11. Features in Zone 2, 45-OK-287.

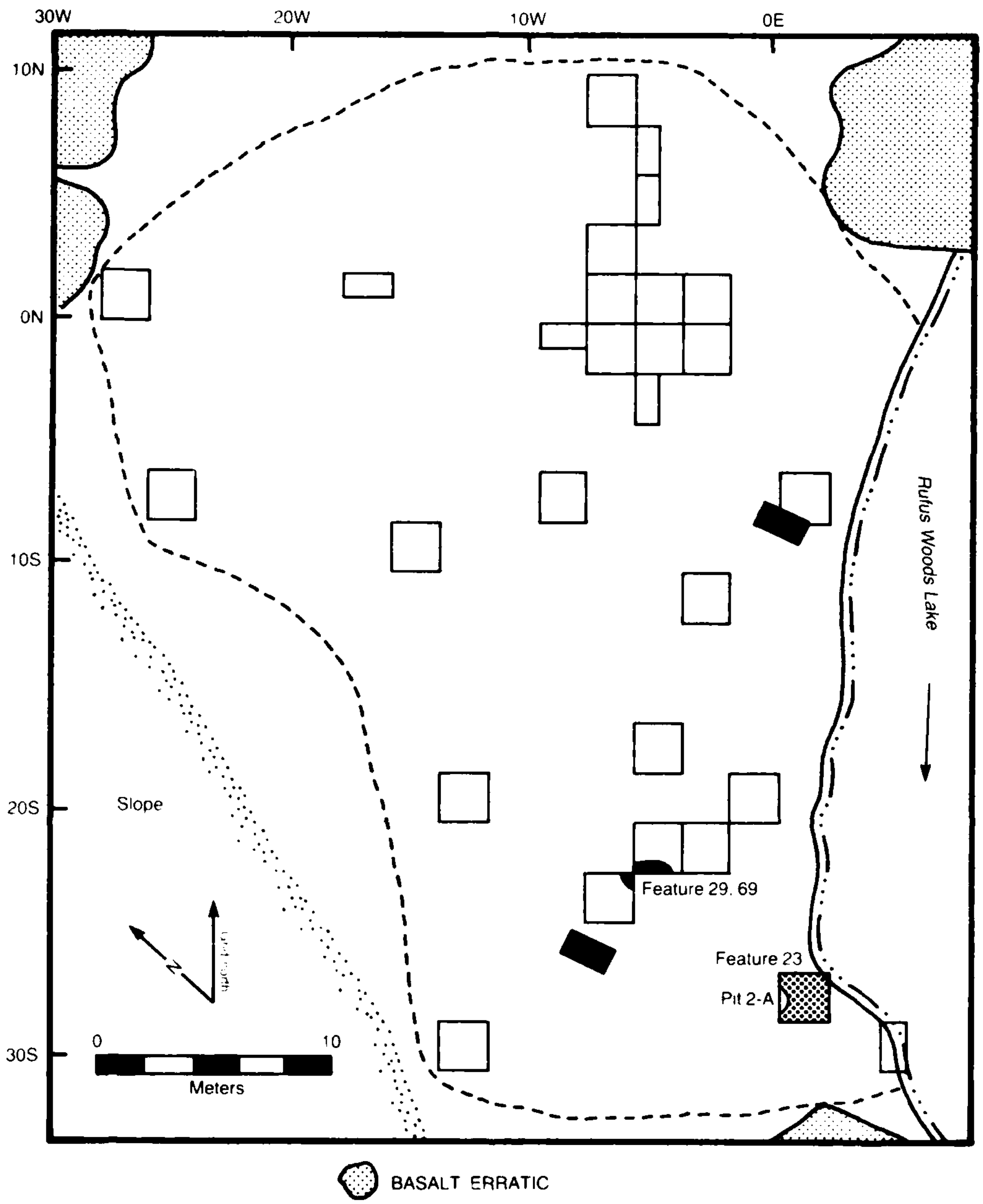


Figure 6-12. Features in Zone 2, 45-OK-288.

its abundance of large FMR (53 at 49 kg). The soil around and under the rocks was heavily stained with charcoal, but there was not enough fuel material in the botanical samples to indicate sustained burning. Still, given the lack of "trash" material--e.g., broken tools, debitage, bone--we judge that this is a firepit.

The second pit (Firepit 2-2, Feature 6*) is very similar to the first. Recorded in 32S0W*, it has a reconstructed diameter of 1.4-2 m and is about 30 cm deep. The edges of the pit are oxidized and the fill contains large quantities of charcoal and FMR. The fuel apparently filled the bottom of the pit, with the rock packed above it. The fuel, apparently, was used to heat the rocks, either for boiling water with hot stones, or to produce steam as in an earth oven or sweat lodge. Flotation samples were taken from under the rocks only, so while we know the fuel that was used--sage and greasewood--we do not know what edibles, if any, were cooked on top of the rocks. This firepit is securely dated to 628±50 B.P. (TX-4038); a projectile point (Morphological Type 18, Wallula Rectangular Stemmed) was recovered from within it.

A thin rock scatter on stained soil (Feature 11*) was recorded in 46S2W* (a 1 x 1 x .10-m area). This is an unpatterned scatter of fire-modified and unmodified basalt, granite, and quartzite. It occurs at about the same level as the occupation surface (Feature 12* in 26S2W*) and may be part of the same cultural stratum. Unique to this feature are 12 g of broken shell; this is one of only three features at the site to contain shell. At other sites in the project area (see, for example, 45-OK-11 or 45-OK-258), 12 g of shell would be fairly insignificant.

The last feature in this Zone (Feature 7*) is the remains of a modern wooden post (22 cm long, 10 cm diameter) in 45S12W*. The posthole was circular and smooth, apparently dug with a modern auger or posthole digger. Its occurrence in this zone does not contradict the radiocarbon dates, since it is obviously intrusive.

ZONE 1

A historic rock pile (Feature 14), recorded in 4N8W at 45-OK-288, is the only cultural feature in Zone 1 (Figure 6-13). The base of the pile covered an area nearly 1.5 m on a side, although originally the base may have been more compact. Clear glass fragments, a hammerstone, and a rusted, round-headed nail were found within the pile which stood 40 cm high. The date, origin and purpose of the pile are unknown. The hammerstone does not necessarily imply aboriginal origin; it may have been coincidentally piled there with the other stones. The clear glass fragments appear to be part of a broken, screw-top quart bottle found nearby. They had simply fallen onto the pile. The nail, however, was found at the base of the pile and clearly dates it to historic times.

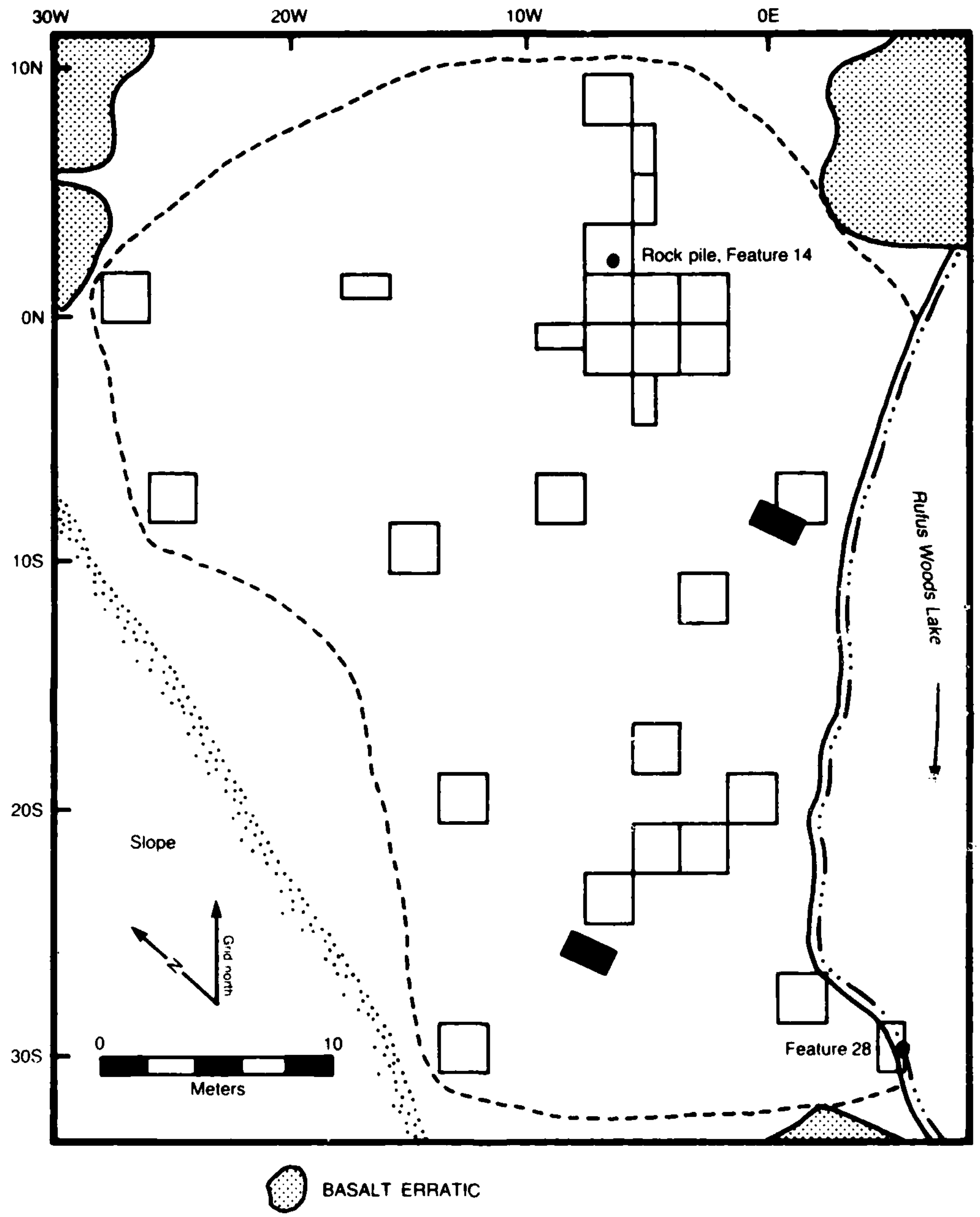


Figure 6-13. Features in Zone 1, 45-OK-288. Feature 28 was not assigned to a zone.

BEACH LAG

A possible earth oven, Feature 28 (Plate 6-4), was located on the beach sands at 45-OK-288 in 28S4E. This feature was partially submerged by fluctuating levels during work at the site. Severe slumping of sidewalls prevented profiling of the excavation unit, so it cannot be correlated with analytic zones in the main body of the site. This rock feature consisted of 170 FMR arranged in a shallow, oval depression (2 x 1.5 x .15 m). Along with the artifacts listed below was a small piece of metal, apparently found below the rocks. However, such a fragment could have sifted down through the sand or been carried there by rodents; we do not feel that its occurrence necessarily dates the feature. Other artifacts are more typical of prehistoric use: 52 pieces of lithic debitage, 62 bone fragments (7 g), 170 FMR (88 kg), a projectile point tip, a biface fragment, and a resharpening flake.

Plate 6-4. Feature 28 (Class 1211), a shallow depression filled with fire-modified rock, found on the surface in Unit 28S4E, 45-OK-288.

SUMMARY

Table 6-4 outlines the distribution of types of features through time at 45-OK-287/288: interior and exterior living surfaces, occupational strata, firepits, other pits, bone and FMR concentrations, and miscellaneous features (e.g., the historic rock pile of Zone 1). Firepits are uniformly distributed among five of the six zones. Cultural surfaces and strata also occur in the

Table 6-4. Types of features by zone, 45-OK-287/288.

Zone	Housepit	Occupation Surface[1]	Occupational Stratum[2]	Firepits		Pits		Bone Concentrations	FMR Scatters	Other	Zone Total
				Interior	Exterior	Interior	Exterior				
6	-	-	3	1	-	2	-	-	-	-	6
5	-	1	-	1	1	-	-	2	-	1	6
4	-	-	1	2	1	-	-	-	-	-	4
3	1	-	-	2	2	-	-	1	1	-	7
2	-	3	-	-	2	-	1	-	1	-	7
TOTAL	1	4	4	6	6	2	1	3	2	1	30

1 ≤ 20 cm thick, usually compacted
2 > 20 cm thick, no evidence of compact surface

five zones. The distinction between occupation strata in Zones 6 and 4 and occupational surfaces in Zones 5 and 2 is apparently the result of natural depositional processes; that is, the deposits of Zones 6 and 4 reflect deflation and active accumulation of natural soils which prevented the formation of stable surfaces.

The primary emphasis in features in all zones was the processing of deer. Table 6-3 shows clearly the predominance of deer among the faunal species identified, although pronghorn is also well represented. (The number of mountain sheep fragments is skewed by a shattered horn core in one feature.) Bone fragments tend to be small: bone weight is usually around .20-.30 g within the features. A primary butchering area at 45-OK-11 yielded bone fragments with a mean weight of 1.4-2.6 g. From the smaller bone weight at 45-OK-287/288 we conclude that most animals were butchered elsewhere.

The question of seasonality at 45-OK-287/288 cannot be answered from features alone, although we have two strong indications of spring or summer occupation in Zone 5 and Zone 3. The development of a large outdoor use surface (Occupation Surface A) in Zone 5 suggests that the site was occupied during seasons when outdoor activities were possible. The structure in Zone 3, which is very shallow and saucer-shaped in profile, is more like ethnographic summer mat lodges (Ray 1932) than archaeologically documented "winter" housepits. We believe that Structure 1 does imply summer occupation.

From the limited evidence of the cultural features themselves, we judge that 45-OK-287 and 45-OK-288 represent hunting camps. The large occupation surface in Zone 5 probably indicates a base camp, occupied for perhaps several weeks at a time, from which hunting parties forayed. Structure 1 in Zone 3 indicates a temporary domestic habitation or camp, similar to summer camps documented ethnographically. The features and cultural strata of the other zones suggest transient camps, short visits to the site by very few people. Evidence for variation in the size of the community and the duration of the visit from zone to zone is very subtle and only poorly reflected in the cultural features at 45-OK-287/288. The obvious similarities in technologies and subsistence patterns throughout the history of the site further suggest only minor variation. Therefore, we believe that the basic pattern of use at the site was consistent: the differences suggested by feature analysis are of degree, not kind.

7. SYNTHESIS

This chapter summarizes and integrates the information presented in the previous chapters. The following sections describe geological, chronological, faunal, botanical and seasonality data and the horizontal distribution of artifacts and features associated with each zone. The final section discusses the site and its relation to the project area and Plateau archaeological record.

GEOCHRONOLOGY

Site 45-OK-287/288 is on a narrow terrace bounded on the west by a steep slope with granitic outcrops and on the east by the Columbia River. The slope behind the site, the Columbia River, and the wind have all influenced eposition and erosion at the site as attested by a depositional sequence consisting predominantly of overbank deposits with varying contributions of colluvium, slopewash, and aeolian sedimensts (Tables 2-3 and 2-4). All of the cultural zones are associated with deposits above a basal gravel and cobble bar (DU I). The following discussion applies primarily to the depositional sequence of 45-OK-288.

Zone 6 is associated with laminated sands and silts of DU II (Stratum 900) just above the basal gravels and cobbles. The feature analysis indicates that some of the northern and eastern cultural material may not be primary deposits. Artifact concentrations in these areas are not accompanied by discolored or stained matrices, suggesting they represent deflated or redeposited material. Two radiocarbon dates from the zone above allow us to estimate the age of Zone 6 as prior to about 4800 B.P.

Zone 5 is also associated with sands and silts of DU II (Stratum 800). The matrix of Zone 5 is loosely compacted, coarser and better sorted with fewer pebbles and cobbles than that of Zone 6. Analysis of features has shown that most of the cultural material represents in situ deposits. Two radiocarbon dates date the Zone between 4800 and 4400 B.P.

Zone 4 is associated primarily with poorly sorted colluvial deposits in DU II between Stratum 800 and Stratum 700 and includes Stratum 700. Stratum 700 contained some undisturbed cultural material and yielded the only radiocarbon date at the upper boundary of the zone. However, most of the artifacts from this zone are from a disturbed context. Zones 3 and 4 of 45-OK-287 have been combined with this zone at 45-OK-288 because of their stratigraphic position beneath Zone 2 with its radiocarbon date of 1399±112 B.P. The zones contribute a small artifact assemblage including two projectile points whose styles support the similar age estimate. They also lack structured features as does most of Zone 4 at 45-OK-288.

On the basis of the radiocarbon dates above, below, and within Zone 4, we estimate the time span represented from 4400 to 1500 B.P. The projectile point styles recovered from this zone include a variety of forms suggesting most of the cultural material represent an amalgam of disturbed and mixed occupations.

Zone 3 is also associated with massively bedded overbank deposits of Stratum 600 (DU II). The matrix is distinguished from the zone above by a slightly larger grain size. While most of the cultural materials appear to be primary deposits, stratigraphic profiles show ephemeral streams from the western slope were most active in Zone 3 and in overlying Zone 2. Erosion and deposition by small channels is primarily retricted to the central portion of 45-OK-288.

Cultural material from Zone 2 at 45-OK-287 has been included with this zone on the basis of two radiocarbon dates, four projectile points, and the similarity of the depositional strata. We estimate the time span represented by the zone as from 1500 to 850 B.P. on the basis of the five radiocarbon dates.

Zone 2 is associated with massively bedded alluvial deposits (Stratum 500, DU II). The cultural material is undisturbed except for the central site area affected by ephemeral stream action.

Zone 1 at 45-OK-287 has been associated with this zone on the basis of two radiocarbon dates and the similarity of Stratum 150 to Stratum 500 (Tables 2-1 and 2-2). We estimate the age of the zone as 850 to 400 B.P. on the basis of three radiocarbon dates.

Zone 1 represents aeolian deposition and modifications at both sites and alluvial fan accretion in the central area of 45-OK-288 over the last 400 years (DU III). Very little prehistoric cultural material was found in this zone at 45-OK-288. Even less material was found in the upper aeolian deposits at 45-OK-287. Both sites yielded historic material including fence posts, a 1900 penny and other debris. There is little evidence for late prehistoric or historic Native American use of the site.

CULTURAL CHRONOLOGY

Numerous radiocarbon dates allow us to make good estimates for the time spans represented by the analytic zones (Table 3-22). We are also able to correlate the dates with our projectile points and to compare the sequence with others on the Plateau (Figure 3-23). We use this discussion to introduce the Project phase designations.

We have discussed the results of classification of the projectile points from 45-OK-287/288 by both morphological and historical types in Chapter 3. The sequence of dominant projectile point forms is similar to that found elsewhere on the Plateau (Grabert 1968; Nelson 1969).

Zone 6 (?-4800 B.P.) and Zone 5 (4800-4400 B.P.) represent late Kartar Phase occupations. The projectile points are dominated by shouldered lanceolate and Rabbit Island Stemmed forms. The lanceolate points are similar to those from the late Vantage Phase and the stemmed points are characteristic of Frenchman's Springs Phase (Nelson 1969). Nelson (1969:115) suggested a southern origin for these stemmed points. However, 45-OK-287/288 provides a slightly older age range for the style on the Upper Columbia and demonstrates their association with older lanceolate forms. We find no evidence for Nelson's (1969) intervening Cold Springs Phase in the form of large side-notched projectile points. In this we concur with Galm et al. (1981) that the phase designation is unnecessary. Though the sample size at 45-OK-287/288 is small, it reflects the distribution in the project area. A preliminary sorting of historical types has resulted in classification of only 17 of 719 points as Cold Springs Side-notched. Six of these are from the Kartar Phase (Appendix B, Figure B-6).

The projectile points from these zones are also similar to those from Grabert's Indian Dan Phase for the Wells Reservoir (1968: Groups VII, VIII, IX and X, Figure 5). At both Sunset Creek and Wells Reservoir the early phases are also characterized by the greater use of opaque lithic material, a pattern similar to the increased frequency of argillite in the lower zones at 45-OK-287/288.

Zone 4 (4400-1500 B.P.) presents a variety of projectile points associated elsewhere with the several phases with which this time span corresponds. We find shouldered lanceolate and Rabbit Island stemmed forms accompanied by Quilomene Bar and Columbia Plateau stemmed forms. The Quilomene Bar forms appear as early as the Frenchman Springs Phase on the Middle Columbia and continue until historic times (Nelson 1969:117).

The Columbia Plateau stemmed point is found in the later Cayuse and Cassimer Bar Phases (Nelson 1969; Grabert 1968). In general, the projectile point styles from Zone 4 support the long estimated age of these mixed deposits. The recovery of Quilomene Bar and Columbia Plateau stemmed points from Zones 3 and 4 at 45-OK-287 supports our zone combinations.

Zone 3 (1500-850 B.P.) and Zone 2 (850-400 B.P.) represented Coyote Creek Phase Components. They are dominated by late, small, stemmed and notched varieties characteristic of Cayuse and Cassimer Bar Phases. The remaining point types, the shouldered lanceolate and Rabbit Island stemmed, in Zone 3 allow us to comment on other temporal stylistic sequences. Nelson (1969:116) has observed that this stemmed form (his Type 3) is replaced by the Quilomene Bar basal notched form about 2500 B.P. and then re-introduced (Nelson's Type 8) in Cayuse III from The Dalles. Grabert (1968:151) on the other hand found the Chiliwist Phase to be characterized by stemmed, basal notched, and lanceolate forms. At 45-OK-287/288 we find a continuum of stemmed forms from at least 4500 B.P. In this respect we find the Zone 3, Coyote Creek Phase points more similar to the Chiliwist Phase styles and, logically enough, the sequence more similar to that of the nearby Wells Reservoir.

Zone 1 contained no projectile points and yielded little cultural material. It represents the deposition of the last 400 years accompanied by little prehistoric use of the site.

FAUNAL REMAINS

Faunal material makes up the largest proportion of each zone assemblage at 45-OK-287/288 (Table 2-3 and 2-4). The taxa identified include species known ethnographically to be important sources of meat, hides and bone (Table 7-1). The large mammals include antelope, mountain sheep, deer and possibly elk. Of these only deer are still found in the project area. Smaller mammals identified were marmot, muskrat, beaver and *Canis* sp. Non-mammalian species include turtle and salmonids.

Evidence of butchering and burning are found among all of these taxa except muskrat, turtle and salmonid (Table 4-2). While such modifications occur in all zones and most frequently in Zone 4, we must recall that our only

Table 7-1. Distribution of economic fauna by zone, 45-OK-287/288. (%=taxa NISP/zone NISP excluding non-economic fauna)[1]

Fauna	Zone					
	1	2	3	4	5	6
Antelope	-	14.5	8.2	3.0	11.7	3.0
Mountain Sheep	-	5.3	3.5	12.2	1.3	12.1
Deer	3.8	17.1	25.2	25.7	21.4	39.4
Deer-Sized	88.5	60.5	61.1	50.6	51.2	36.4
Elk-Sized	7.7	-	0.2	-	-	-
Sheep/Antelope	-	-	0.4	1.7	0.3	1.5
Cervidae	-	-	0.2	0.4	1.0	-
Marmot	-	-	-	1.7	0.3	-
Muskrat	-	-	-	1.7	5.0	1.5
Beaver	-	-	-	0.4	0.3	-
Canis sp.	-	-	-	0.8	1.7	-
Turtle	-	-	-	-	5.7	-
Salmonid	-	2.6	1.1	1.7	-	6.1
TOTAL N	26	76	453	237	299	66

1 45-OK-287 contributes the following NISP:

Canis sp.	NISP = 1, Zone 4
Deer	NISP = 9, Zone 4
	NISP = 3, Zone 3
	NISP = 4, Zone 2
Deer-Sized	NISP = 3, Zone 2

2 NISP includes 331 pieces of same horn core counted here as one element.

information comes from taxonomically identifiable specimens. Comparable information was not recorded on the nidentified specimens, which inspection indicates show considerable evidnece of cultural modification as well. The highly fragmented nature of the collection suggests processing techniques that were designed to maximize faunal resources, although other taphonomic processes may also play a role. Both the number of identified individuals (MNI) and identifiable bone (NISP) are extremely low for each taxa in comparison to the total number of bone fragments for each zone (Figure 7-1). Average weights of bone fragments are small and decrease from the upper to lower zones. While it is difficult for us to attribute the declining weights to cultural factors because of differential preservation over time and the differences in sample sizes, we cannot dismiss the trend solely as increased fragmentation with age. For example, we note a greater average weight of bone fragments in older zones at 45-DO-285 where occupations span the last 3,000 years. This period is comparable in age to Zones 1 through 3 and at least some of Zone 4 at 45-OK-287/288. We also note that the ratio of the generally larger identifiable to non-identifiable bone does not decrease steadily over time as might be expected if attrition were entirely responsible.

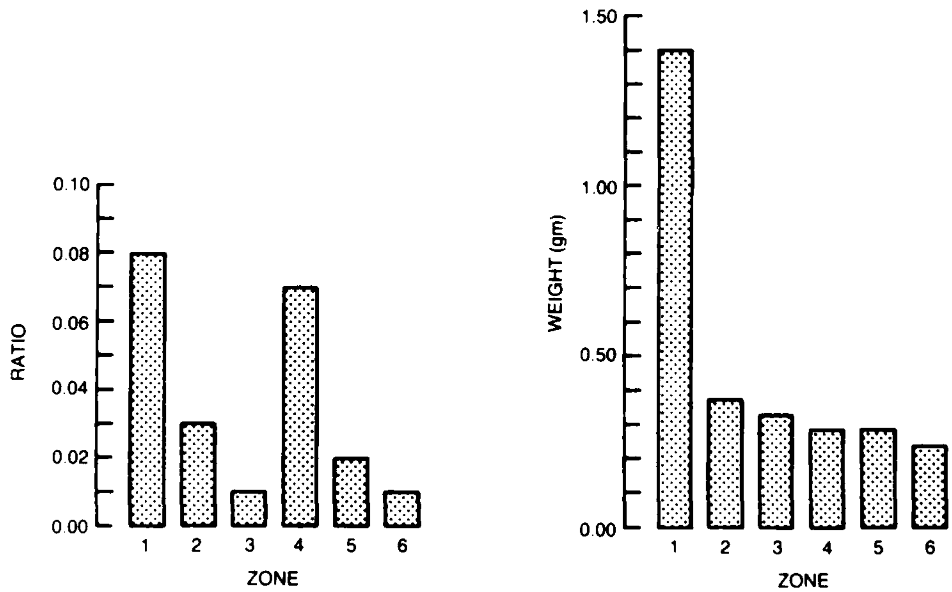


Figure 7-1. Ratios of identifiable to non-identifiable bone and average weight of bone framents by zone, 45-OK-287/288.

Recalling the difficulty in limiting the time span of Zone 4 and attributing to it specific <u>in situ</u> cultural deposits, we find it difficult to explain the ratio in that zone. Less than 9% of the identifiable bone and 24.8% of the unidentifiable bone comes from featured cultural deposits (Features 59, 60 and 72). If most of the remaining faunal material is transported or deflated, then we may be witnessing recovery of the larger, identifiable pieces and erosion of the smaller. However, a similar larger ratio does not occur in Zone 6 which also shows evidence of erosion. .cp 3

Table 7-1 allows us to compare the composition of faunal assemblages of the zones. While there appear to be variations in the incidence of the antelope, mountain sheep and deer among the zones, we can point to no clear trend through time because remains of each may also appear in the "Deer-Sized" category. We do find a difference in the distribution of the small mammal taxa which appear primarily in Zones 4 and 5. We may interpret this trend as demonstrating greater use of small game.

We can draw few conclusions from the non-mammalian taxa, turtle and salmon, other than to note their presence. Neither seems to have been a highly exploited resource.

Finally, we note that the faunal material contributed by 45-OK-287 to the collection does not differ markedly from the 45-OK-288 assemablage. The faunal remains show an emphasis on large game procurement and processing in all zones. The appearance of small mammals particularly in Zone 5 may represent a broader range of faunal exploitation.

BOTANICAL REMAINS

The botanical analysis has demonstrated the presence of species providing fruit, fiber, and wood. Most are locally available and have been used for fuel. Others are known ethnographically to have been used for hide smoking, medicines, tools and construction.

We recognize that the distribution of botanical species is highly influenced by factors of preservation and the selective character of sampling and recovery methods. However, there is evidence from the botanical data which in conjunction with information from the features, seasonality and artifact analyses suggests a subtle broadening through time of foraging patterns to include more plant resources collected from the upland and a shift in site function. The botanical remains of the earlier zone (primarily Zone 5) consist of species used mainly as fuel. They include pine and fir woods, sage stems, seeds of mallow and bitterbrush, and a few bits of tissue which may represent edible fruits (Table 5-1).

In contrast, the later Zone 2 and 3 have larger, more diverse botanical assemblages. In Zone 3 botanical species recovered from Feature 12, the structure floor, include a variety unlikely to have been locally available. Larch, Douglas fir, white pine and red cedar may have been obtained from river driftwood or from the Okanogan uplands and beyond. Two of the botanical species identified--smartweed and sunflower--may have formed part of the diet. The sunflower is unexpected because it is not considered to pre-date Euroamerican settlement of the Plateau. These remains show wider variety of softwoods and hardwoods were being used than in the earlier zones, not only for fuel, and that edible seeds and fruits were collected.

The species from Zone 2, although fewer in number, resemble those of Zone 3. Rabbitbrush, willow, sumac and bullrush are added to the botanical assemblage. The first two may have been used to produce specialized fires for hide smoking. Sumac, serviceberry and hawthorns/wild cherry pits represent collection of edible fruit. Bulrush suggests matting. This species in particular indicates the use of the uplands because of its availability at Goose Lake.

We must make two final observations about the botanical data. First, there is a greater incidence of yellow and hard pines in the lower zones and more sage and bitterbrush in the upper zones. This may be due to cultural change in fuel preference. However, further analysis of botanical samples from the project area, suggests a shift from conifers in the Kartar Phase to steppe hardwoods in the Coyote Creek Phase possibly representing environmental change (Stenholm 1984).

Finally, we note the occurrence of generally similar botanical species at 45-OK-287 and 45-OK-288. We regard this as additional support for the way the zones were combined.

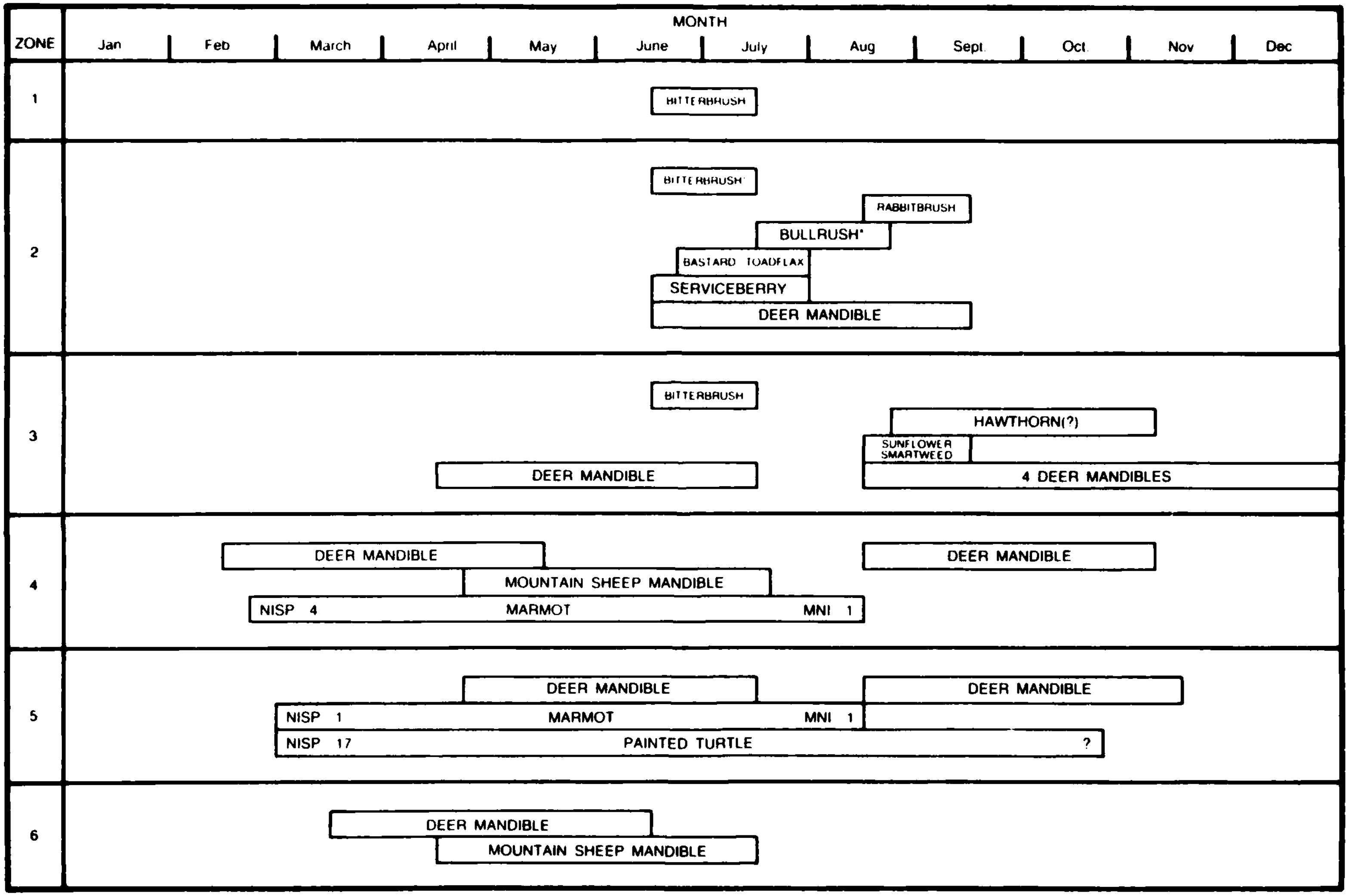
SEASONALITY

The indicators of seasonality at 45-OK-287/288 include both botanical and faunal remains (Figure 7-2). The reliability of the seasonal estimates is dependent on the degree to which the indicators may be attributed to a specific zone as primary deposits. Cultural practices, including processing and storage of economic botanical species, is not always discernible so that often we cannot be sure their presence reflects the season of harvest, (e.g. serviceberry). We also cannot always determine if the species present is contemporary with the cultural deposits and the result of human activities. For example, the cache of burned bitterbrush seeds in Zone 1 has been interpreted as culturally deposited because of burning and lack of evidence of rodents although there are no known ethnographic parallels for harvest of the species.

Similar factors affect the reliability of the faunal indicators. For example, the small NISP for marmot and recovery from adjacent zones makes the remains less reliable indicators than say, a burned and butchered deer mandible from a cultural surface. Primary deposition of remains such as the painted turtle carapace fragments is also open to question. A turtle shell is ideally suited for use as a cup, bowl or rattle and may have been discarded at any season. While evidence of burning, which does not appear on these specimens, may enhance the interpretation of turtle carapace without butchering evidence, we still cannot say that it represents primary deposition. Discard and burning of refuse could be equally responsible for this modification.

We present the seasonality data with the possibility of these alternate explanations in mind. The data is enhanced by the overlap and number of independent factors.

Zone 6 yielded two indicators suggesting spring use of the site. Maximum indicators for Zones 4 and 5 suggest a nearly year round use of the site, excepting only the winter months. The association of Zone 4 and Zone 5 as suggested by the faunal data is encouraged by these seasonality factors. The seasonal occupation estimate for Zone 3 is late April through December. The maximum estimate for Zone 2 is June through September. Zone 1 provides only



*Indicates 45-OK-287

Figure 7-2. Seasonality data by zone, 45-OK-287/288.

the remains of burned bitterbrush seeds to indicate a mid-summer use of the site.

In summary, the available data indicates a fairly restricted summer site use in Zones 1 and 2; summer, fall and early winter site use in Zone 3; spring, summer and fall use in Zones 4 and 5; and spring use in Zone 6.

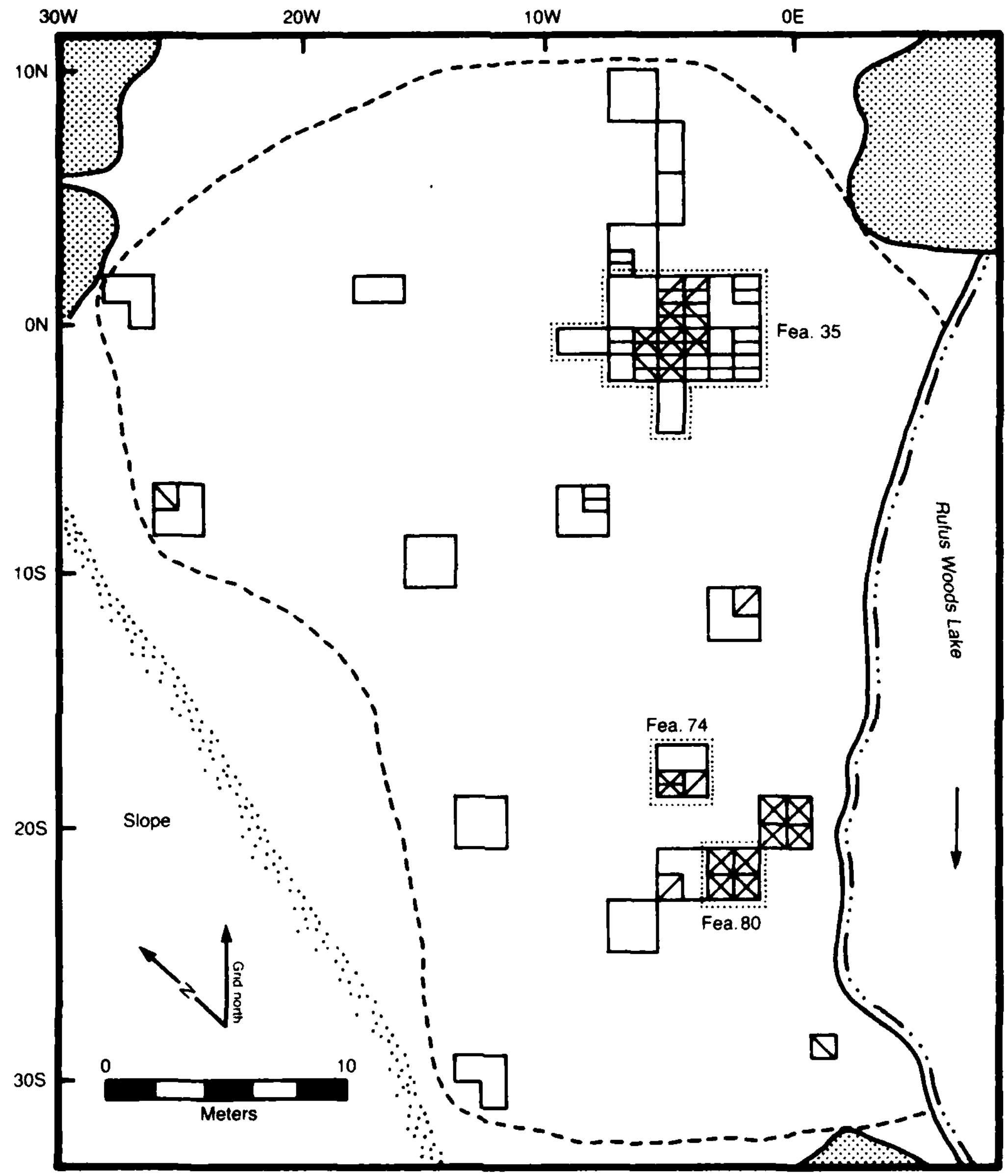
ARTIFACT DISTRIBUTION

This section discusses the horizontal spatial patterning of the zone assemblages. We rely on the spatial distribution of features and artifact class frequencies by unit to define areas of economic interest and more widespread distribution to define the extent of site use. Although organization of prehistoric activities is likely to be complex at even the most temporary locations occupied by small groups, the kinds of cultural material recovered allow us to infer subsistence related activities. Peak frequencies of cultural material, indicating refuse accumulations, lithic manufacture, food processing, or hearth areas should occupy a nuclear area within a wider scatter of debris. The patterning of such artifact distributions enable us to discuss the organization of activities within each zone.

Several factors influence the zone distributions and the inferences that can be made from them: the location and number of the sampling units in relation to the size and spatial pattern of the occupations, the rate of artifact discard, duration of the occupancy, the number of reoccupations within a zone, the degree to which two or more such occupations overlap, and disturbance of the artifact patterns after deposition. The last factor is of greatest importance. Two principal postoccupation disturbances occur at almost every site in the project area. The first, especially important to the discussion of 45-OK-287/288, is stream and river erosion. The second is vertical displacement by rodents. The upward and downward dispersion of a bead cache at 45-OK-18 showed that small artifacts from a single occupation surface can be displaced vertically by as much as a meter in either direction (Jaehnig 1984b). It is difficult to determine the extent of these disturbances; we will, however, consider their effects in the following discussion.

The graphics which accompany the discussion (Figures 7-3 through 7-11) are derived from the computer-generated distribution maps in Appendix D. On these maps sample data appear by alphanumeric codes for nine divisions of the cumulative frequency class counts. Divisions were adjusted so that score ranges did not overlap, and zero scores were always mapped as zero. The ninth division was broken down further by use of letter codes for each score from highest to lowest.

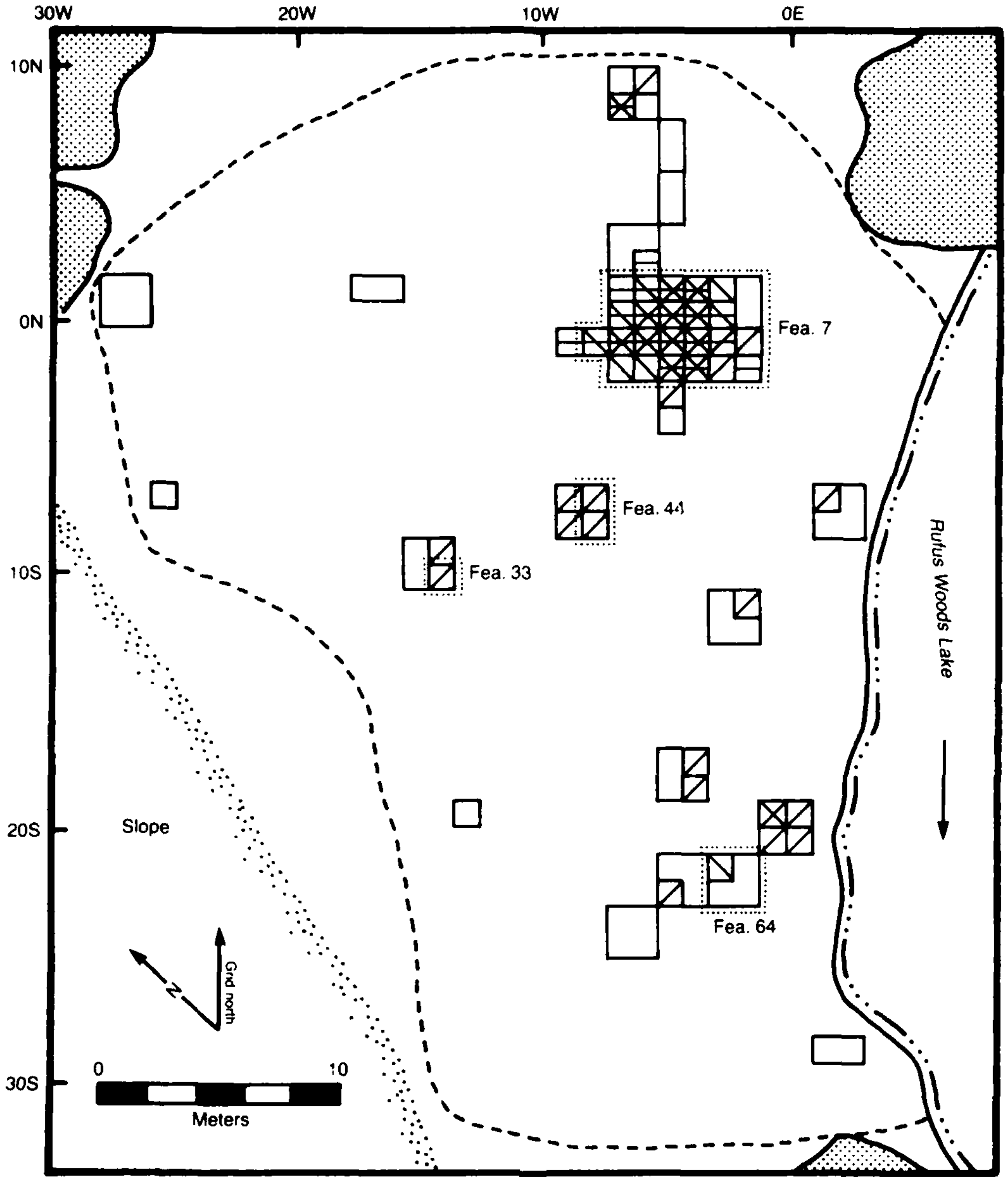
The interpretive graphics present the locations of the letter codes and one or two of the highest density numeric codes (Figures 7-3 through 7-11). Units that were not zoned, as in the case of 28S4E, and units with no cultural material do not appear. Mean score, standard deviation, and other statistics are presented.



	Range Shown	x̄	s.d.	N
Bone	121-477	80.3	80.5	7147
Lithic	33-127	20.7	23.2	1841
FMR	8-26	4.2	6.6	376

BASALT ERRATIC

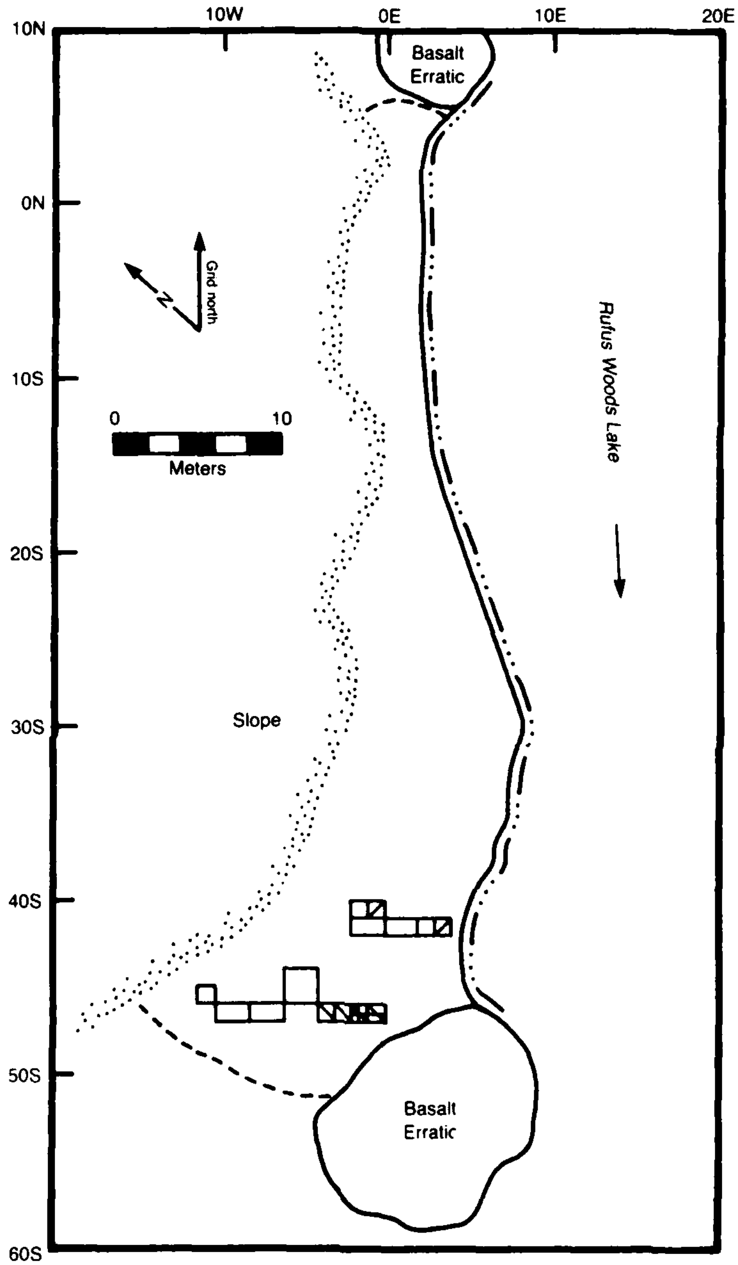
Figure 7-3. Distribution of cultural materials, Zone 6, 45-OK-288.



	Range Shown	x̄	s.d.	N
Bone	207-2596	195.4	336.6	18763
Lithic	91-166	30.8	37.0	2952
FMR	8-88	8.1	12.7	780

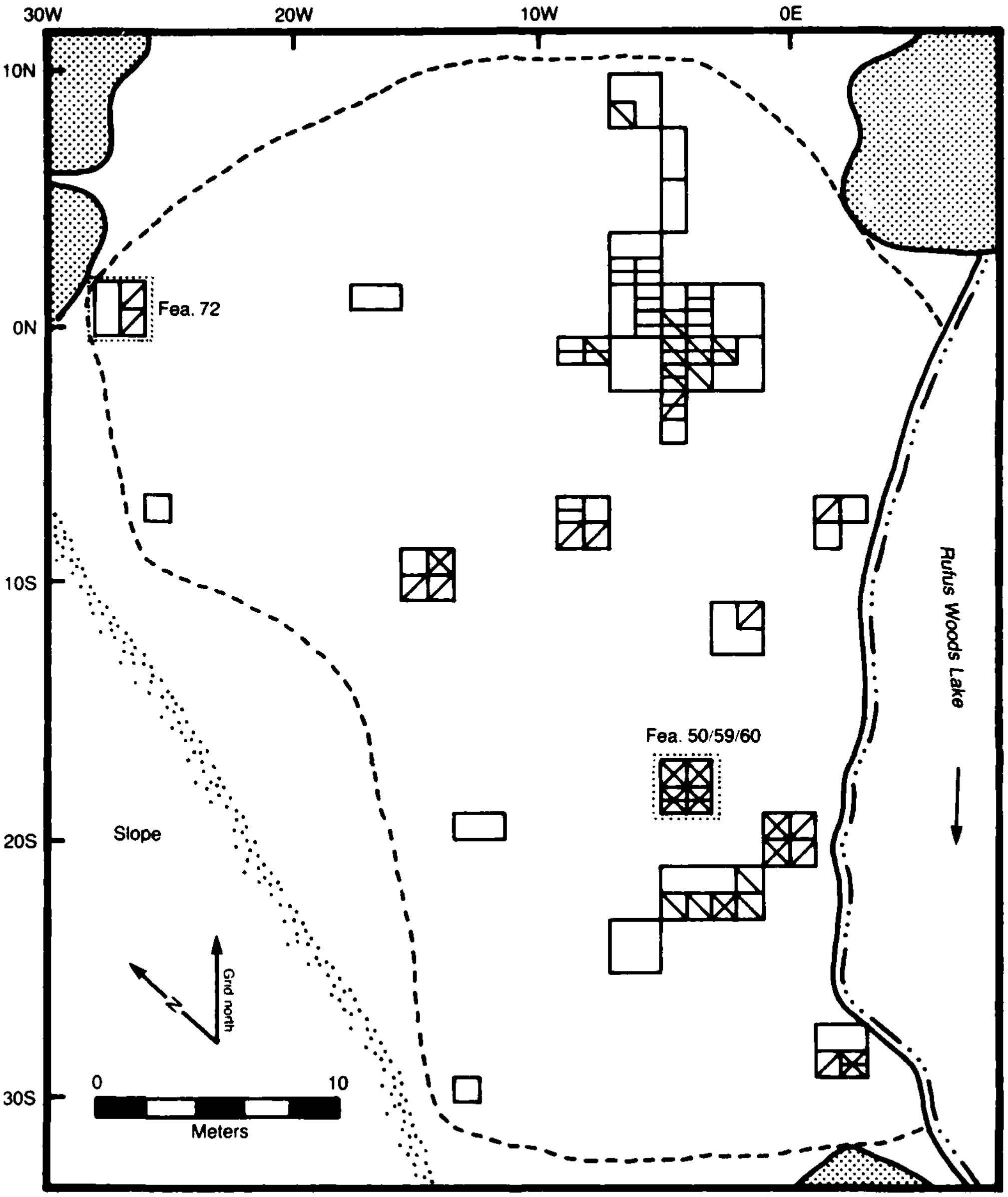
BASALT ERRATIC

Figure 7-4. Distribution of cultural materials, Zone 5, 45-OK-288.



	Range Shown	x̄	s.d.	N
Bone	207-476	77.3	136.7	1701
Lithic	17-39	5.5	8.7	121
FMR	8	1.0	2.3	22

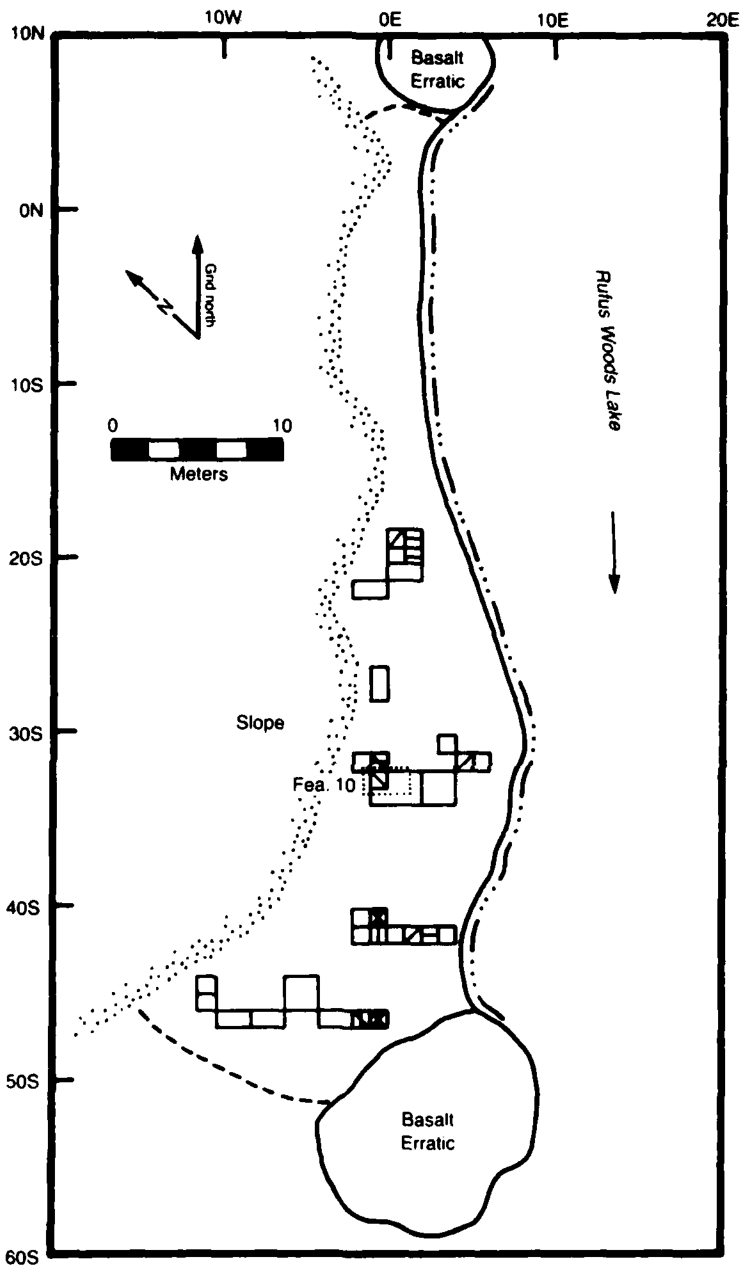
Figure 7-5. Distribution of cultural materials, Zone 4, 45-OK-287.



	Range Shown	x̄	s.d.	N
Bone	128-2327	105.9	242.1	10374
Lithic	27-53	15.1	12.6	1475
FMR	8-84	4.9	10.5	482

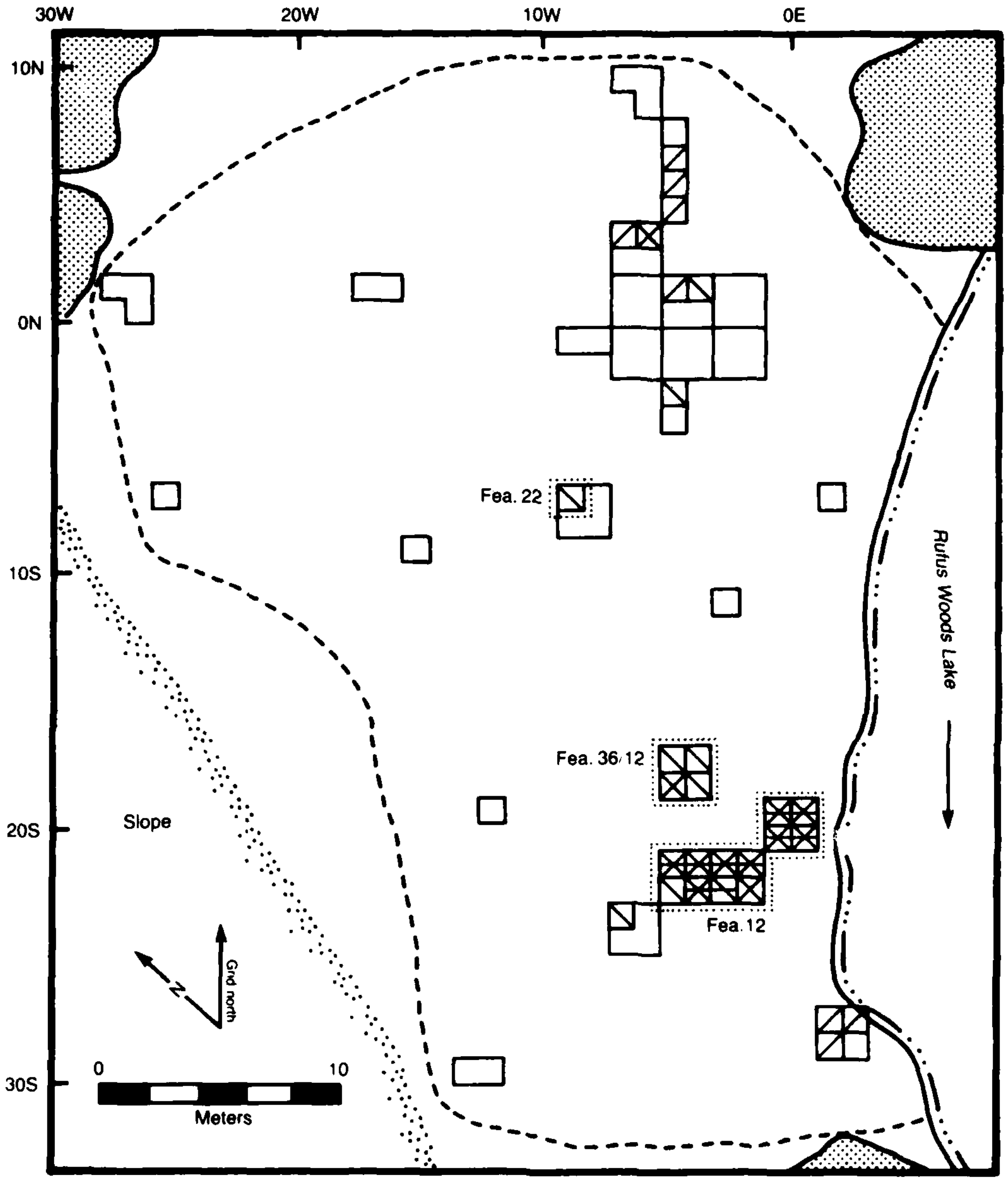
BASALT ERRATIC

Figure 7-6. Distribution of cultural materials, Zone 4, 45-OK-288.



	Range Shown	x̄	s.d.	N
Bone	57-177	20.4	33.2	999
Lithic	17-38	6.0	7.7	294
FMR	9-31	4.4	6.8	214
Shell	3-14	0.7	2.2	33

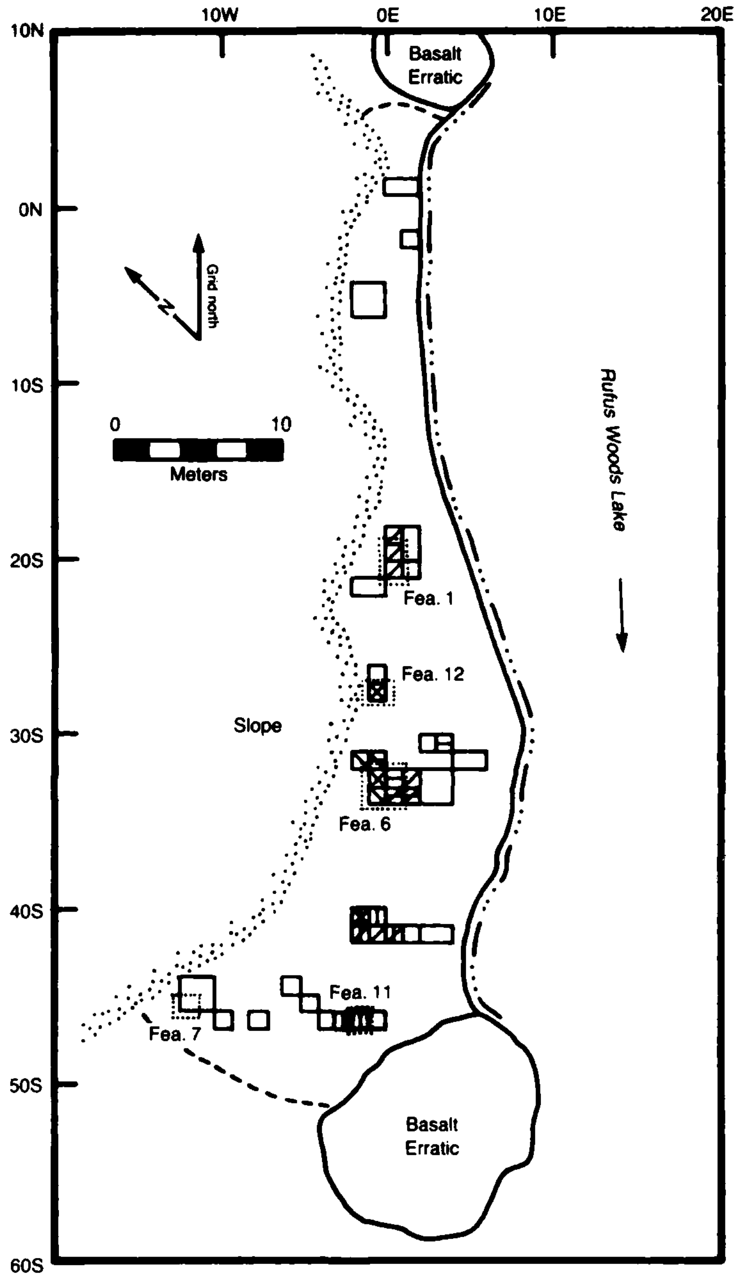
Figure 7-7. Distribution of cultural materials, Zone 3, 45-OK-287.



	Range Shown	x̄	s.d.	N
Bone	70-460	162.2	396.6	15737
Lithic	43-156	15.4	29.3	1497
FMR	7-127	7.9	19.4	769

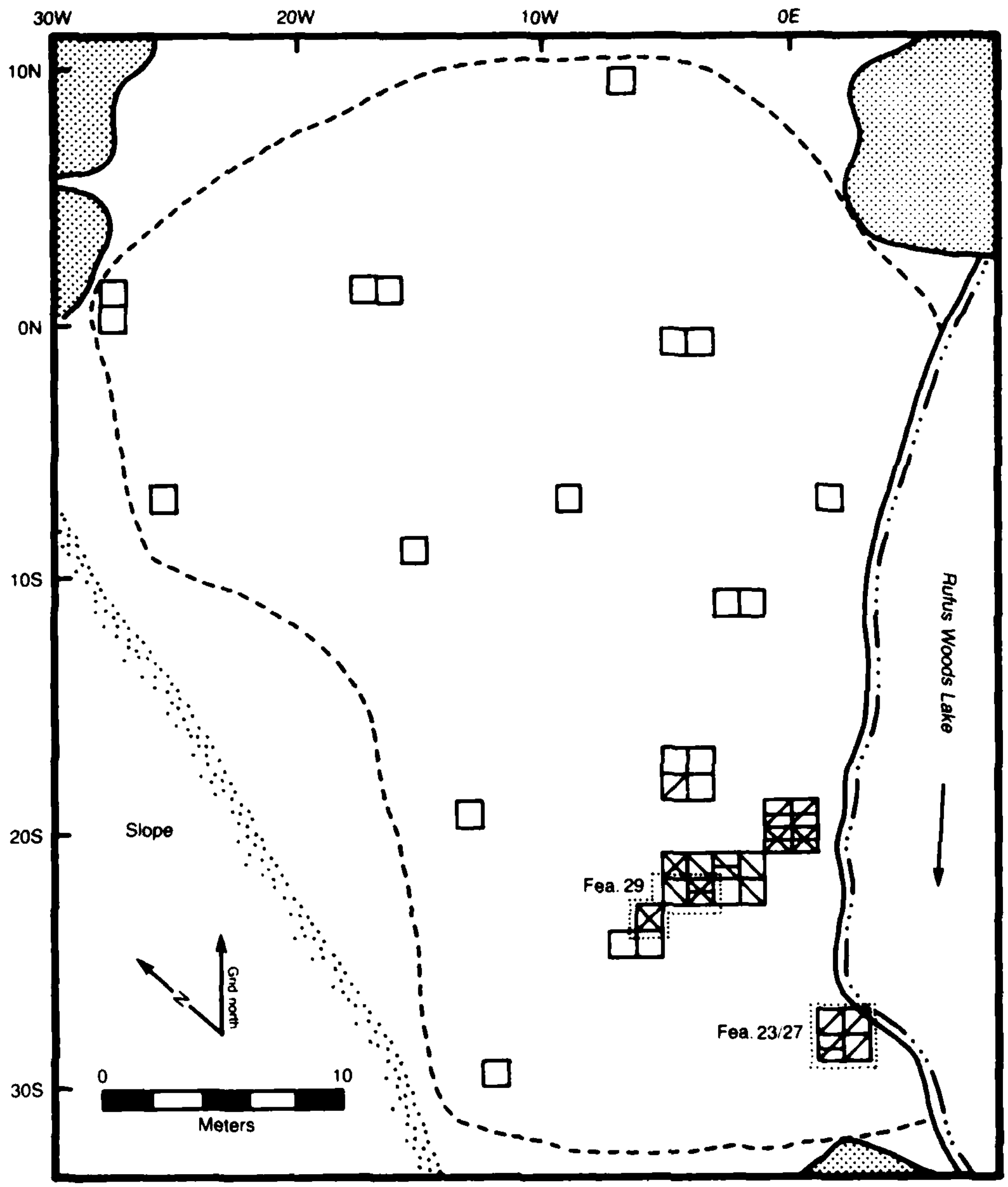
BASALT ERRATIC

Figure 7-8. Distribution of cultural materials, Zone 3, 45-OK-288.



	Range Shown	x̄	s.d.	N
Bone	18-74	9.0	15.1	515
Lithic	12-23	3.6	5.3	207
FMR	9-181	8.8	25.8	499
Shell	4-6	0.7	1.5	42

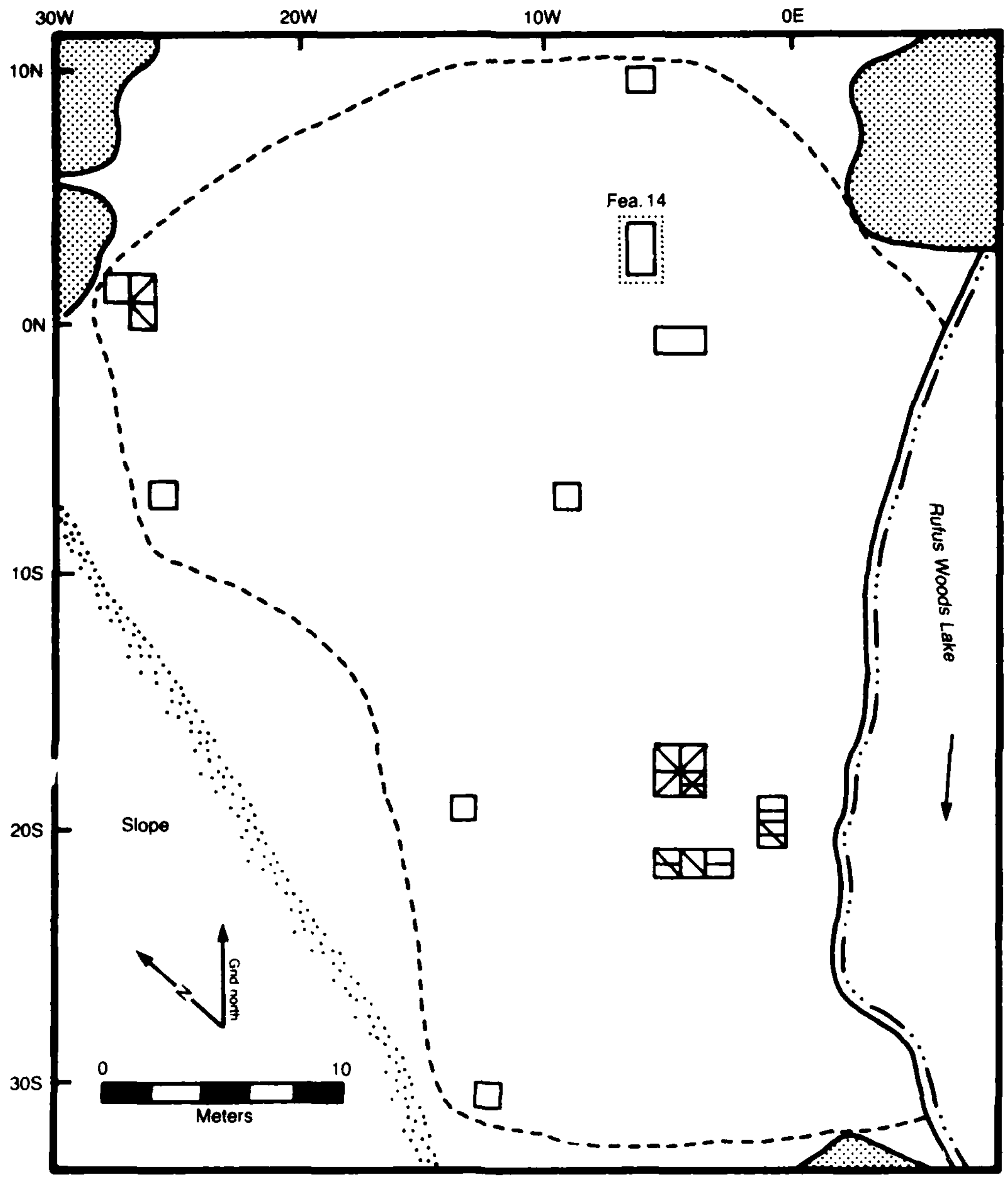
Figure 7-9. Distribution of cultural materials, Zone 2, 45-OK-287.



	Range Shown	x̄	s.d.	N
Bone	74-496	38.3	80.6	2411
Lithic	13-32	3.8	6.8	238
FMR	3-32	2.4	6.1	153

BASALT ERRATIC

Figure 7-10. Distribution of cultural materials, Zone 2, 45-OK-288.



		Range Shown	x̄	s d	N
⧅	Bone	10-124	5.4	18.0	313
⊟	Lithic	3-10	0.9	2.1	50
⧄	FMR	1-2	0.1	0.4	6

BASALT ERRATIC

Figure 7-11. Distribution of cultural materials, Zone 1, 45-OK-288.

ZONE 6 (?-4800 B.P.)

Zone 6 contained a small, fairly sparse assemblage. The highest frequencies of materials were distributed in the northern and southern areas of the site (Figure 7-3). In the northern excavation block, Feature 35 closely underlies the Feature 7 complex of Zone 5, from which it is separated by at least 10 cm of matrix containing very little cultural material, and in some units by thin lenses of culturally sterile coarse sand. The central units contain bone, lithics, and FMR coincidentally with Zone 5, but in lower frequencies. However, the peripheral areas of the northern block show high lithic frequencies in units independent of distributions in overlying zones. The geologic context of the Feature 35 area may have biased the recovery of artifacts of small size and weight, and precludes any extensive reliance on Feature 35 for pattern interpretation of this zone.

In the southern part of the site an intact surface is represented by Features 74 and 80. Bone and FMR occur coincidentally in more units and are more extensively distributed than in Zone 5. In this area, Zones 6 and 5 probably represent similar activities, and may be separated by a relatively brief time span.

Analysis of Zone 6 artifacts indicates more argillite and cobble-derived artifacts than in subsequent zones representing an emphasis on locally-available cobble resources and game processing activities.

ZONE 5 (4800-4400 B.P.)

Zone 5 contained high densities of cultural material associated with undisturbed surfaces and cultural features. Most of the highest frequencies of artifact classes coincide with and are included in the Feature 7 complex (Figure 7-4). Additional loci, primarily of single artifact classes, are associated with other features and in scattered units. In general, the distribution indicates orientation toward the river, away from the slope to the west.

The pattern is one of widespread use focusing on the northern part of the site. The Feature 7 complex and surrounding clusters of FMR with low frequencies of bone and lithics may represent use of the site by a relatively large group of people. We suggest that activities focused on a central game processing area with other contemporaneous domestic loci representing the division of the larger group into smaller units. However, the FMR concentrations outside of Feature 7 also could be interpreted as evidence of short visits by small groups before and after the activities which created Feature 7. The long span represented by the seasonality data supports either frequent short-term small group use or prolonged large group occupancy. Elements of both explanations probably contribute to the pattern.

The artifact assemblage of Zone 5 suggests more than a transitory hunting camp, although hunting and game processing appear to be the primary activities represented. Evidence for the manufacture and maintenance of CCS implements (projectile points, bifaces, and linear flakes) is present. A large proportion of cobble-derived objects such as choppers and hammerstones and the prevalence of argillite continue the emphasis on locally-available cobble resources and game processing activities represented by Zone 6. The presence of gravers, scrapers, and bone implements in Zones 6 and 5 suggest occupations of some duration so that hides could be processed and used. The location of 45-OK-288 in relation to the uplands and the river probably made it attractive as a semi-permanent base camp as well as for transitory hunting expeditions.

ZONE 4 (4400-1500 B.P.)

The Zone 4 assemblage is less dense than that of Zone 5 although it suggests some pattern retention. We regard its horizontal distribution with caution because of the depositional history of the zone and the long time span represented. At 45-OK-287 Zone 4 appears only in the southernmost units, and the highest frequencies of bone and lithics occur in the units closest to the basalt erratic (Figure 7-6). At 45-OK-288 high frequencies of lithics were found in the northern units, high frequencies of bone and FMR were found in the southern units, and high frequencies of FMR were found in the central area (Figure 7-6). In addition, intact features indicate at least some independent patterning. While the radiocarbon date associated with the southern features provides an upper age estimate for Zone 4, this information cannot be extrapolated to other material concentrations such as Feature 72. Much of the cultural material appears to be closely associated with Zone 5 and 6 as evidenced by the similarity of the projectile points, the faunal taxa identified, the seasonality data, and the lithic assemblage. Further temporal distinctions are not possible because of the discontinuous stratigraphy of the zone, its complex colluvial deposition, and disruption by erosional events.

ZONE 3 (1500-850 B.P.)

The first large assemblage at 45-OK-287/288 was encountered in Zone 3. Distribution of the major material classes at 45-OK-287 and 45-OK-288 is presented in Figures 7-8 and 7-9 respectively. At 45-OK-287 Feature 10, a rock-lined pit, is associated with relatively high frequencies of bone and lithics. North and south of this feature are areas with high frequencies of other artifact classes. In general, little coincidence of the classes in single units was observed. At 45-OK-288 the Feature 12 complex, representing a structure floor, shows the coincidence of high frequencies of the major artifact classes. The Feature 12 complex is younger than Feature 10 at 45-OK-287, from which a single radiocarbon date was obtained, and artifact densities at 45-OK-288 are much higher for all classes than at 45-OK-287. The illustration of these frequencies in Figures 7-8 and 7-9 is somewhat misleading when the two sites are compared: the distribution shown to the south in Figure 7-7 for 45-OK-287 should be regarded as an extension of the lower frequencies of 45-OK-288.

The contents and structure of the Feature 12 complex are detailed in Chapters 5 and 6. It is important to note that although the floor is a shallow depression, we cannot describe the feature as a "housepit." The lack of evidence for internal supports and the concentration of cultural material and discolored matrix suggest an above-surface structure.

The broad range of faunal, botanical and lithic material deposited on the floor we interpret as evidence of generalized domestic activities. More than 90% of the identifiable bone from Zone 3, 45-OK-288 was recovered from the Feature 12 complex. Botanical evidence includes a variety of species unlikely to have been locally available. From these remains we can say that large game, some salmon, and a variety of hard and soft woods, and several edible plant species were exploited by the structure's inhabitants.

It is difficult to determine if the artifact concentrations outside of the Feature 12 complex are contemporaneous with the feature itself. A high frequency of bone is associated with Feature 22. The three adjacent 1 x 1-m units were begun after removal of overlying matrix by bulldozer. In the northern block area and south of the structure there are high frequencies of bone and FMR. While none of these units lacks lithic artifacts, the domestic complexity of the structure is absent. We can interpret these areas as specialized processing loci or as representing infrequent shorter duration occupations.

In general we interpret Zone 3 as a period of more intense site use than the other zones, with at least one structure and possibly related areas of outside activity. The seasonality data indicates a longer period of yearly use than in earlier zones. The artifact assemblage is what we should expect of a small band of people living by the river for the majority of the year. The Zone 3 assemblage contains the greatest numbers of projectile points and point fragments, bifaces, cores and formed objects in general, as well as a large number of linear flakes. All are objects which suggest manufacture and maintenance of tools; activities we would expect from occupations that were more than transitory. Hunting is the primary subsistence activity for which we have evidence. However, the botanical analysis indicates the use of various plant species as well. An overall picture emerges of a convenient central semi-permanent camp with the river immediately at hand, and the plant and animal resources of the uplands easily accessible.

ZONE 2 (850-400 B.P.)

The assemblage from Zone 2 is distributed as shown in Figures 7-9 and 7-10, representing sites 45-OK-287 and 45-OK-288 respectively. That the cultural materials found in the southernmost areas of both sites are in situ is demonstrated by the presence of several features.

Two surfaces (Features 23 and 29 at 45-OK-288) were recognized in the field as thin deposits of slightly stained and compacted matrix. Additional concentrations of bone, lithics, and FMR occur to the north and northeast of Feature 29 but were not recognized as part of the surface. The distribution patterns of artifactual materials are similar to those within the Feature 12 complex of Zone 3 (Figures 7-8 and 7-9) for most material classes. Feature 12 lies only 10 to 30 cm below the boundary between Zones 3 and 2.

The distribution of lithic artifacts at 45-OK-287 ($\bar{x}$=3.6) is similar to that shown for 45-OK-288 ($\bar{x}$=3.8). However, the bone frequency is lower while the FMR frequency is higher. In addition 42 of the 43 river mussel shells in Zone 2 are found at 45-OK-287. As at 45-OK-288, high frequencies of material generally correspond to feature locations. The single exception is the association of FMR with bone and shell between Features 11 and 6. The materials associated with the other prehistoric features is of interest. We find most of the shell associated with Feature 11, a thin occupation surface. Major frequencies of other materials do not occur here. Feature 1, a pit, is associated only with high frequencies of FMR while Feature 12 is limited to FMR and bone. Interestingly, we find concentrations of FMR, lithics and bone associated with Feature 6, the steam producing pit. This kind of distribution suggests activities associated with a short-term camp rather than a specialized function, such as a sweat lodge.

Viewing the two sites together, it appears the locations of activities along the 120 m length of the two sites are widely separated. (We must recall, however, that portions of the intervening area at 45-OK-288 were removed by bulldozing in this zone.) 45-OK-288 shows coincidence primarily of FMR and bone. 45-OK-287 shows a central general use area surrounding Feature 6 and additional, more widely scattered areas marked by features and high frequencies of diverse material. These may represent discrete activities contemporaneous with the Feature 6 occupation or independent incidents. In any case, we find evidence for a slightly larger area of occupation than in earlier zones. The occupation at 45-OK-288 is of a more diverse nature and perhaps longer duration than at 45-OK-287. At both sites the assemblages and distributions represent short-term, transitory summer seasonal use for hunting and game processing.

ZONE 1 (400 B.P.-Historic)

The small assemblage from Zone 1 provides little interpretive information. Distributions show concentrations of FMR and bone in the northwest at the base of a small basalt erratic and FMR, lithics and bone in the southern area (Figure 7-11). The single feature from Zone 1 (Feature 14) is a rock pile containing historic material.

The northern concentration of prehistoric cultural material appears to represent a small transient occupation. The southern concentrations appear to resemble the artifact patterning in the underlying two zones rather than representing a different use of the same area. Much of the material in this zone may be displaced by the alluvial action of ephemeral streams from the western slope.

SUMMARY

Of the six analytic zones at 45-OK-287/288, Zones 3 and 5 contribute most substantially to our knowledge of the prehistory of the project area. Although both zones were occupied at least during summer and early fall, Zone 3 contains a structure and possibly related activity areas, while Zone 5 includes one major and several additional areas of activity. The Zone 5 occupation surface is a locality devoted primarily to bone processing. Mammal bone constitutes a relatively large proportion of the house floor contents, but the percentage of identifiable bone is considerably less and field records suggest a greater degree of fragmentation than in the bone processing area of Zone 5. The taxonomic composition of the two faunal assemblages is similar, but the bone is scattered more uniformly on the dwelling floor, and distributed as clusters on the processing surface of Zone 5. The material from which tools are made and their inferred uses also differ in the two major activity areas and throughout the two zones as a whole.

Given the limited sampling employed at the site and the possibility of loss due to river and downslope erosion, we cannot claim that an additional bone processing area was not an element of the Zone 3 occupation, nor that a dwelling did not once occupy a Zone 5 surface. The sample, however, suggests that the two zones are functionally distinct, the one apparently representing domestic and general subsistence activities, and the other representing specialized activities involving scattered hearths and the processing of mammal bone.

The Zone 6 assemblage is viewed with considerable suspicion because of its geological context. The cultural materials in Zone 4 appear to be a composite, representing the period from about 4400 B.P. to 1500 B.P. The Zone 2 assemblage includes some materials transported from Zone 3, but also contains several intact discrete cultural deposits. While neither Zone 1 or Zone 2 is particularly useful for spatial analysis, their combined assemblages probably represent the contents of transient camps comparable in age to that of the Late Cayuse sub-phase on the Middle Columbia (Nelson 1969). Few of the cultural materials in Zone 1 appear to be in situ; most may be the result of bioturbation and recent downslope erosion.

Our evidence suggests three different kinds of site use at 45-OK-287/288. The first, transient camps, is represented in Zone 2 by very localized, thin scatters of FMR, bone, and lithic debitage, adjacent to the erratics. The second, domestic habitation, is found in Zone 3 with its dwelling and associated activity areas. The third, a base camp, is represented by Zone 5 and the Feature 7 surface. Each of these kinds of site use appear to represent different aspects of subsistence patterns which are fundamentally the same.

We cannot generalize from this data to a Plateau-wide scheme of cultural change involving a shift to more sedentary settlement patterns as proposed by others (cf. Nelson 1969; Grabert 1968). Nor can we attribute the cause of the differences noted among the zones directly to environmental change (cf., Galm et al. 1981) or innovations in technology or subsistence practices (Nelson 1973; Rice 1974; Schalk 1983). Indeed, the causes and the changes themselves are all brought into question by data from this project. Project-wide analysis suggests the basic subsistence pattern was already established at least six thousand years ago. Variation in the area is observed as subtle shifts in intensity and function of site use rather than the appearance or disappearance of single traits. Site 45-OK-287/288 is an example of such variation while reflecting continued use of a location for similar purposes over the last 5,000 years. The close proximity to the river of diverse habitats and their resources appears to have been the maj reason for its occupation. The site history is not necessarily a model for the area; we must rely on the project-wide synthesis for this.

REFERENCES

Asch, D.L. and N.B. Asch
1977 Chenopod as cultigen: a re-evaluation of some prehistoric collections from Eastern North America. **Mid-Continental Journal of Archaeology** 2(1):3-45.

Bense, J.A.
1972 **The Cascade phase: a study in the effect of the altithermal on a cultural system.** Unpublished Ph.D. Dissertation, Department of Anthropology, Washington State University.

Callahan, E.
1979 The basics of biface knapping in the eastern fluted point tradition--a manual for flint knappers and lithic analysits. **Archaeology of Eastern North America** 7(1):1-180.

Campbell, S.K.
1984a **Archaeological investigations at nonhabitation sites, Chief Joseph Dam Project, Washington.** Office of Public Archaeology, University of Washington, Seattle.

1984b **Archaeological investigations at Sites 45-OK-2 and 45-OK-2A, Chief Joseph Dam Project, Washington.** Office of Public Archaeology, University of Washington, Seattle.

Campbell, S.K., editor
1984c **Report of burial relocation projects, Chief Joseph Dam Project, Washington.** Office of Public Archaeology, University of Washington, Seattle.

1984d **Research Design for the Chief Joseph Dam Cultural Resources Project.** Office of Public Archaeology, University of Washington, Seattle.

Chamberlain, A.B.
1892 Report on the Kootenay Indians of Southeastern British Columbia. **Eigth Report on the Northwestern Tribes of Canada.** British Association for the Advancement of Science, Edinburgh.

Chance, D.H., and J.V. Chance
1982 Kettle Falls: 1971/1974. **University of Idaho, Anthropological Research Manuscripts Series** 69.

Chance, D.H., J.V. Chance, and J.L. Fagan
1977 Kettle Falls: 1972. **University of Idaho, Anthropological Research Manuscript Series** 31.

Collier, D., A.E. Hudson, and A. Ford
1942 Archaeology of the upper Columbia region. **University of Washington, Publications in Anthropology** 9(1).

Cotton, J.S.
1904 A report on the range conditions of central Washington. v**Washington Agricultural Experiment Station, Bulletin** 62.

Cowan, I.M.
1940 Distribution and variation in the native sheep of North America. **American Midland Naturalist** 24:505-530.

Crabtree, D.E., and E.H. Swanson, Jr.
1968 Edge ground cobbles and blade-making in the Northwest. **Tebiwa** 11(2):38-42.

Dalquest, W.W.
1948 Mammals of Washington. **University of Kansas Museum of Natural History, Publications** 2.

Damon, P.E., C.W. Ferguson, A. Long, and E.I. Wallick
1974 Dendrochronological calibration of the radiocarbon time scale. **American Antiquity** 39:350-366.

Daubenmire, R.F.
1970 Steppe vegetation of Washington. **Washington State University, Washington Agricultural Experiment Station, Technical Bulletin** 62.

Dennell, R.W.
1976 The economic importance of plant resources represented on archaeological sites. **Journal of Archaeological Science** 3:229-247.

Dimbleby, G.
1967 **Plants and archaeology.** Humanities Press, New York.

Elmendorf, W.W.
1936 Lakes Salish Ethnography. Field notes, photocopy on file, British Columbia Indian Language Project, Victoria.

Erichsen-Brown, C.
1979 **Use of plants for the past 500 years.** Breezy Creeks Press, Aurora, Ontario.

Ernst, C.H., and R.W. Barbour
1972 **Turtles of the United States.** University of Kentucky Press, Lexington.

Flenniken, J.J.
1978 Further technological analyses of the lithic artifacts from the Miller site, 45-FR-5. In Second annual interim report on the archaeological investigations at the Miller Site (45-FR-5) on Strawberry Island (1977), a late prehistoric village near Burbank, Washington, by Cleveland et al. **Washington State University, Washington Archaeological Research Center, Project Reports** 72.

Flenniken, J., and J.C. Haggerty
1979 Trampling as an agency in the formation of edge damage: an experiment in lithic technology. **Northwest Anthropological Research Notes** 13(2):208-214.

Ford, R.I.
1979 Paleoethnobotany in American archaeology. In **Advances in archaeological method and theory**, edited by M.B. Schiffer, pp. 285-336. Academic Press, New York.

Frison, G.C.
1968 A functional analysis of certain chipped stone tools. **American Antiquity** 33:149-155.

Franklin, J.F., and C.T. Dyrness
1973 Natural vegetation of Oregon and Washington. **U.S. Department of Agriculture, Forest Service, General Technical Report** PNW-8.

Galm, J.R., G.D. Hartmann, R.A. Masten, and G.O. Stephenson
1981 A cultural resources overview of Bonneville Power Adminstration's Mid-Columbia Project, Central Washington. **Bonneville Cultural Resources Group, Eastern Washington University Reports in Archaeology and History** 100-16.

Gould, R.A. and J. Quilter
1972 Flat adzes: a class of flaked stone tools from southwestern Australia. **American Museum of Natural History Novitiates** 2502:1-14.

Gould, R.A., D.A. Koster, and A.H.L. Sontz
1971 The lithic assemblages of the Western Desert Aborigines. **American Antiquity** 36:149-169.

Grabert, G.F.

1968 North-central Washington prehistory. **University of Washington, Department of Anthropology, Reports in Archaeology** 1.

Gustafson, C.E.

1972 **Vertebrate faunal remains from the Marmes rockshelter and related archaeolgical sites in the Columbia Basin.** Ph.D. dissertation, Washington State University. University Microfilms, Ann Arbor.

Hayden, B. and J. Kamminga

1973 Gould, Koster and Sontz on microwear: a critical review. **Newsletter of Lithic Technology** 2(1-2):3-8.

Heiser, C.B., Jr.

1953 The archaeological record of the cultivated sunflower, with remarks concerning the origin of Indian agriculture in eastern North America. Ms. in hands of author.

Hibbert, D.M.

1984 Quaternary geology and the history of the landscape along the Columbia between Chief Joseph and Grand Coulee Dams. In **Summary of results, Chief Joseph Dam Cultural Resources Project**, edited by M.E.W Jaehnig and S.K. Campbell. Office of Public Archaeology, University of Washington, Seattle.

Hitchcock, C.L., and A.Cronquist

1961 **Vascular Plants of the Pacific Northwest,** Vol. 3: Saxifragaceae ro Ericaceae. Washington Press, Seattle.

1964 **Vascular Plants of the Pacific Northwest,** Vol. 2: Salicaceae to Saxifragaceae. Washington Press, Seattle.

Holmes, W.H.

1919 Handbook of aboriginal American antiquities, part 1. **Bureau of American Ethnology, Bulletin** 60(1).

Ingles, L.G.

1965 **Mammals of the Pacific states.** Stanford University Press, Stanford.

Jaehnig, M.E.W.

1983a Archaeological investigations at Site 45-OK-258, Chief Joseph Dam Reservoir, Washington. Ms. on file, U.S. Army Corps of Engineers, Seattle District.

1983b **Chief Joseph Dam Cultural Resources Project: preliminary report of field investigations, 1978-1980.** Office of Public Archaeology, University of Washington, Seattle.

1984a **Archaeological Investigations at Site 45-DO-273, Chief Joseph Dam Project.** Office of Public Archaeology, University of Washington, Seattle.

1984b **Archaeological Investigations at Site 45-OK-18, Chief Joseph Dam Project, Washington.** Office of Public Archaeology University of Washington, Seattle.

Jaehnig, M.E.W. and S.K. Campbell (editors)
1984 **Summary of results, Chief Joseph Dam Cultural Resources Project.** Office of Public Archaeology, University of Washington, Seattle.

Jermann, J.V., W.S. Dancey, R.C. Dunnell, and B. Thomas
1978 Chief Joseph Dam cultural resources management plan. Ms. on file, U.S. Army Corps of Engineers, Seattle District.

Lawrence, B.
1968 Antiquity of large dogs in North America. **Tebiwa** 11(2):43-49.

Leaf, G.R.
1979 Variations in the form of bipolar cores. **Plains Anthroplogist** *23(83):39-50.*

Leeds, L.L., W.S. Dancey, J.V. Jermann and R.L. Lyman
1981 Archaeologicaly testing at 79 prehistoric habitation sites: subsistence strategy and site distribution. Ms. on file, University of Washington, Office of Public Archaeology.

Leonhardy, F.C., and D.G. Rice
1970 A proposed culture typology for the lower Snake River region, southeastern Washington. **Northwest Anthropological Research Notes** 4(1):1-29.

Lewis, W.H., and M.P.F. Elvin-Lewis
1977 **Medical botany.** John Wiley, New York.

Lohse, E.S.
1984a **Archaeological Investigations at site 45-DO-204, Chief Joseph Dam Reservoir, Washington.** Office of Public Archaeology, University of Washington, Seattle.

1984b **Archaeological Investigations at Site 45-DO-211, Chief Joseph Dam Reservoir, Washington.** Office of Public Archaeology, University of Washington, Seattle.

1984c **Archaeological investigations at Site 45-DO-242/243, Chief Joseph Dam Reservoir, Washington.** Office of Public Archaeology, University of Washington, Seattle.

1984d **Archaeological investigations at Site 45-DO-282, Chief Joseph Dam Reservoir, Washington.** Office of Public Archaeology, University of Washington, Seattle.

1984e **Archaeological investigations at Site 45-DO-326, Chief Joseph Dam Reservoir, Washington.** Office of Public Archaeology, University of Washington, Seattle.

1984f **Archaeological investigations at Site 45-OK-11, Chief Joseph Dam Reservoir, Washington.** Office of Public Archaeology, University of Washington, Seattle.

1984g Rufus Woods Lake Projectile Point Chronology. In **Summary of results, Chief Joseph Dam Cultural Resources Project**, edited by M.E.W. Jaehnig and S.K. Campbell. Office of Public Archaeology, University of Washington, Seattle.

Lyman, R.L.

1976 Exploratory archaeological research along Rufus Woods Lake, upper Columbia region, north central Washington, 1975. **Washington State University, Washington Archaeological Research Center, Project Reports** 29.

MacDonald, G.F.

1971 A review of research on Paleo-Indian in eastern North America, 1960-1970. **Arctic Anthropology** 8(2):32-41.

Manville, R.H.

1980 The origin and relationship of American wild sheep. In **The desert bighorn: its life history, ecology and management**, edited by G. Monson and L. Sumner, pp. 1-6. University of Arizona Press, Tucson.

Martin, A.C.

1954 Identifying **Polygonum** seeds. **Journal of Wildlife Management** 18:520-541.

Miss, C.J.

1984a **Archaeological investigations at Site 45-DO-214, Chief Joseph Dam Reservoir, Washington.** Office of Public Archaeology, University of Washington, Seattle.

1984b **Archaeological Investigations at Site 45-DO-285, Chief Joseph Dam Reservoir, Washington.** Office of Public Archaeology, University of Washington, Seattle.

1984c **Archaeological Investigations at Site 45-OK-250/4, Chief Joseph Dam Reservoir, Washington.** Office of Public Archaeology, University of Washington, Seattle.

1984d **Archaeological Investigations at Site 45-OK-287/288, Chief Joseph Dam Reservoir, Washington.** Office of Public Archaeology, University of Washington, Seattle.

Montgomery, F.M.
1977 **Seeds and fruits of plants of eastern Canada and northeastern United States.** University of Toronto Press, Toronto.

Muto, G.R.
1971 **A technological analysis of the early stages in the manufacture of lithic artifacts.** Unpublished M.A. thesis, Department of Anthropology, Idaho State University.

Nelson, C.M.
1969 *The Sunset Creek site (45-KT-28) and its place in Plateau prehistory.* **Washington State University, Laboratory of Anthropology, Reports of Investigations** 47.

1973 Prehistoric culture change in the Intermontane Plateau of western North America. In **The explanation of culture change,** edited by C. Renfrew, pp. 371-390. Duckworth, London.

Olsen, S.J.
1960 Post-cranial skeletal characters of Bison and Bos. **Peabody Museum of American Archaeology and Ethnology, Papers** 35(4).

Osborne, H.D.
1953 Archaeological occurrence of pronghorn antelope, bison and horse in the Columbia Plateau. **Science Monthly** 77:260-269.

Panshin, A., and C. Dezeeuw
1970 **Textbook of wood technology** (third ed.) (Vol. 1). McGraw-Hill, New York.

Piper, C.
1906 Flora of the state of Washington. In **Contributions to the U.S. National Herbarium** (Vol. 11). U.S. Government Printing Office, Washington, D.C.

Post, R.H.

1938 The subsistence quest. In The Sinkaietk or Southern Okanogan of Washington, edited by L. Spier, pp. 9-34. **George Banta, General Series in Anthropology** 6.

Post, R.H. and Commons, R.S.

1938 Material culture. In The Sinkaietk or Southern Okanogan of Washington, edited by L. Spier, pp. 35-70. **George Banta, General Series in Anthropology** 6.

Ray, V.F.

1932 The Sanpoil and Nespelem: Salishan peoples of northeast Washington. **University of Washington, Publications in Anthropology** 5.

1936 Native villages and groupings of the Columbia Basin. **Pacific Northwest Quarterly** 27:99-152.

Renfrew, J.M.

1973 **Paleoethnobotany.** Columbia University Press, New York.

Rice, D.G.

1974 **A commentary on the derivation of Plateau cultura.** Report Mid-Columbia Archaeological Society.

Robbins, W.W., J.P. Harrington, and B. Preire-Marreco

1916 Ethnobotany of the Tewa Indians. **Smithsonian Institution, Bureau of American Ethnology, Bulletin** 55.

Robinette, W.L., D.A. Jones, G. Rogers, and J.S. Gashwiler

1957 Notes on tooth development and wear for Rocky Mountain mule deer. **Journal of Wildlife Management** 21(2):134-153.

Sanger, D.

1969 Cultural traditions in the interior of British columbia. **Syesis** 2:189-200.

Schalk, R.I (editor)

1983 Cultural resource investigations for the Lyons Ferry Fish Hatchery Project, Near Lyons Ferry, Washington. **Washington State University, Laboratory of Archaeology and History, Project Report** 8.

Schroedl, Gerald

1973 The archaeological occurrence of bison in the southern Plateau. **Washington State University, Laboratory of Anthropology, Reports of Investigations** 51.

Severinghause, C.W.
1949 Tooth development and wear as criteria of age in white-tailed deer. **Journal of Wildlife Management** 13:195-216.

Sharrock, F.W.
1966 Prehistoric occupation patterns in southwest Wyoming and cultural relationships with the Great Basin and Plains cultural areas. **University of Utah, Anthropological Papers** 77.

Spinden, H.
1908 The Nez Perce Indians. **American Anthropological Association, Memoirs** 2:167-274.

Stebbins, R.C.
1966 **A field guide to western reptiles and amphibians.** Houghton Mifflin, Boston.

Stenholm, N.A.
1984 The botanical assemblage of the Chief Joseph Dam Project. In, **Summary of Results, Chief Joseph Dam Cultural Resources Project,** edited by M.E.W. Jaehnig and S.K. Campbell. Office of Public Archaeology, University of Washington, Seattle.

Teit, J.
1930 The Salishan tribes of the western Plateau. **Bureau of American Ethnology, Annual Report** 45:25-396.

Thomas, B., L.L. Larson, and M.G. Hawkes
1984 Archaeological investigations at 30 historic sites, Chief Joseph Dam Reservoir, Washington. Office of Public Archaeology, University of Washington, Seattle.

Turner, N.J.
1978 Food plants of British Columbia Indians, Part II--interior peoples **British Columbia Provincial Museum, Handbook** 36.

1979 Plants in British Columbia Indian technology. **British Columbia Provincial Museum, Handbook** 38.

Turner, N.J., R. Bouchard, and D.I.D. Kennedy
1980 Ethnobotany of the Okanogan-Colville Indians of British Columbia and Washington. **British Columbia Provincial Museum, Occasional Papers** 21.

U.S.D.A.
1974 Seeds of woody plants in the United States. **U.S. Department of Agriculture, Forest Service, Handbook** 450.

Vestal, P.A.
1952 Ethnobotany of the Raman Navaho. **Harvard University, Peabody Museum of American Archaeology and Ethnology, Papers** XL(4).

Wilmsen, E.N.
1970 Lithic analysis and cultural inference: a paleo-Indian case. **University of Arizona, Anthropological Papers** 16.

1974 **Lindenmeier: a Pleistocene Hunting Society.** Harper and Row, New York.

Womack, B.R.
1977 An archaeological investigation and technological analysis of the Stockhoff basalt quarry, northeastern Oregon. Unpublished M.A. thesis, Department of Anthropology, Washington State University.

Wylie, H.G.
1975 Tool microwear and functional types from Hogup Cave, Utah. **Tebiwa** 17:1-31.

Yarnell, R.A.
1978 Domestication of sunflower and sumpweed in eastern North America. In The nature and status of ethnobotany, edited by R.I. Ford, pp. 289-299. **University of Michigan, Museum of Anthropology, Anthropological Papers** 67.

APPENDIX A:

RADIOCARBON DATE SAMPLES, 45-OK-287/288

Table A-1. Radiocarbon date samples, 45-OK-288.

Lab Sample #[1]	Zone	DU	Stratum	Unit	Level	Feature #	Material/gms	Radiocarbon Age (Years B.P.) T1/2=5730	Dendrocorrected[2] Age (Years B.P.)
TX-3130	3	II	600	Test Pit #2	80-90	-	Charcoal/9.9	960±70	923±77
TX-6800	5	II	600	2N4W	191-200 cm	7	Charcoal/6	4070±110	4691±150
Feature 7 = Occupation Surface A Sample = Pine (Pinus spp.) and other conifer cone fragments.									
TX-4026	2	II	500	22S7W	40	29	Charcoal/10.7	750±60	756±67
Feature 29 = occupation surface Sample = Pine (Pinus spp.)									
TX-4027	5	II	600	1N4W	190	-	Charcoal/7	3990±60	4525±126
Sample = Ponderosa pine (Pinus ponderosa)									
TX-4028	2	II	500	25S0W	60	27	Charcoal/10.8	440±50	473±43
Feature 27 = Pit 2A within Feature 23, occupation surface 10.8 g removed from Flot for radiocarbon sample Sample = Cedar (Thuja plicata), sage (Artemisia tridentata), bitterbrush (Purshia tridentata), rabbitbrush (Chrysothamnus nauseosus), hardwood bark, serviceberry seeds (Amelanchier alnifolia), sumac seed (Rhus sp.), unknown seed fragments, and grass.									
TX-4029	4	II	700	16S5W	160	59	Charcoal/7.1	1580±90	1543±94
Feature 59 = occupation surface Sample = Pine (Pinus spp.)									
TX-4030	3	II	600	20S6W	100	28	Charcoal/30	1060±60	1048±69
Feature 28 = depression beneath Feature 12, structure floor; interpreted as dump area within structure. Sample = Bolewood, Western red cedar (Thuja plicata)									
TX-4031	3	II	600	20S9W	110	28	Charcoal/30.6	1140±40	1122±65
Feature 28 = depression beneath Feature 12; structure floor; interpreted as dump area within structure. Sample = Worn and manufactured plank with uncarbonized portions, Western red cedar (Thuja plicata)									

1 TX samples were dated by University of Texas-Austin, Radiocarbon Laboratory.
2 Dendrocorrected after Damon et al. (1974).

Table A-2. Radiocarbon date samples, 45-OK-287.

Lab Sample #[1]	Zone[2]	DU	Stratum	Unit	Level	Feature #	Material/gms	Radiocarbon Age (Years .B.P.) T1/2=5730	Dendrocorrected[3] Age (Years .B.P.)
TX-4035	2(1)	II	150	19S0W	30	1	Charcoal/10	770±60	774±67
	Feature 1 = firepit								
TX-4036	3(2)	II	210/250	46S3W	50	2	Charcoal/10	1080±40	1064±64
	Feature 2 = geological								
TX-4037	3(2)	II	200	32S0W	70	10	Charcoal/7.3	1420±110	1399±112
	Sample = Mock orange (Philadelphus Lewisii)								
TX-4038	2(1)	II	150	33S1E	20	6	Charcoal/11.4	610±40	628±50
	Feature 6 = firepit.								

1 TX samples were dated by University of Texas-Austin, Radiocarbon Laboratory.
2 Final zone designations, original 45-OK-287 zone designations shown in ( ).
3 Dendrocorrected after Damon et al. (1974).

APPENDIX B:

ARTIFACT ASSEMBLAGE, 45-OK-287/288

Table B-1. Technological dimensions.

DIMENSION I: OBJECT TYPE

- Conchoidal flake
- Chunk
- Core
- Linear flake
- Unmodified
- Tabular flake
- Formed object
- Weathered
- Indeterminate

DIMENSION II: RAW MATERIAL*

- Jasper
- Chalcedony
- Petrified Wood
- Obsidian
- Opal
- Quartzite
- Fine-grained quartzite
- Basalt
- Fine-grained basalt
- Silicized mudstone
- Argillite
- Granite
- Siltstone/mudstone
- Schist
- Graphite/molybdenite
- Bone/antler
- Ochre
- Shell
- Dentalium

DIMENSION III: CONDITION

- Complete
- Proximal fragment
- Proximal flake
- Less than 1/4 inch
- Broken
- Indeterminate

DIMENSION IV: DORSAL TOPOGRAPHY

- None
- Partial cortex
- Complete cortex
- Indeterminate/not applicable

DIMENSION V: TREATMENT

- Definitely burned
- Dehydrated (heat treatment)

ATTRIBUTE I: WEIGHT

Recorded weight in grams

ATTRIBUTE II: LENGTH

Flakes: length is measured between the point of impact and the distal end along the bulbar axis

Other: length is taken as the longest dimension

ATTRIBUTE III: WIDTH

Flakes: width is measured at the widest point perpendicular to the *bulbar axis*

Other: width is taken as the maximum measurement along an axis perpendicular to the axis of length

ATTRIBUTE IV: THICKNESS

Flakes: thickness is taken at the thickest point on the object, excluding the bulb of percussion and the striking platform

Other: thickness is taken as the measurement perpendicular to the width measurement along an axis perpendicular to the axis of length

* Only those raw materials recorded from the site are listed here; a complete list is available in the Project's Research Design (Campbell 1984d).

Table B-2. Size attributes of cryptocrystalline conchoidal flakes, 45-OK-287/288.

Attribute	Statistic	Zone						Total[1]
		1	2	3	4	5	6	
Length (mm)	$\bar{x}$	13.8	10.6	9.9	10.5	9.7	9.6	9.9
	s.d.	7.7	5.7	4.7	5.5	4.9	4.3	5.0
	N	13	146	639	571	1,107	430	2,937
Width (mm)	$\bar{x}$	10.1	9.5	9.2	9.8	8.9	8.8	9.2
	s.d.	5.8	4.8	4.8	6.2	4.6	3.6	4.9
	N	14	128	570	523	1,059	413	2,737
Thickness (mm)	$\bar{x}$	2.1	1.9	1.8	1.7	1.5	1.5	1.6
	s.d.	1.8	1.2	1.3	1.3	1.0	1.2	1.2
	N	23	258	993	951	1,729	726	4,730
Weight (gm)	$\bar{x}$	4.6	3.2	2.8	3.5	3.4	2.6	3.1
	s.d.	11.8	7.6	7.6	11.1	35.9	12.5	22.7
	N	29	330	1,195	1,042	1,824	779	5,249
Length: Width Ratio		1.37	1.1	1.08	1.07	1.09	1.09	1.08

[1] Includes unassigned flakes.

Table B-3. Size attributes of argillite conchoidal flakes, 45-OK-287/288.

Attribute	Statistic	Zone					Total[1]
		2	3	4	5	6	
Length (mm)	$\bar{x}$	-	21.2	12.4	13.0	14.3	14.1
	s.d.	-	13.1	5.4	7.3	8.5	8.4
	N	-	13	25	107	119	270
Width (mm)	$\bar{x}$	-	22.1	12.7	13.5	15.1	14.6
	s.d.	-	19.7	6.6	7.9	8.2	8.7
	N	-	9	24	106	134	276
Thickness (mm)	$\bar{x}$	2.3	4.2	1.7	2.5	2.8	2.6
	s.d.	1.6	5.2	0.9	1.8	2.3	2.2
	N	2	18	50	170	238	484
Weight (gm)	$\bar{x}$	2.0	52.2	3.2	8.2	10.4	10.5
	s.d.	1.4	110.4	5.0	18.2	35.6	35.3
	N	2	18	51	180	259	516
Length:Width Ratio		-	0.96	0.98	0.96	0.95	0.97

[1] Includes unassigned flakes.

Table B-4. Size attributes of quartzite conchoidal flakes, 45-OK-287/288.

Attribute	Statistic	Zone						Total[1]
		1	2	3	4	5	6	
Length (mm)	$\bar{x}$	-	34.7	24.8	20.8	21.6	25.2	23.7
	s.d.	-	23.5	18.6	17.3	15.6	17.3	17.1
	N	-	3	46	34	98	159	340
Width (mm)	$\bar{x}$	-	23.3	27.6	19.6	26.3	31.7	28.2
	s.d.	-	14.2	22.0	8.8	17.9	20.0	19.0
	N	-	3	37	33	85	140	298
Thickness (mm)	$\bar{x}$	2.6	11.8	7.1	4.2	5.3	6.7	6.1
	s.d.	-	11.0	7.9	3.8	5.3	5.9	6.0
	N	1	6	56	46	115	186	410
Weight (gm)	$\bar{x}$	3.0	322.4	248.1	46.9	90.4	150.5	136.9
	s.d.	1.4	639.6	823.0	154.5	272.9	390.7	435.2
	N	2	7	59	53	122	211	454
Length:Width Ratio		-	1.49	0.89	1.06	0.82	0.79	0.44

[1] Includes unassigned flakes.

Table B-5. Size attributes of fine-grained quartzite conchoidal flakes, 45-OK-287/288.

Attribute	Statistic	Zone						Total
		1	2	3	4	5	6	
Length (mm)	x̄	-	5.0	20.5	22.5	16.9	21.0	19.5
	s.d.	-	-	18.2	16.7	10.9	13.8	13.6
	N	-	1	10	8	27	36	82
Width (mm)	x̄	-	12.0	19.4	25.7	21.8	22.5	22.0
	s.d.	-	-	11.2	16.4	13.0	13.4	13.0
	N	-	1	9	7	28	31	76
Thickness (mm)	x̄	-	1.0	4.1	4.6	4.0	4.7	4.3
	s.d.	-	-	3.4	3.8	3.2	3.5	3.4
	N	-	1	12	13	40	45	111
Weight (gm)	x̄	2.0	1.0	37.0	54.5	48.3	50.2	47.7
	s.d.	-	-	78.1	100.5	140.3	96.5	110.9
	N	1	1	15	16	43	47	123
Length:Width Ratio		-	-	1.06	0.88	0.78	0.93	0.89

Table B-6. Size attributes of basalt conchoidal flakes, 45-OK-287/288.

Attribute	Statistic	Zone						Total
		1	2	3	4	5	6	
Length (mm)	x̄	-	58.0	19.4	23.9	22.5	27.9	24.4
	s.d.	-	-	14.0	11.5	25.6	16.9	20.7
	N	-	1	7	21	53	34	116
Width (mm)	x̄	-	20.0	22.3	25.2	21.5	33.9	26.0
	s.d.	-	-	9.9	14.3	20.6	22.2	20.4
	N	-	1	6	14	49	33	103
Thickness (mm)	x̄	-	15.8	4.1	5.4	4.3	7.4	5.6
	s.d.	-	19.4	2.9	3.0	5.2	6.4	5.9
	N	-	3	15	26	71	48	163
Weight (gm)	x̄	-	2,812.0	35.1	55.4	147.4	145.5	167.5
	s.d.	-	4,810.0	51.3	89.5	973.5	309.8	898.7
	N	-	3	15	27	80	60	185
Length:Width Ratio		-	-	0.87	0.95	1.05	0.82	0.94

Table B-7. Kinds of debitage by zone, 45-OK-287/288.

Material and Kind	Zone						Total
	1	2	3	4	5	6	
Cryptocrystalline Silicates							
Conchoidal flakes	31	385	1,676	1,148	1,966	871	6,130
Tabular flakes	–	–	–	–	3	2	5
Chunks	2	22	103	85	201	66	491
Indeterminate	–	–	–	1	4	1	6
Weathered	1	2	7	9	6	3	28
Argillite							
Conchoidal flakes	–	2	18	51	180	259	510
Tabular flakes	–	–	–	1	8	2	11
Chunks	–	–	8	8	19	27	62
Indeterminate	–	–	–	–	1	2	3
Weathered	–	–	1	–	1	2	4
Quartzite							
Conchoidal flakes	3	9	62	56	123	206	459
Tabular flakes	5	29	167	114	119	126	560
Chunks	–	1	15	15	24	28	84
Indeterminate	–	–	–	–	1	2	3
Weathered	–	–	1	–	–	–	1
Fine-Grained Quartzite							
Conchoidal flakes	1	2	17	18	45	50	133
Tabular flakes	–	–	2	4	21	6	33
Chunks	–	–	2	9	39	27	77
Basalt							
Conchoidal flakes	–	2	17	26	80	57	182
Tabular flakes	–	–	–	–	3	3	6
Chunks	–	–	–	3	18	14	35
Indetermine	–	–	–	1	–	2	3
Obsidian							
Conchoidal flakes	–	1	4	3	9	6	23
Chunk	–	–	–	–	–	1	1
Granitic							
Conchoidal flakes	–	–	–	1	2	–	3
Tabular flakes	–	–	–	1	3	6	10
Chunk	–	–	–	–	4	2	6
Indeterminate	–	–	–	–	–	1	1
Weathered	–	–	–	–	–	2	2
Other Lithic							
Conchoidal flakes	–	–	3	5	11	18	27
Tabular flakes	–	–	–	–	2	2	4
Chunk	–	–	11	3	8	6	28
Indeterminate	–	5	–	–	1	–	6
Weathered	–	–	–	1	2	1	4
Indeterminate Lithic							
Conchoidal flakes	–	–	1	6	6	19	32
Tabular flakes	–	–	–	–	4	4	8
Chunk	–	–	2	4	7	10	23
Indeterminate	–	–	3	5	5	6	19
Weathered	–	–	2	3	3	2	10

Table B-8. Count of primary and secondary debitage by zone, 45-OK-287/288.

Material and Type	Zone						Total
	1	2	3	4	5	6	
Cryptocrystalline Silicates							
Primary	4	37	174	114	221	78	628
Secondary	25	297	1,049	951	1,740	742	4,804
Indeterminate	-	-	2	1	4	3	10
Argillite							
Primary	-	-	7	10	33	54	104
Secondary	-	1	17	49	172	231	470
Indeterminate	-	-	1	-	1	-	2
Quartzite							
Primary	2	11	88	78	125	224	528
Secondary	5	25	147	103	136	135	551
Fine-Grained Quartzite							
Primary	-	-	11	19	68	57	155
Secondary	1	1	7	10	33	23	75
Indeterminate	-	-	1	-	1	-	2
Basalt							
Primary	-	-	4	15	43	35	97
Secondary	-	2	11	14	54	[illegible]	119
Indeterminate	-	-	-	-	3	-	3
Obsidian							
Primary	-	-	-	-	-	1	1
Secondary	-	1	4	3	7	6	21
Granitic							
Primary	-	-	-	-	8	4	12
Secondary	-	-	-	2	1	4	7
Other Lithic							
Primary	1	1	10	4	11	9	36
Secondary	-	-	2	2	1	3	8
Indeterminate	-	-	-	1	3	2	6
Indeterminate							
Primary	-	-	2	8	9	20	39
Secondary	-	-	-	2	7	10	19
Indeterminate	-	-	-	-	1	3	4

Table B-9. Frequency of <1/4 in flakes by material type and zone, 45-OK-287/288.

Material Type	Zone						Total
	1	2	3	4	5	6	
Jasper	-	29	163	54	85	33	364
Chalcedony	4	44	376	86	58	28	596
Petrified wood	-	-	-	-	1	-	1
Opal	-	-	15	27	61	55	158
Argillite	-	-	-	2	7	5	14
Quartzite	1	3	9	4	5	1	23
Fine-grained quartzite	-	1	2	2	3	3	11
Basalt	-	-	1	-	-	-	1
Fine-grained basalt	-	-	1	-	1	1	3
Obsidian	-	-	-	-	2	-	2
Siliceous mudstone	-	-	1	-	-	-	1
Granitic	1	3	4	6	15	25	54
Sandstone	-	-	-	-	1	-	1
Silt/mudstone	-	5	-	-	-	2	7
Schist	-	-	-	-	3	1	4
Very fine-grained sandstone	-	-	1	1	3	1	6
Indeterminate	-	-	1	-	-	-	1
TOTAL	6	85	574	182	245	155	1,247

Table B-10. Count of heat treatment by zone, 45-OK-287/288.

Treatment	Zone						Total[1]
	1	2	3	4	5	6	
None	50	422	1,716	1,533	2,880	1,844	8,445
Col %	100.0	94.8	95.4	94.9	96.6	97.7	96.2
Burned	-	23	81	80	95	40	319
Col %		5.2	4.5	5.0	3.2	2.1	3.6
Dehydrated	-	-	1	3	7	4	15
Col %			0.1	0.2	0.2	0.2	0.2
TOTAL	50	445	1,798	1,616	2,982	1,888	8,856

[1] <1/4 in flakes and non-lithics deleted.

Table B-11. Count of condition by zone, 45-OK-287/288.

Condition	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Total[1]
Complete	14	107	531	561	1,239	710	3,162
Col %	28.0	24.0	29.5	34.7	41.5	37.6	36.1
Proximal fragment	13	111	405	312	454	313	1,608
Col %	26.0	24.9	22.5	19.3	15.2	16.6	18.2
Proximal flake	5	61	246	164	340	187	1,003
Col %	10.0	13.7	13.7	10.1	11.4	9.9	11.5
Broken	15	162	576	520	810	564	2,647
Col %	30.0	36.4	32.0	32.2	27.2	29.9	30.1
Indeterminate	3	4	40	59	139	114	359
Col %	6.0	0.9	2.2	3.7	4.7	6.0	4.1
TOTAL	50	445	1,743	1,616	2,982	1,888	8,779

[1] <1/4 in flakes and non-lithics deleted.

Table B-12. Functional dimensions.

DIMENSION I: UTILIZATION/MODIFICATION

- None
- Wear only
- Manufacture only
- Manufacture and wear
- Modified/indeterminate
- Indeterminate

DIMENSION II: TYPE OF MANUFACTURE

- None
- Chipping
- Pecking
- Grinding
- Chipping and pecking
- Chipping and grinding
- Pecking and grinding
- Chipping, pecking, grinding
- Indeterminate/not applicable

DIMENSION III: MANUFACTURE DISPOSITION

- None
- Partial
- Total
- Indeterminate/not applicable

DIMENSION IV: WEAR CONDITION

- None
- Complete
- Fragment

DIMENSION V: WEAR/MANUFACTURE RELATIONSHIP

- None
- Independent
- Overlapping - total
- Overlapping - partial
- Independent - opposite
- Indeterminate/not applicable

DIMENSION VI: KIND OF WEAR

- Abrasion/grinding
- Smoothing
- Crushing/pecking
- Polishing

DIMENSION VI: Continued

- Feathered chipping
- Feathered chipping/abrasion
- Feathered chipping/smoothing
- Feathered chipping/crushing
- Feathered chipping/polishing
- Hinged chipping
- Hinged chipping/abrasion
- Hinged chipping/smoothing
- Hinged chipping/crushing
- Hinged chipping/polishing
- None

DIMENSION VII: LOCATION OF WEAR

- Edge only
- Unifacial edge
- Bifacial edge
- Point only
- Point and unifacial edge
- Point and bifacial edge
- Point and any combination
- Surface
- Terminal surface
- None

DIMENSION VIII: SHAPE OF WORN AREA

- Not applicable
- Convex
- Concave
- Straight
- Point
- Notch
- Slightly convex
- Slightly concave
- Irregular

DIMENSION IX: ORIENTATION OF WEAR

- Not applicable
- Parallel
- Oblique
- Perpendicular
- Diffuse
- Indeterminate

DIMENSION X: OBJECT EDGE ANGLE

- Actual edge angle

Table B-13. Manufacture disposition by zone, 45-OK-287/288.

Manufacture Disposition	Zone 1	2	3	4	5	6	Total
None	6	34	129	117	157	85	528
Col %	54.5	50.7	52.0	55.2	55.7	44.7	52.3
Partial	4	23	93	80	106	96	402
Col %	36.4	34.3	37.5	37.7	37.6	50.5	39.8
Total	1	5	23	11	9	1	50
Col %	9.1	7.5	9.3	5.2	3.2	0.5	4.9
Indeterminate	-	5	3	4	10	8	30
Col %		7.5	1.2	1.9	3.5	4.2	2.9
TOTAL	11	67	248	212	282	190	1,010

Table B-14. Utilization/modification by zone, 45-OK-287/288.

Utilization/ Modification	Zone 1	2	3	4	5	6	Total
None	3	9	65	52	75	33	237
Col %	27.3	13.4	26.2	24.5	26.6	17.4	23.7
Wear only	3	25	64	65	82	52	291
Col %	27.3	37.3	25.8	30.7	29.1	27.4	28.6
Manufacture only	4	14	70	57	56	57	258
Col %	36.4	20.9	28.2	26.9	19.9	30.0	25.7
Wear and Manufacture	1	14	45	34	59	40	193
Col %	9.1	20.9	18.1	16.0	20.9	21.1	19.0
Modification indeterminate	-	5	4	4	9	8	30
Col %		7.5	1.6	1.9	3.2	4.2	2.9
Indeterminate	-	-	-	-	1	-	1
Col %					0.4		0.1
TOTAL	11	67	248	212	282	190	1,010

Table B-15. Wear/manufacture relationship by zone, 45-OK-287/288.

Utilization/ Modification	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Total
None	4	39	82	105	126	74	430
Col %	80.0	61.9	54.7	64.4	51.6	54.4	56.5
Independent	-	-	6	1	11	9	27
Col %			4.0	0.6	4.5	6.6	3.5
Overlap-total	1	24	60	49	95	45	274
Col %	20.0	38.1	40.0	30.1	38.9	33.1	36.0
Overlap-partial	-	-	2	1	3	3	9
Col %			1.3	0.6	1.2	2.2	1.2
Independent/ Opposite	-	-	-	7	7	3	17
Col %				4.3	2.9	2.2	2.2
Indeterminate	-	-	-	-	2	2	4
Col %					0.8	1.5	0.5
TOTAL	5	63	150	163	224	136	761

Examination of the wear types recorded for 45-OK-287/288 indicated that the divisions of the dimensions were unneccessarily fine. To facilitate analysis, certain categories were combined. The following list shows which categories were combined and Tables B-16 through B-21 show the distribution of the original categories by zone and cross-correlated with each other.

1. Kind of wear

   Smoothing: The following were included in the smoothing category on the premise that they result from similar sorts of activities. In the case of the feathered and hinged chipping, smoothing is the final result of use.
   - a. Abrasion/grinding
   - b. Feathered chipping and smoothing
   - c. Hinged chipping and smoothing

2. Location of wear

   Point:
   - a. Point only
   - b. Point, unifacial
   - c. Point and 2 edges

   Surface:
   - a. Surface
   - b. Terminal surface

3. Shape of worn area

   Convex:
   - a. Convex
   - b. Mildly convex

   Concave:
   - a. Concave
   - b. Mildly concave

Table B-16. Kind of wear by zone, 45-OK-287/288.

Kind of Wear	Zone						Total
	1	2	3	4	5	6	
Abrasion/Grinding	-	-	-	1	4	-	5
Col %				0.6	1.6		0.7
Smoothing	1	14	30	17	23	20	105
Col %	20.0	22.2	20.0	10.4	9.4	14.7	13.8
Crushing/Packing	1	11	9	14	32	54	121
Col %	20.0	17.5	6.0	8.6	13.1	39.7	15.9
Feathered chipping	3	32	77	98	125	40	375
Col %	60.0	50.8	51.3	60.1	51.2	29.4	49.3
Feathered chipping/ Smoothing	-	2	11	11	10	9	43
Col %		3.2	7.3	6.7	4.1	6.6	5.7
Hinged chipping	-	3	21	15	42	4	85
Col %		4.8	14.0	9.2	17.2	2.9	11.2
Hinged chipping/ Smoothing	-	1	2	7	8	9	27
Col %		1.6	1.3	4.3	3.3	6.6	3.5
TOTAL	5	63	150	163	244	136	761

Table B-17. Location of wear by zone, 45-OK-287/288.

Location of Wear	Zone						Total
	1	2	3	4	5	6	
Edge only	-	13	21	17	22	26	99
Col %	0.0	20.6	14.0	10.4	9.0	19.1	13.0
Unifacial edge	3	32	101	116	177	48	477
Col %	60.0	50.8	67.3	71.2	72.5	35.3	62.7
Bifacial edge	-	7	20	15	12	19	73
Col %		11.1	13.3	9.2	4.9	14.0	9.6
Point only	1	-	-	3	2	1	7
Col %	20.0			1.8	0.8	0.7	0.9
Point and unifacial edge	-	-	-	-	1	1	2
Col %					0.4	0.7	0.3
Point and two edges	-	-	-	-	2	2	4
Col %					0.8	1.5	0.5
Surface	-	-	1	1	3	3	8
Col %			0.7	0.6	1.2	2.2	1.1
Terminal surface	1	11	7	11	25	36	91
Col %	20.0	17.5	4.7	6.7	10.2	26.5	12.0
TOTAL	5	63	150	163	244	136	761

Table B-18. Kind of wear by location of wear, 45-OK-287/288.

Kind of Wear	Location of Wear								Total
	Edge only	Unifacial edge	Bifacial edge	Point only	Point and Unifacial edge	Point and two edges	Surface	Terminal surface	
Abrasion/Grinding	–	1	3	–	–	–	1	–	5
Smoothing	77	9	12	5	–	1	1	–	105
Crushing/Pecking	22	–	2	–	–	–	6	91	121
Feathered chipping	–	337	35	1	1	1	–	–	375
Feathered chipping/ Smoothing	–	29	12	–	1	1	–	–	43
Hinged chipping	–	81	3	–	–	1	–	–	85
Hinged chipping/ smoothing	–	20	6	1	–	–	–	–	27
TOTAL	99	477	73	7	2	4	8	91	781

Table B-19. Shape of worn area by zone, 45-OK-287/288.

Shape of Worn Area	Zone						Total
	1	2	3	4	5	6	
Convex	1	17	56	41	83	53	251
Col %	20.0	27.0	37.3	25.2	34.0	39.0	33.0
Concave	-	4	8	13	24	11	60
Col %	0.0	6.3	5.3	8.0	9.8	8.1	7.9
Straight	2	22	36	44	70	39	213
Col %	40.0	34.9	24.0	27.0	28.7	28.7	28.0
Point	1	-	-	3	5	3	12
Col %	20.0	0.0	0.0	1.8	2.0	2.2	1.6
Mildly convex	1	15	31	37	43	22	149
Col %	20.0	23.8	20.7	22.7	17.6	16.2	19.6
Mildly concave	-	5	18	25	16	8	72
Col %	0.0	7.9	12.0	15.3	6.6	5.9	9.5
Irregular	-	-	1	-	3	-	4
Col %	0.0	0.0	0.7	0.0	1.2	0.0	0.5
TOTAL	5	63	150	163	244	136	761

Table B-20. Kind of wear by shape of worn area, 45-OK-287/288.

Kind of Wear	Shape of Worn Area							Total
	Convex	Concave	Straight	Point	Mildly Convex	Mildly Concave	Irregular	
Abrasion/Grinding	4	-	-	-	-	1	-	5
Smoothing	45	5	19	6	25	5	-	105
Crushing/Pecking	95	1	13	-	10	2	-	121
Feathered chipping	63	37	143	3	77	50	2	375
Feathered chipping/ smoothing	16	-	13	1	10	2	1	43
Hinged chipping	20	16	18	1	22	7	1	85
Hinged chipping/ smoothing	8	1	7	1	5	5	-	27
TOTAL	251	60	213	12	149	72	4	761

Table B-21. Object edge angle by kind of wear, 45-OK-287/288.

Object Edge Angle (degrees)	Kind of Wear: Abrasion/ Grinding	Smoothing	Crushing/ Pecking	Feathered Chipping	Feathered Chipping/ Smoothing	Hinged Chipping	Hinged Chipping/ Smoothing	Total
6-10	-	-	-	9	-	-	-	9
11-15	-	-	-	28	3	-	-	31
16-20	-	1	-	61	6	1	-	69
21-25	-	8	-	39	1	7	-	55
26-30	-	7	-	35	2	6	-	50
31-35	-	8	-	20	2	2	-	32
36-40	-	8	1	37	-	2	-	48
41-45	2	10	-	37	2	4	-	55
46-50	-	18	1	27	3	8	4	61
51-55	1	6	-	15	6	7	2	37
56-60	1	8	4	25	6	6	4	54
61-65	-	10	3	10	5	8	4	40
66-70	-	8	1	16	3	8	4	40
71-75	-	3	3	5	2	9	1	23
76-80	-	5	3	8	-	4	2	22
81-85	-	1	2	2	-	7	3	15
86-90	-	-	2	1	1	1	2	7
91-95	-	-	-	-	1	1	-	2
> 95	-	2	3	-	-	4	1	10
Surface	1	1	98	-	-	-	-	100
Miscellaneous	-	1	-	-	-	-	-	1
TOTAL	5	105	121	375	43	85	27	761

Table B-22. Edge angle by utilization-modification, 45-OK-287/288.

Edge Angle (degrees)	Utilization/Modification			Total
	Wear only	Wear and Manufacture	Modification indeterminate	
6-10	9	-	-	9
11-15	31	-	-	31
16-20	60	9	-	69
21-25	46	9	-	55
26-30	39	11	-	50
31-35	23	9	-	32
36-40	29	19	-	48
41-45	29	26	-	55
46-50	17	43	1	61
51-55	15	22	-	37
56-60	15	38	1	54
61-65	8	31	1	40
66-70	10	30	-	40
71-75	1	22	-	23
76-80	3	19	-	22
81-85	1	14	-	15
86-90	4	3	-	7
91-95	-	2	-	2
> 95	3	6	1	10
Surface	87	13	-	100
Miscellaneous	-	1	-	1
TOTAL	430	327	4	761

Table B-23. Kind of wear by utilization/manufacture by zone, 45-OK-287/288.

Kind of Wear and Utilization/ Manufacture	Zone					
	1	2	3	4	5	6
Smoothing						
Wear only	-	2	5	11	4	8
Wear and manufacture	1	15	38	25	41	28
Modification indeterminate	-	-	-	-	-	2
Crushing/Pecking						
Wear only	1	9	7	13	27	33
Wear and manufacture	-	2	2	1	4	21
Modification indeterminate	-	-	-	-	1	-
Feathered chipping						
Wear only	3	26	62	75	83	31
Wear and manufacture	-	6	15	23	42	9
Modification indeterminate	-	-	-	-	-	-
Hinged chipping						
Wear only	-	2	8	6	12	2
Wear and manufacture	-	1	13	9	29	2
Modification indeterminate	-	-	-	-	1	-

Table B-24. Orientation of wear by zone, 45-OK-287/288.

Orientation of Wear	Zone						Total
	1	2	3	4	5	6	
Oblique	-	-	2	-	3	-	5
Col %			1.3		1.2		0.7
Perpendicular	4	49	118	152	222	124	669
Col %	80.0	77.8	78.7	93.3	91.0	91.2	87.9
Diffuse	-	-	2	-	3	-	5
Col %			1.3		1.2		0.7
Indeterminate	1	14	28	11	16	12	82
Col %	20.0	22.2	18.7	6.7	6.6	8.8	10.8
TOTAL	5	63	150	163	244	136	761

Table B-25. Wear condition by zone, 45-OK-287/288.

Wear Condition	Zone						Total
	1	2	3	4	5	6	
Complete	5	46	121	124	187	106	589
Col %	100.0	73.0	80.7	76.1	76.6	77.9	77.4
Fragment	-	17	29	39	57	30	172
Col %		27.0	19.3	23.9	23.4	22.1	22.6
TOTAL	5	63	150	163	244	136	761

Table B-26. Percent of worn object types by zone, 45-OK-287/288. (Column percent = percent of total number of object types)

Object Type	Zone												Total	
	1		2		3		4		5		6			
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Projectile Point	-	-	-	-	2	13.3	-	-	3	42.9	1	50.0	6	17.1
Projectile Point Tip	-	-	-	-	-	-	-	-	1	50.0	1	100.0	2	15.4
Biface	-	-	1	14.3	3	8.6	2	14.3	2	9.5	2	50.0	10	12.0
Graver	-	-	-	-	-	-	-	-	2	100.0	-	-	2	100.0
Scraper	-	-	-	-	6	85.7	7	100.0	13	100.0	4	100.0	30	96.8
Spokeshave	-	-	-	-	1	100.0	-	-	2	100.0	1	100.0	4	100.0
Tabular Knife	-	-	6	100.0	16	72.7	10	66.7	12	54.5	6	66.7	50	67.6
Chopper	1	100.0	1	100.0	3	75.0	4	30.8	6	33.3	16	29.6	31	34.1
Pestle	-	-	1	100.0	-	-	-	-	-	-	-	-	1	100.0
Peripherally Flaked Cobble	-	-	1	50.0	1	50.0	1	100.0	-	-	2	50.0	5	55.6
Edge Ground Cobble	-	-	-	-	-	-	1	100.0	-	-	-	-	1	100.0
Hammerstone	1	100.0	3	100.0	5	100.0	6	100.0	16	100.0	23	82.6	54	100.0
Anvil	-	-	-	-	-	-	-	-	1	100.0	-	-	1	100.0
Millingstone	-	-	-	-	-	-	-	-	1	100.0	1	100.0	2	100.0
Burin Spall	-	-	1	50.0	-	-	-	-	-	-	-	-	1	50.0
Linear Flake	-	-	3	27.3	1	1.6	1	2.1	1	1.4	-	-	6	2.7
Resharpening Flake	-	-	-	-	-	-	1	25.0	-	-	1	33.3	2	15.4
Bifacially Retouched Flake	-	-	2	100.0	3	60.0	1	10.0	1	33.3	2	50.0	9	37.5
Unifacially Retouched Flake	-	-	2	100.0	10	58.8	11	68.8	19	82.6	3	33.3	45	65.2
Utilization Flake	2	100.0	18	100.0	58	100.0	53	100.0	61	100.0	29	100.0	221	100.0
TOTAL	4	7.4	39	8.0	109	5.7	98	5.7	141	4.5	88	4.6	479	5.2

Table B-27. Breakage location and kind by historical type, 45-OK-287/288.

Historic Type	Location[1]	4	4	3	3	5	5	5	6	6	6	7	7	7	8	8	8	Total
	Kind[1]	1	2	2	1	2	3	1	2	3	4	2	3	4	4	5	1	
Cascade A		-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
Shouldered Lanceolate		1	-	-	-	-	-	-	2	-	-	-	1	-	-	-	-	4
Rabbit Island Stemmed A		-	1	-	-	-	-	1	1	-	-	-	-	2	-	2	-	7
Rabbit Island Stemmed B		-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Quilomene Bar Basal-notched		-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Quilomene Bar Corner-notched		-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	1	3
Columbia Corner-notched A		-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
Columbia Corner-notched B		-	2	2	-	-	-	-	1	-	-	-	-	-	-	-	-	5
Columbia Stemmed C		2	-	3	-	-	-	-	-	-	-	-	-	1	-	-	-	6
Wallula Rectangular-Stemmed		-	1	1	1	-	1	-	1	-	-	-	-	-	-	-	-	5
Plateau Side-notched		-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
TOTAL		3	5	7	1	1	1	1	5	1	1	1	1	3	1	2	1	35

[1] See Figure B-1 for key to codes.

Table B-28. Dimensions of morphological projectile point classification.

DIMENSION I: BLADE-STEM JUNCTURE

- N. Not separate
- 1. Side-notched
- 2. Shouldered
- 3. Squared
- 4. Barbed
- 9. Indeterminate

DIMENSION II: OUTLINE

- N. Not applicable
- 1. Triangular
- 2. Lanceolate
- 9. Indeterminate

DIMENSION III: STEM EDGE ORIENTATION

- N. Not applicable
- 1. Straight
- 2. Contracting
- 3. Expanding
- 9. Indeterminate

DIMENSION IV: SIZE

- N. Not applicable
- 1. Large
- 2. Small

DIMENSION V: BASAL EDGE SHAPE

- N. Not applicable
- 1. Straight
- 2. Convex
- 3. Concave
- 4. Point
- 5. 1 or 2 and notched
- 9. Indeterminate

DIMENSION VI: BLADE EDGE SHAPE

- N. Not applicable
- 1. Straight
- 2. Excurvate
- 3. Incurvate
- 4. Reworked
- 9. Indeterminate

DIMENSION VII: CROSS SECTION

- N. Not applicable
- 1. Planoconvex
- 2. Biconvex
- 3. Diamond
- 4. Trapezoidal
- 9. Indeterminate

DIMENSION VIII: SERRATION

- N. Not applicable
- 1. Not serrated
- 2. Serrated
- 9. Indeterminate

DIMENSION IX: EDGE GRINDING

- N. Not applicable
- 1. Not ground
- 2. Blade edge
- 3. Stem edge
- 9. Indeterminate

DIMENSION X: BASAL EDGE THINNING

- N. Not applicable
- 1. Not thinned
- 2. Short flake scars
- 3. Long flake scars
- 9. Indeterminate

DIMENSION XI: FLAKE SCAR PATTERN

- N. Not applicable
- 1. Variable
- 2. Uniform
- 3. Mixed
- 4. Collateral
- 5. Transverse
- 6. Other
- 9. Indeterminate

Table B-29. List of projectile points by morphological and historical type, 45-OK-287/288.

Master #	Morphological Type	Morphological Description	Historical Type
45-OK-287			
3	4	21211211NN1	Plateau Side-notched
133	6	22NN1221NN1	Mahkin Shouldered
93	7	1NN21929NN9	Nespelem Bar
120	7	21214111NN1	Nespelem Bar
932	7	21211211NN1	Not assigned
128	13	31311929NN9	Quilomine Corner-notched
124	17	41112341NN3	Quilomine Basal-notched A
39	18	41321321NN1	Wallula Rectangular-stemmed
59	18	41322121NN1	Wallula Rectangular-stemmed
49	18	41122321NN1	Columbia Stemmed C
45-OK-288			
779	1	N1N11221NN3	Cold Springs Side-notched
596	1	N1N19241NN3	Not assigned
691	4	1NN23919NN1	Cold Springs Side-notched
398	6	22NN1231131	Mahkin Shouldered
342	6	22NN1211121	Not assigned
451	6	22NN2241123	Mahkin Shouldered
665	6	22NN9341193	Mahkin Shouldered
84	6	22NN2241121	Mahkin Shouldered
374	6	22NN1241121	Mahkin Shouldered
19	6	22NN3221131	Windust
563	6	22NN9141113	Mahkin Shouldered
156	6	22NN1211123	Cascade A
400	6	22NN2231121	Mahkin Shouldered
5	6	22NN1241121	Mahkin Shouldered
901	7	21211211NN3	Nespelem Bar
159	7	21212241NN1	Nespelem Bar
65	8	21222142NN3	Nespelem Bar
445	9	21311919NN1	Columbia Corner-notched A
78	9	21315121NN1	Not assigned
908	9	21313221NN3	Nespelem Bar
782	10	21323929NN1	Columbia Corner-notched B
423	10	21322211NN3	Nespelem Bar
934	12	31229941NN1	Nespelem Bar
736	12	31222241NN1	Nespelem Bar
566	13	31313929NN1	Quilomene Corner-notched
781	13	31323322NN4	Columbia Corner-notched B
856	15	41212321NN3	Rabbit Island A
970	17	41312929NN9	Quilomene Corner-notched
803	18	41322929NN9	Not assigned
792	18	41323929NN1	Not assigned
660	18	41322212NN3	Columbia Corner-notched B
763	18	41321342NN1	Columbia Stemmed C
780	18	41121321NN3	Columbia Stemmed C
927	18	41321311NN1	Wallula Rectangular-stemmed
928	18	41322322NN3	Columbia Corner-notched B
859	18	41321321NN3	Columbia Corner-notched B
896	18	41322121NN3	Columbia Stemmed C
863	18	41322321NN3	Columbia Stemmed C

Table B-30. Descriptive statistics for projectile points, 45-OK-287/288.

Historic Type	Blade Length (.1 mm)	Haft Length (.1 mm)	Neck Width (.1 mm)	Ratio Neck Width: Basal Width	Ratio Blade Length: Total Length
Windust C					
$\bar{x}$	164.5	79.5	46.0	1.2	0.7
s.d.	-	-	-	-	-
N	1	1	1	1	1
Cascade A					
$\bar{x}$	280.5	108.5	87.5	0.5	0.7
s.d.	-	-	-	-	-
N	1	1	1	1	1
Mahkin Shouldered					
$\bar{x}$	373.8	131.6	59.7	0.6	0.7
s.d.	141.8	46.0	11.4	0.2	0.1
N	7	7	7	7	7
Rabbit Island A					
$\bar{x}$	269.5	77.8	49.2	0.7	0.8
s.d.	53.8	30.1	12.5	0.3	-
N	7	9	9	9	7
Rabbit Island B					
$\bar{x}$	307.1	51.0	50.0	0.7	0.9
s.d.	-	-	-	-	-
N	1	1	1	1	1
Quilomene Bar Basal-notched					
$\bar{x}$	277.5	58.5	47.5	0.8	0.9
s.d.	-	-	-	-	-
N	1	1	1	1	1
Quilomene Bar Corner-notched					
$\bar{x}$	-	75.2	76.7	1.0	-
s.d.	-	9.5	14.5	0.3	-
N	-	2	2	2	-
Columbia Corner-notched A					
$\bar{x}$	264.0	101.0	55.0	1.1	0.7
s.d.	-	-	-	-	-
N	1	1	1	1	1
Columbia Corner-notched B					
$\bar{x}$	187.0	51.4	23.4	1.2	0.8
s.d.	47.4	13.4	4.4	0.2	-
N	2	5	5	5	2
Wallula Rectangular-stemmed					
$\bar{x}$	140.2	45.8	26.1	1.1	0.8
s.d.	42.6	4.1	2.3	0.2	0.1
N	3	3	3	3	3
Columbia Stemmed C					
$\bar{x}$	167.9	45.9	26.0	1.1	0.8
s.d.	32.4	7.6	0.7	0.3	-
N	4	4	4	4	4
Plateau Side-notched					
$\bar{x}$	-	68.0	31.5	1.6	-
s.d.	-	-	-	-	-
N	-	1	1	1	-

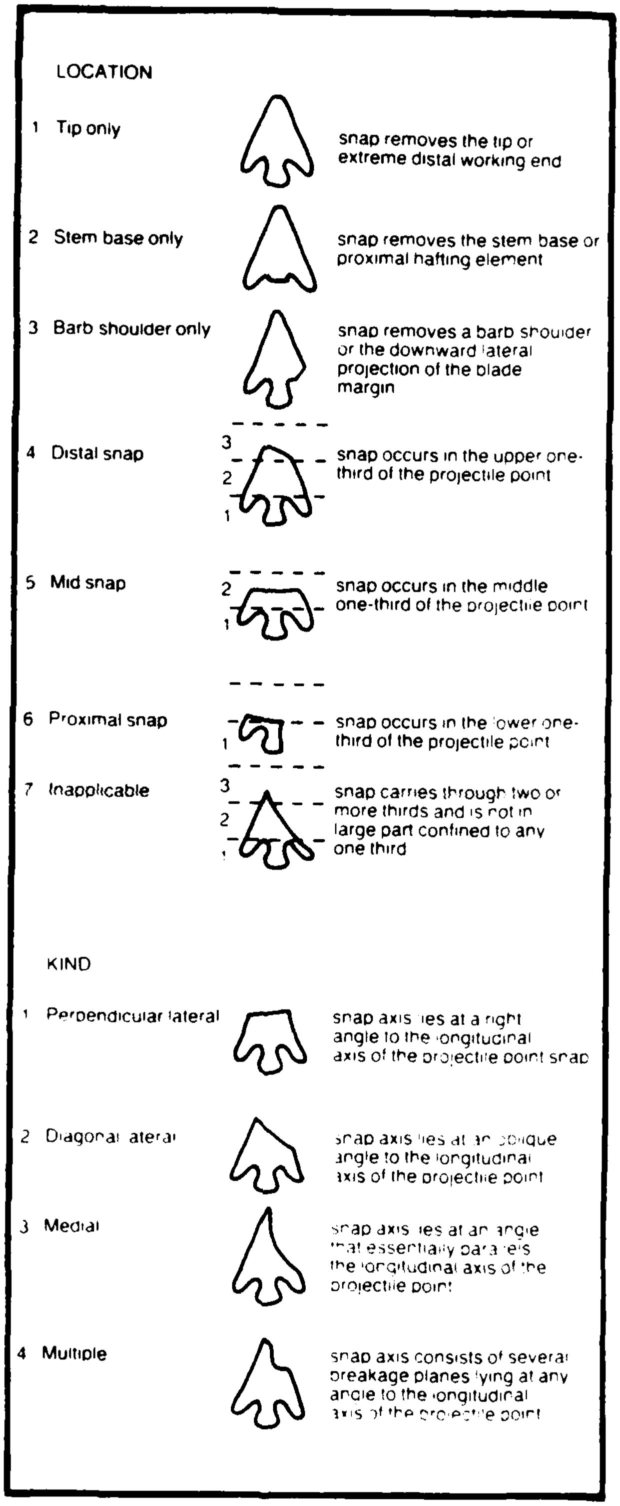


Figure B-1. Breakage terminology Illustrated.

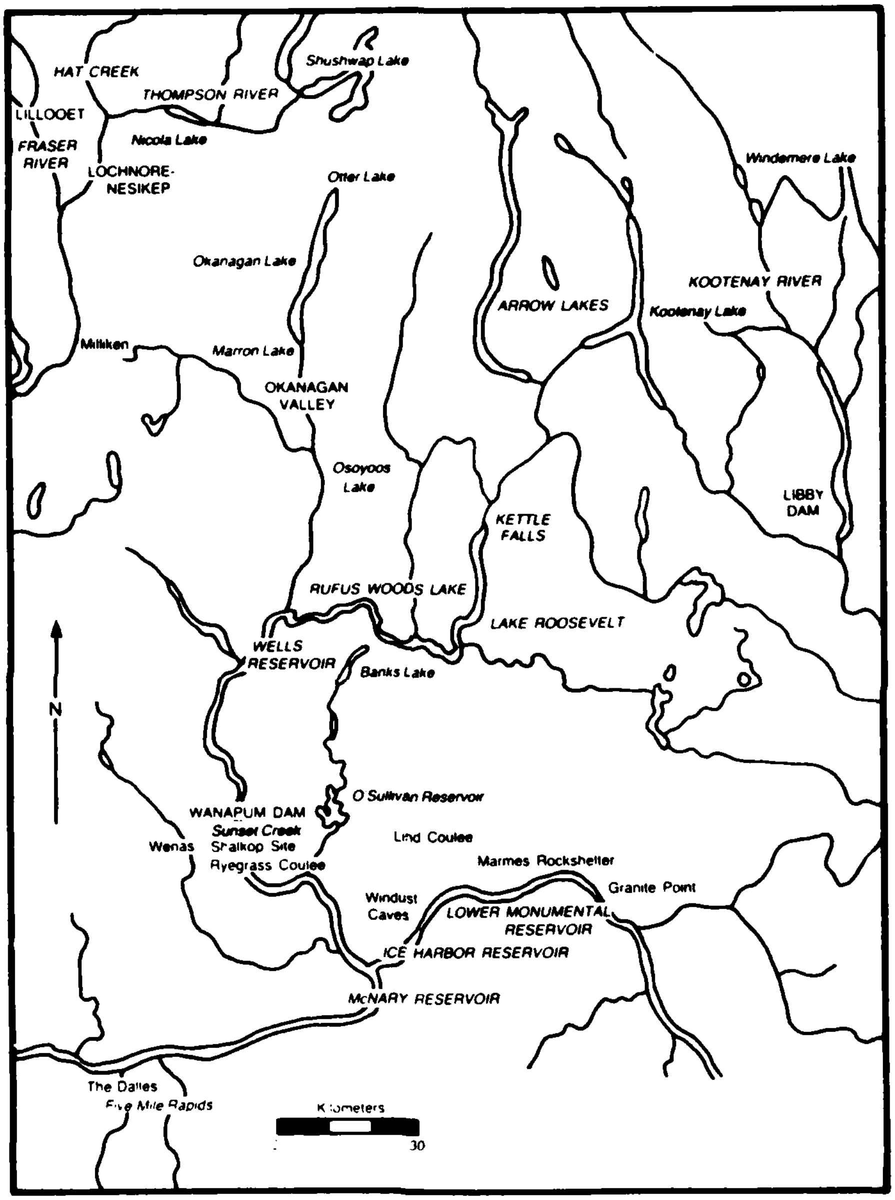
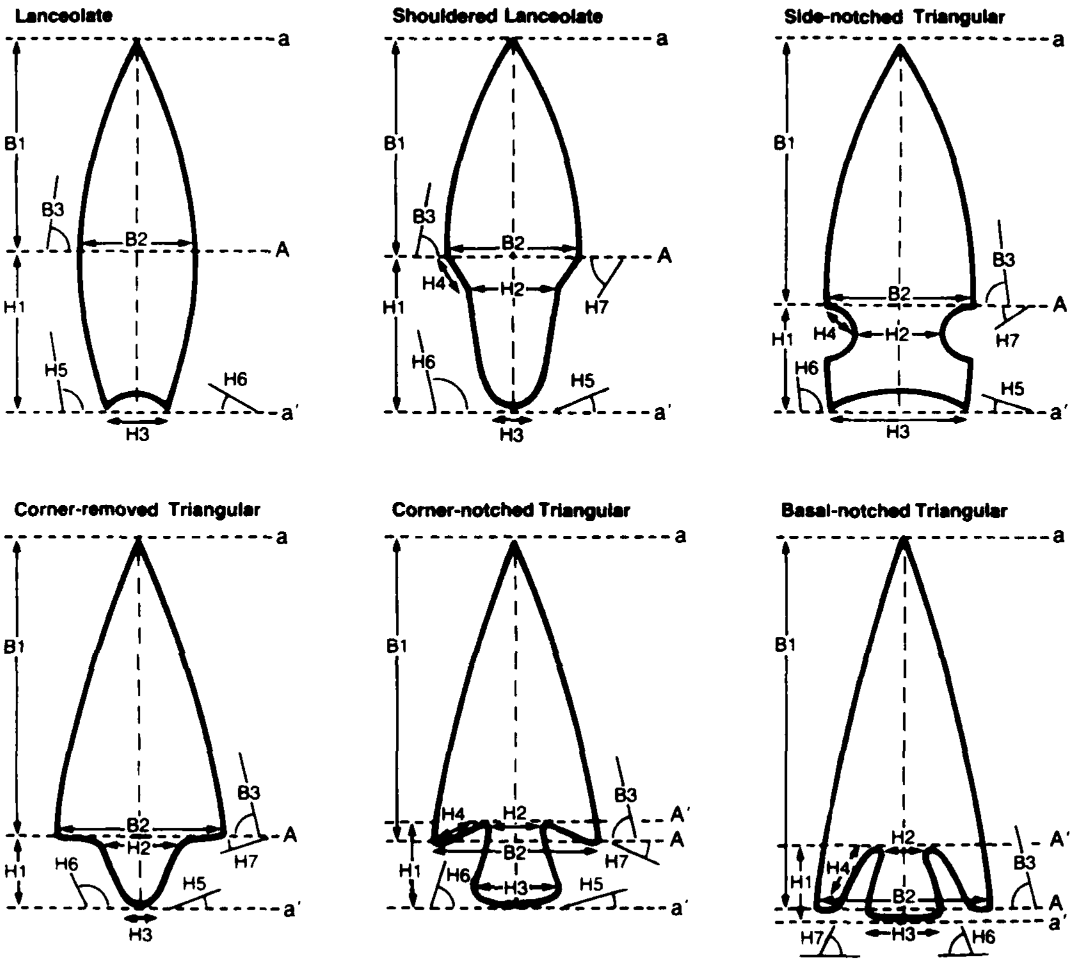


Figure B-2. Map of the Columbia Plateau showing location of projectile point assemblage analyzed.



B1. Blade Length
B2. Blade Width
B3. Blade Angle
H1. Haft Length
H2. Neck Width
H3. Basal Width
H4. Shoulder Length
H5. Basal Angle
H6. Basal Margin Angle
H7. Shoulder Angle
R1. Blade Length/Total Length
R2. Neck Width/Basal Width
R3. Basal Width/Blade Width
R4. Notch Width/Shoulder Length
R5. Notch Width/Basal Margin Length

Figure B-3. Location of digitized landmarks and measurement variables on projectile points.

HISTORICAL TYPE CLASSIFICATION

DIVISION	LANCEOLATE		TRIANGULAR			
SERIES	SIMPLE	SHOULDERED	SIDE-NOTCHED	CORNER-REMOVED	CORNER-NOTCHED	BASAL-NOTCHED
TYPE	11 LARGE LANCEOLATE	12 LIND COULEE	41 COLD SPRINGS	51 NESPELEM BAR	61 COLUMBIA A Corner-notched	71 QUILOMENE A Basal-notched
	15 WINDUST C Contracting base	13 WINDUST A	42 PLATEAU Side-notched	52 RABBIT ISLAND A	62 QUILOMENE Corner-notched	72 QUILOMENE B Basal-notched
	21 CASCADE A	14 WINDUST B		53 RABBIT ISLAND B	63 COLUMBIA B Corner-notched	73 COLUMBIA STEM A
	22 CASCADE B	31 MAHKIN SHOULDERED			64 WALLULA Rectangular stemmed	74 COLUMBIA STEM B
	23 CASCADE C					75 COLUMBIA STEM C

Types are numbered consecutively within formal series a two-digit code indicates the approximate temporal sequence of defined series and types

Type names are those most commonly applied Mahkin Shouldered and Nespelem Bar are types defined for the Rufus Woods Lake project area

Figure B-4. Historical projectile point type classification.

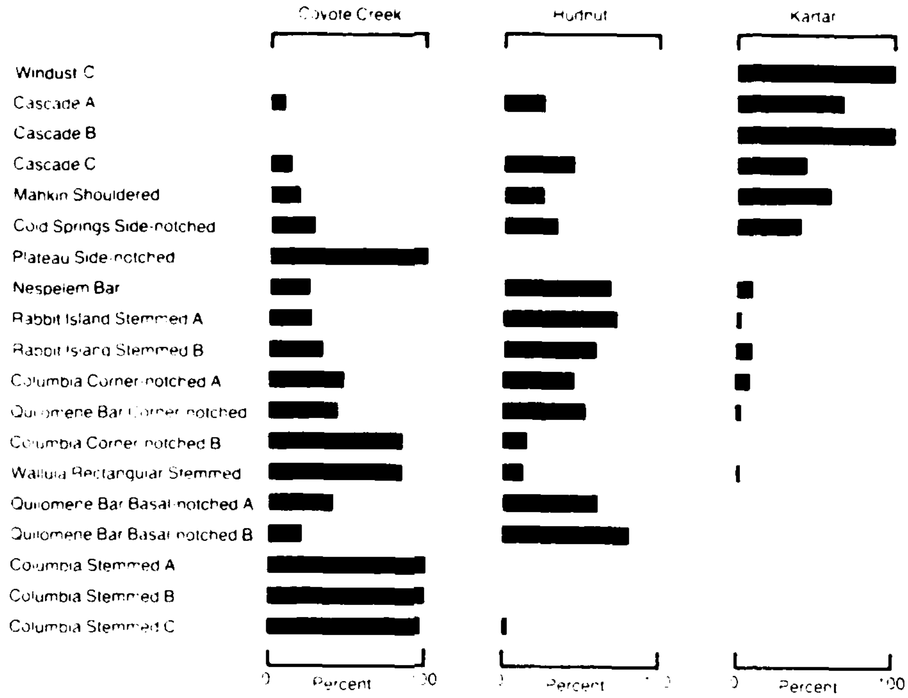


Figure B-5. Proportions of historic projectile point types across all phases.

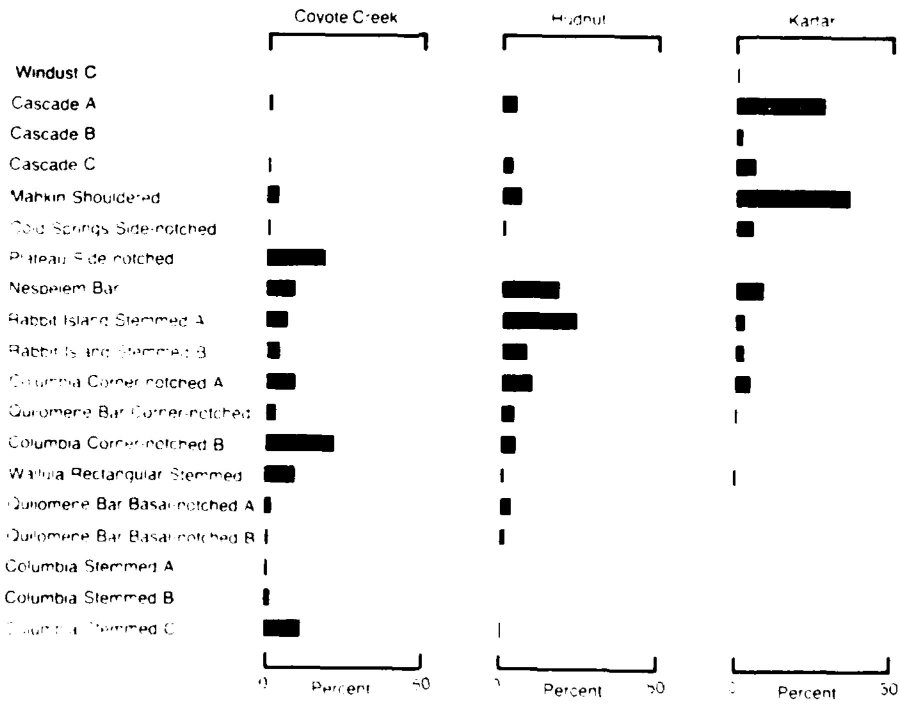


Figure B-6. Proportions of historic projectile point types within phase.

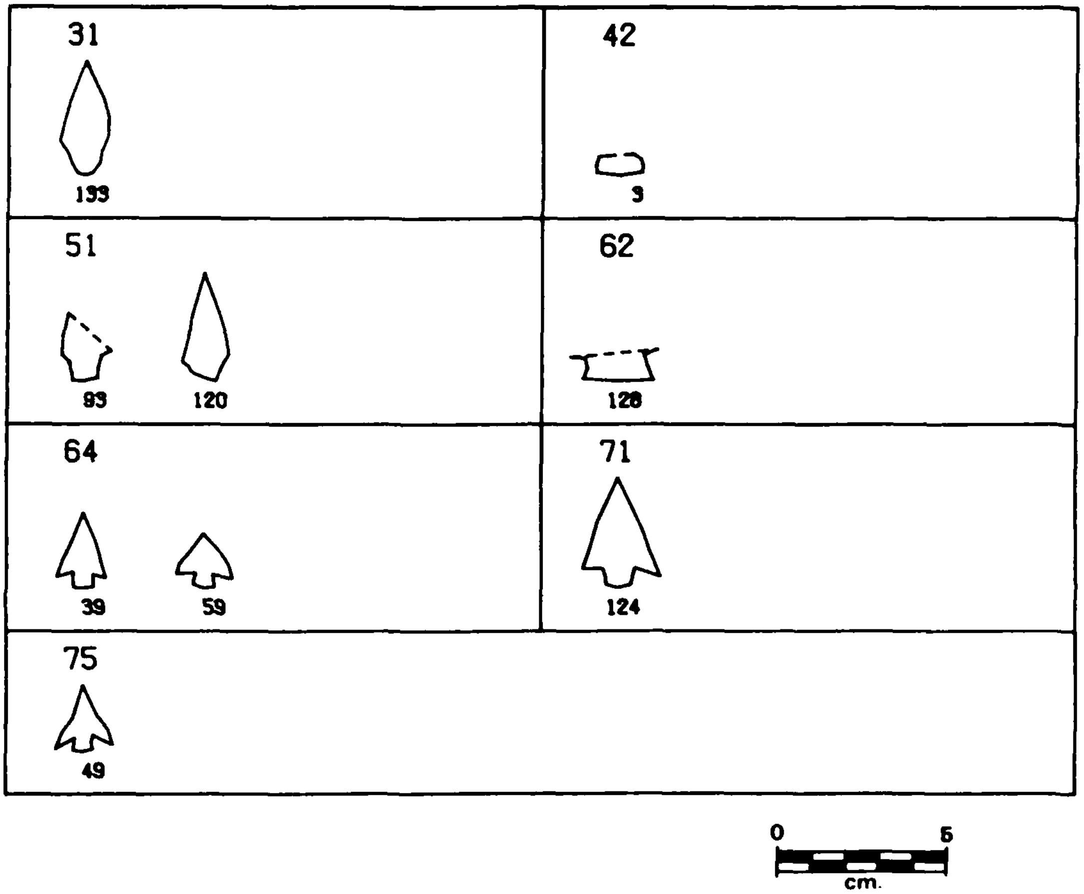


Figure B-7. Projectile point outlines from digitized measurements, 45-OK-287. Upper number is the historic type (see Figure B-4 for key). Lower number is the master number.

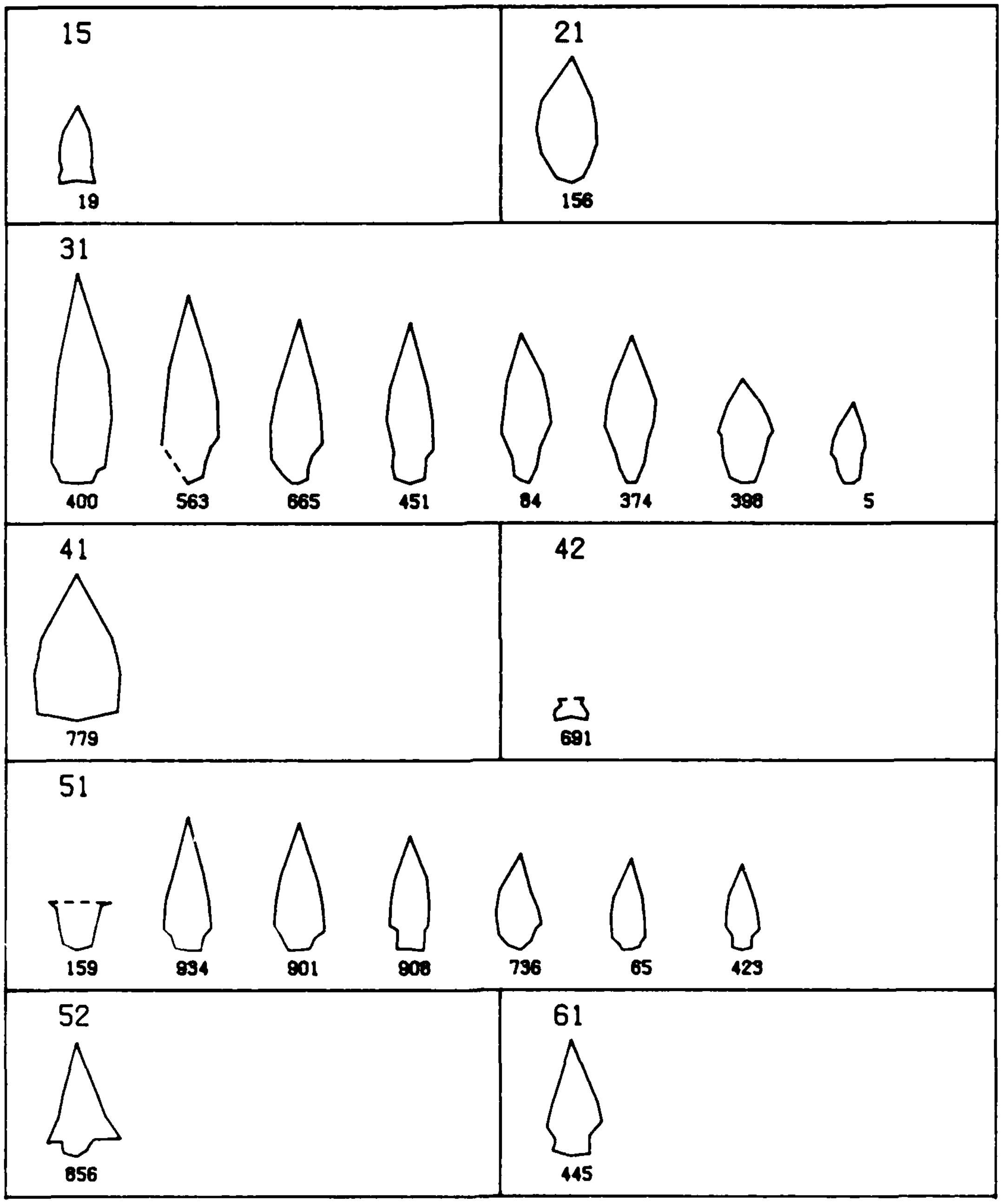


Figure B-8. Projectile point outlines from digitized measurements, 45-OK-288. Upper number is the historic type (see Figure B-4 for key). Lower number is the master number.

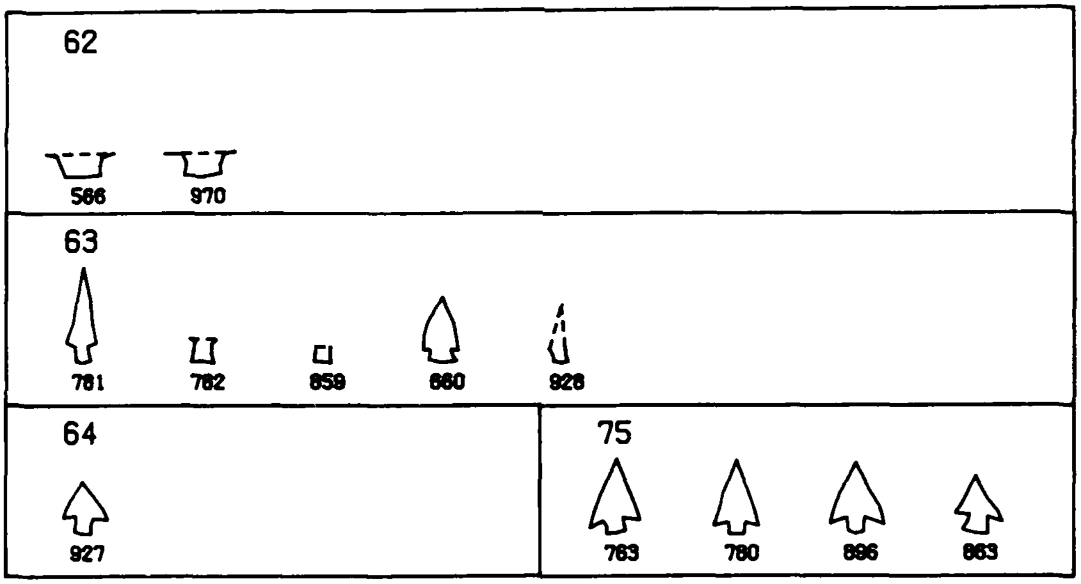


Figure B-8. Cont'd.

APPENDIX C:

FAUNAL ASSEMBLAGE, 45-OK-287/288

Family Sciuridae

Marmota flaviventris

Zone 4: 2 incisor fragments, 1 humerus fragment, 1 femur fragment.
Zone 5: 1 femur fragment.

Family Geomyidae

Thomomys talpoides

Zone 4: 1 skull fragment, 2 mandibles, 4 mandible fragments, 1 humerus, 2 pelves, 1 femur, 2 femur fragments.
Zone 5: 1 femur.
Zone 6: 3 skull fragments, 1 mandible, 5 mandible fragments, 1 humerus, 4 humerus fragments, 1 ulna, 1 innominate fragment, 2 femur fragments.

Family Heteromyidae

Perognathus parvus

Zone 3: 1 skull fragment, 1 mandible, 1 humerus fragment.
Zone 4: 1 skull fragment.
Zone 6: 1 mandible fragment.

Family Castoridae

Castor canadensis

Zone 4: 1 incisor fragment.
Zone 5: 1 incisor fragment.

Family Cricetidae

Zone 2: 1 skull fragment.
Zone 3: 1 innominate fragment.

Neotoma cinerea

Zone 3: 1 molar.

Ondatra zibethicus

Zone 4: 1 molar, 1 molar fragment, 2 ulna fragments.
Zone 5: 2 skull fragments, 1 mandible fragment, 11 molars, 1 molar fragment.
Zone 6: 1 mandible fragment.

Family Canidae

Canis spp.

Zone 4: 1 humerus fragment, 1 phalanx fragment.
Zone 5: 1 incisor, 1 premolar, 2 molar fragments, 1 tibia fragment.

Family Cervidae

Zone 3: 1 antler fragment.
Zone 4: 1 antler fragment.
Zone 5: 3 antler fragments.

Odocoileus spp.

Zone 1: 1 phalanx fragment.
Zone 2: 1 mandible fragment, 1 incisor fragment, 1 molar, 2 molar fragments, 1 humerus fragment, 1 radius fragment, 1 tibia fragment, 1 astragalus, 2 metatarsal fragments, 1 phalanx, 1 phalanx fragment.
Zone 3: 7 skull fragments, 3 mandible fragments, 4 incisors, 7 premolars, 17 molars, 28 molar fragments, 1 scapula fragment, 1 humerus fragment, 5 radius fragments, 2 ulna fragments, 3 carpals, 1 innominate fragment, 1 tibia fragment, 1 tarsal fragment, 4 metatarsal fragments, 4 metapodial fragments, 4 phlanges, 13 phalanx fragments.
Zone 4: 1 mandible fragments, 2 incisors, 2 premolars, 2 molars, 31 molar fragments, 1 humerus fragment, 2 carpals, 1 calcaneus fragment, 3 metatarsal fragments, 2 metapodial fragments, 6 phalanges, 1 phalanx fragment.
Zone 5: 1 skull fragment, 2 incisors, 1 incisor fragments, 6 premolars, 13 molars, 21 molar fragments, 1 radius fragment, 1 astragalus fragment, 1 metatarsal fragment, 1 phalanx, 4 phalanx fragments.

Zone 6: 1 antler fragment, 1 skull fragment, 1 mandible fragment, 4 premolars, 1 premolar fragment, 1 molar, 13 molar fragments, 1 carpal fragment, 1 tibia fragment, 1 metapodial fragment, 1 phalanx.

O. hemionus

Zone 3: 1 dentary with $P_{2,3,4},M_1$.

O. virginianus

Zone 3: 1 dentary with $M_{2,3}$.
Zone 4: 2 dentary with $M_{2,3}$.
Zone 5: 1 dentary with $P_{2,3,4},M_1$, 1 dentary with $P_{2,3,4}M_{1,2,3}$.

Family Bovidae

Zone 3: 1 incisor, 1 molar fragment.
Zone 4: 1 premolar, 3 molar fragments.
Zone 5: 1 incisor.
Zone 6: 1 molar fragment.

Antilocapra americana

Zone 2: 1 radius fragment, 1 ulna fragment, 6 carpals, 1 metacarpal fragment, 1 femur fragment, 1 phalanx fragment.
Zone 3: 1 premolar, 2 molars, 2 humerus fragments, 1 radius fragment, 1 ulna fragment, 1 femur fragment, 2 tibia fragments, 3 astragali, 2 calcanea, 3 tarsals, 3 metatarsal fragments, 7 metapodial fragments, 4 phalanges, 5 phalanx fragments.
Zone 4: 1 incisor, 1 carpal, 2 metatarsal fragments, 1 metapodial fragment, 2 phalanx fragments.
Zone 5: 2 mandible fragments, 3 premolars, 1 molar, 11 molar fragments, 2 radius fragments, 3 metacarpal fragments, 1 astragalus, 3 metatarsal fragments, 2 metapodial fragments, 3 phalanges, 4 phalanx fragments.
Zone 6: 2 molar fragments.

Ovis canadensis

Zone 2: 1 atlas fragment, 1 metapodial fragment, 2 phalanx fragments.
Zone 3: 1 incisor, 2 premolars, 3 molar fragments, 1 scapula, 1 metatarsal fragment, 2 phlanges, 6 phalanx fragments.
Zone 4: 331 horn core fragments, 2 mandible fragments, 3 incisor fragments, 6 premolars, 9 molars, 1 molar fragments, 2 radius fragments, 2 metapodial fragments, 3 phalanx fragments.
Zone 5: 1 horn core fragment, 1 premolar, 2 molar fragments.
Zone 6: 2 horn core fragments, 3 molars, 2 molar fragments, 1 phalanx fragment.

Bos/Bison

Zone 2: 1 patella.

Deer-Sized

Zone 1: 1 thoracic vertebra fragment, 2 vertebrae fragments, 20 rib fragments.

Zone 2: 3 skull fragments, 1 atlas fragment, 2 cervical vertebra fragments, 2 vertebra fragments, 9 rib fragments, 2 scapula fragments, 2 humerus fragments, 1 radius fragment, 3 carpals, 1 carpal fragment, 1 metacarpal fragment, 3 femur fragments, 2 tibia fragments, 1 astragalus fragment, 2 calcaneus fragments, 1 tarsal fragment, 5 metapodial fragments, 4 phalanx fragments, 1 sesamoid.

Zone 3: 15 skull fragments, 10 mandible fragments, 1 hyoid, 1 atals vertebrae fragment, 2 axis vertebra fragments, 16 lumbar vertebra fragments, 1 sacral vertebra fragment, 5 vertebra fragments, 34 rib fragments, 1 sternum fragment, 1 costal cartilage fragment, 7 scapula fragments, 6 humerus fragments, 12 radius fragments, 3 ulna fragments, 10 carpals, 7 carpal fragments, 3 metacarpal fragments, 8 innominate fragments, 10 femur fragments, 15 tibia fragments, 6 astragalus fragments, 2 calccaneus fragments, 2 tarsals, 5 tarsal fragments, 8 metatarsal fragments, 34 metapodial fragments, 4 phlanges, 42 phalanx fragments, 3 dewclaw fragments, 3 sesamoids.

Zone 4: 3 skull fragments, 3 atlas fragments, 1 axis, 1 cervical vertebra fragment, 5 lumbar vertebra fragments, 4 vertebra fragments, 23 rib fragments, 1 costal cartilage fragment, 6 scapula fragments, 4 humerus fragments, 6 radius fragments, 2 ulna fragments, 1 carpal, 1 innominate fragment, 7 femur fragments, 10 tibia fragments, 1 astragalus, 3 astragalus fragments, 2 calcaneus fragments, 2 tarsals, 1 tarsal fragment, 2 metatarsal fragments, 15 metapodial fragments, 12 phalanx fragments, 1 dewclaw fragment, 3 sesamoids.

Zone 5: 1 skull fragment, 4 mandible fragments, 1 cervical vertebra fragments, 5 lumbar vertebra fragments, 14 rib fragments, 3 scapula fragments, 7 humerus fragments, 12 radius fragments, 4 ulna fragments, 3 carpals, 2 carpal fragments, 4 metacarpal fragments, 2 innominate fragments, 7 femur fragments, 21 tibia fragments, 1 astragalus, 2 astragalus fragments, 1 calcaneus fragment, 5 metatarsal fragments, 35 metapodial fragments, 1 phalanx, 18 phalanx fragments.

Zone 6: 1 skull fragment, 2 mandible fragments, 1 thoracic vertebra fragment, 2 lumbar vertebra fragments, 1 rib fragment, 2 humerus fragments, 1 radius fragment, 1 carpal, 1 carpal fragment, 2 femur fragments, 1 astragalus fragment, 1 tarsal, 3 metapodial fragments, 5 phalanx fragments.

Elk-Sized

Zone 1: 1 innominate fragment, 1 tibia fragment.
Zone 3: 1 rib fragment.

Family Chelydridae

Chrysemys picta

Zone 3: 17 shell fragments.

Family Ranidae/Bufonidae

Zone 3: 1 complete skeleton.

Family Salmonidae

Zone 2: 2 vertebra fragments
Zone 3: 5 vertebra fragments.
Zone 4: 4 vertebra fragments.
Zone 6: 1 vertebra, 3 vertebra fragments.

Table C-1. Distribution of butchering marks and evidence of nt, burning by element, 45-OK-287/288.

Taxon and Element	Butchering[1]					Burning	Both
	1	2	3	4	5		
Zone 2							
Antilocapra							
Carpal	-	-	-	-	-	1	-
Ovis							
Atlas	-	-	-	-	-	1	-
Deer Size							
Vertebra	-	-	-	-	-	2	-
Rib	-	-	-	-	-	2	-
Carpals	-	-	-	-	-	2	-
Femur	-	1	-	-	-	-	-
Tarsals	-	-	-	-	-	1	-
Metapodial	-	1	-	-	-	1	-
Zone 3							
Antilocapra							
Tarsals	1	-	-	-	-	-	-
Phalanges	-	3	-	-	-	-	-
Ovis							
Phalanges	-	2	-	-	-	-	-
Odocoileus							
Mandible	-	1	-	-	-	-	-
Phalnges	-	2	-	-	-	-	-
Radius	-	1	-	-	-	-	-
Ulna	-	2	-	-	-	-	-
Zone 4							
Deer Size							
Vertebra	-	-	-	-	-	1	-
Humerus	-	2	-	-	-	2	-
Radius	-	-	-	-	-	1	-
Carpals	-	-	-	-	-	2	-
Femur	-	3	-	-	-	-	-
Tibia	-	-	-	-	-	1	-
Tarsals	-	-	-	-	-	1	-
Metatarsal	-	1	-	-	-	-	-
Metapodial	-	3	-	-	1	2	-
Dewclaw	-	-	-	-	-	2	-
Sheep/Antelope							
Tooth	-	-	-	-	-	1	-
Ovis							
Dentary	-	2	-	-	-	-	-
Canis sp.							
Humerus	-	1	-	-	-	-	-
Odocoileus							
Mandible	-	2	-	-	-	-	-
Humerus	-	-	-	-	-	1	-
Tarsal	-	1	-	-	-	-	-
Metatarsal	1	2	-	-	1	-	-
Metapodial	1	-	-	-	-	-	-

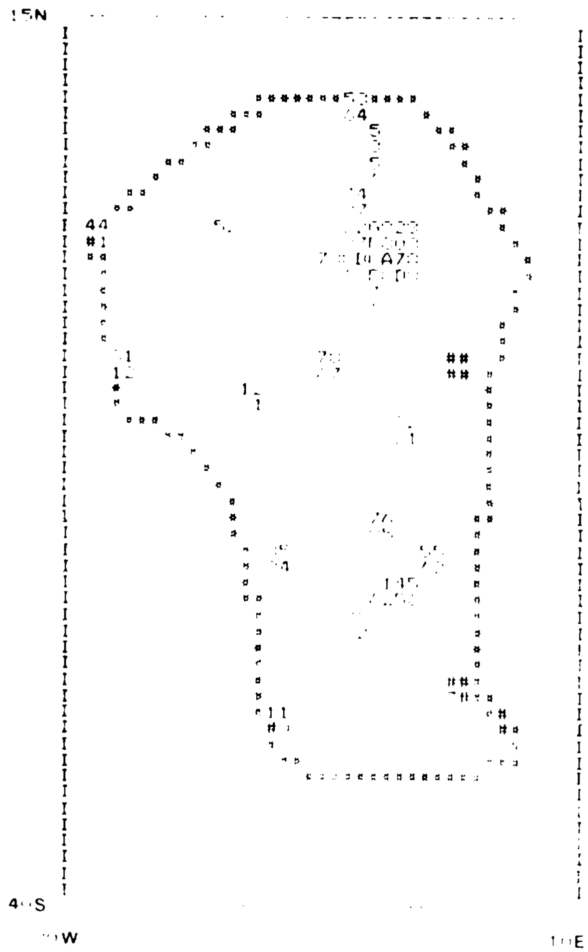
Figure C-1. Cont'd.

Taxon and Element	Butchering[1]					Burning	Both
	1	2	3	4	5		
Deer Size							
Petrosal	-	-	-	-	-	1	-
Mandible	1	-	-	-	-	-	-
Vertebra	-	-	-	-	-	2	-
Rib	-	-	-	-	-	2	-
Scapula	2	-	-	-	-	1	-
Humerus	1	5	-	-	-	-	-
Radius	2	-	-	-	-	-	-
Metacarpal	1	-	-	-	-	-	-
Femur	-	3	-	-	-	1	-
Tibia	-	5	-	-	-	-	-
Metarsal	-	-	-	-	-	1	-
Metapodial	-	6	-	-	-	-	-
Phalanges	-	-	-	-	-	1	-
Zone 5							
<u>Antilocapra</u>							
Mandible	1	-	-	-	-	-	-
Metacarpal	-	1	-	-	1	-	-
Metatarsal	-	2	-	-	1	-	-
<u>Ococoileus</u>							
Mandible	-	2	-	-	-	-	-
<u>Marmota</u>							
Femur	-	-	-	-	-	1	-
Deer Size							
Mandible	-	-	-	-	-	1	-
Femur	-	5	-	-	-	-	-
Humerus	-	5	-	-	-	-	-
Metacarpal	-	-	-	-	1	-	-
Metapodial	1	6	-	-	1	-	-
Phalanx	-	-	-	-	-	2	-
Radius	-	6	-	-	-	-	-
Tibia	-	-	-	-	-	1	-
Zone 6							
<u>Odocoileus</u>							
Mandible	-	1	-	-	-	1	1
Metapodial	-	-	-	-	-	1	-
Deer Size							
Metapodial	-	-	-	-	1	-	-
Phalanges	-	1	-	-	-	1	-

[1] Butchering codes:
1. Striae
2. Flake sc r
3. Chopping scar
4. Saw cut
5. Artifact

APPENDIX D:

ARTIFACT DISTRIBUTIONS, 45-OK-287/288



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	3
2	4	5
3	6	9
4	10	11
5	12	15
6	16	21
7	22	27
8	33	49
9	53	127

INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	127	E	66
B	106	F	61
C	98	G	53
D	72		

STATISTICS

Mean	20.7	Sum	1,841
s.d.	23.2	SS	86,029
Count	89	Var	538.7

Figure D-1. Distribution of lithics, Zone 6, 45-OK-288.

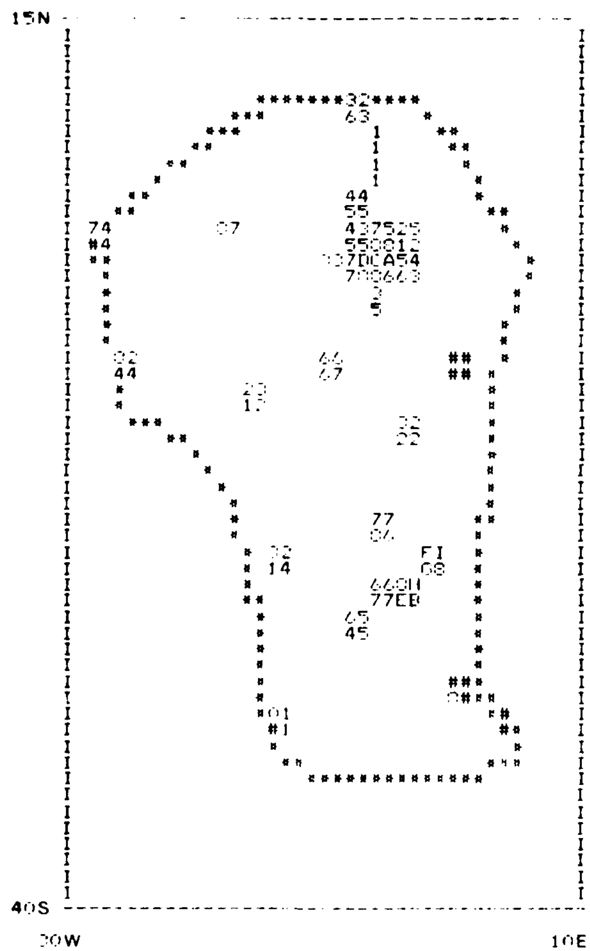


Figure D-2. Distibution of bone, Zone 6, 45-OK-288.

KEY

FREQUENCY INTERVALS

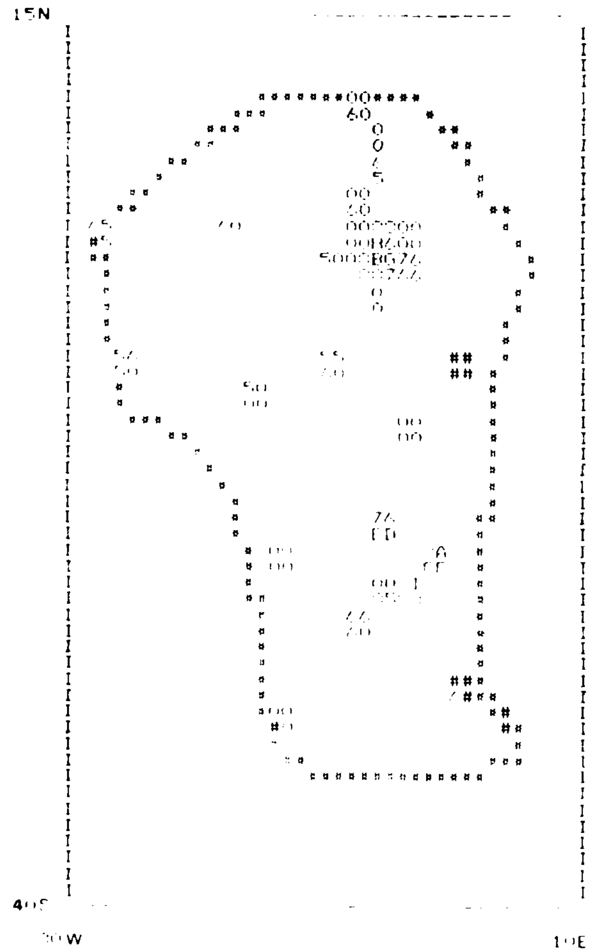
Interval	Minimum Value	Maximum Value
1	0	7
2	10	22
3	24	31
4	32	40
5	41	71
6	76	89
7	93	112
8	121	194
9	199	477

INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	477	E	241
B	271	F	231
C	260	G	213
D	245	H	209
		I	199

STATISTICS

Mean	80.3	Sum	7,147
s.d.	80.5	SS	1,151,171
Count	89	Var	6,485.9



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	-99	-99
3	-99	-99
4	-99	-99
5	1	1
6	2	4
7	5	5
8	6	12
9	13	26

INTERVAL 9 SUBDIVISIONS

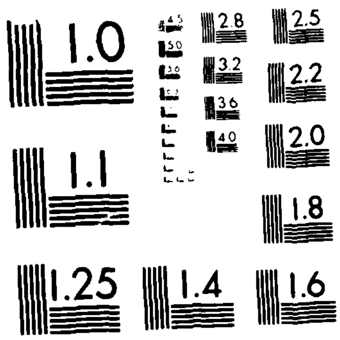
Division	Value	Division	Value
A	26	E	20
B	24	F	19
C	22	G	15
D	23	H	13
		I	13

STATISTICS

Mean	4.0	Sum	353
s.d.	6.3	SS	4,883
Count	89	Var	39.1

Figure D-3. Distribution of FMR, Zone 6, 45-OK-288.

AD-A162 760 ARCHAEOLOGICAL INVESTIGATIONS AT SITES 45-OK-287 AND 4/4
45-OK-288 CHIEF JOSE (U) WASHINGTON UNIV SEATTLE
OFFICE OF PUBLIC ARCHAEOLOGY C J MISS ET AL 1984
UNCLASSIFIED DACW67-78-C-0106 F/G 5/6 NL



MICROCOPY RESOLUTION TEST CHART

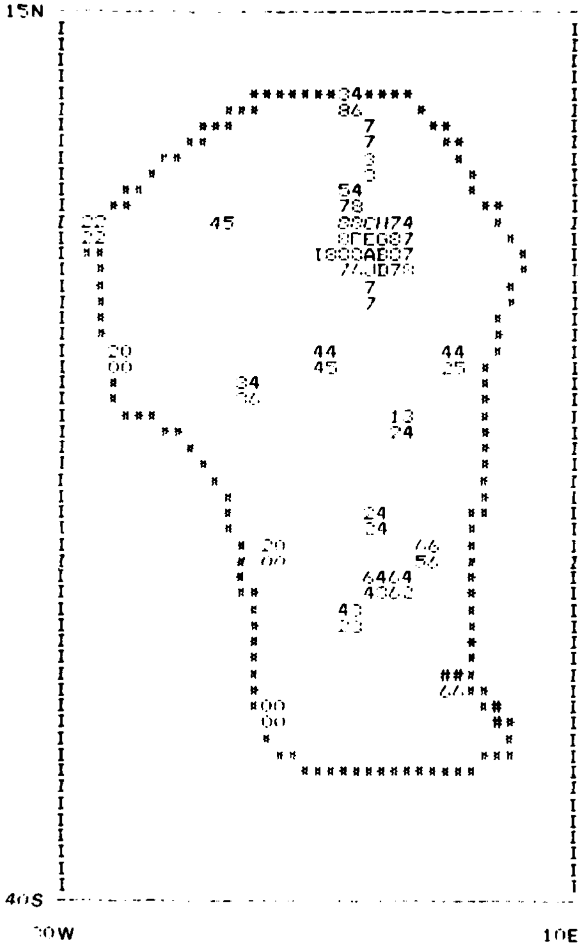


Figure D-4. Distribution of lithics, Zone 5, 45-OK-288.

KEY

FREQUENCY INTERVALS

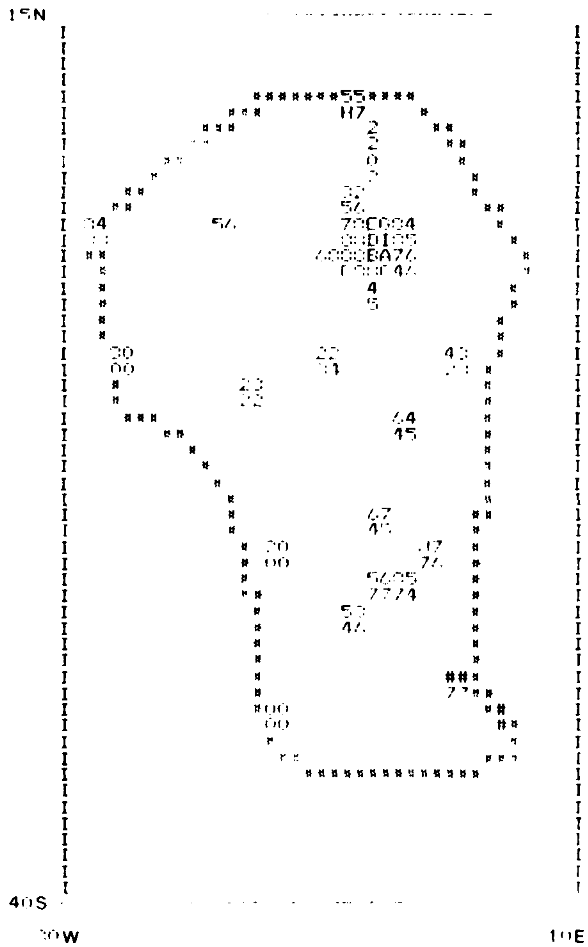
Interval	Minimum Value	Maximum Value
1	0	2
2	4	6
3	7	9
4	10	13
5	14	15
6	16	30
7	31	46
8	48	87
9	91	166

INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	166	F	102
B	150	G	100
C	138	H	99
D	132	I	94
E	113	J	91

STATISTICS

Mean	30.8	Sum	2,952
s.d.	37.0	SS	211,848
Count	96	Var	1,365.4



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	6	29
3	37	51
4	53	76
5	77	93
6	94	141
7	149	205
8	207	526
9	554	2,596

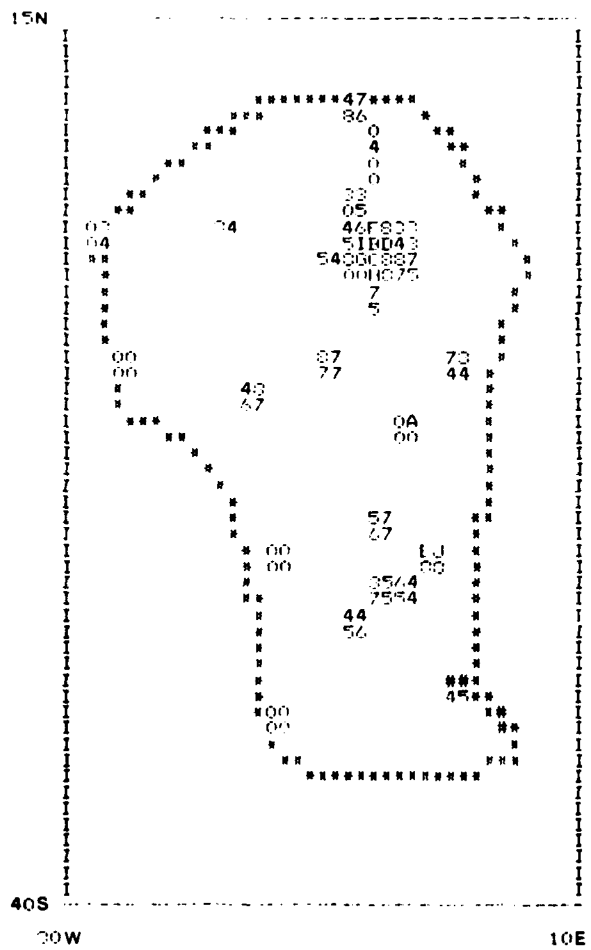
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	2,596	F	734
B	1,049	G	721
C	986	H	619
D	877	I	557
E	867	J	554

STATISTICS

Mean	195.4	Sum	18,763
s.d.	336.6	SS	14,546,709
Count	96	Var	113,328.3

Figure D-5. Distribution of bone, Zone 5, 45-OK-288.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	-99	-99
3	1	1
4	2	3
5	4	5
6	6	7
7	8	11
8	13	20
9	21	88

INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	88	F	30
B	51	G	29
C	37	H	28
D	33	I	25
E	33	J	21

STATISTICS

Mean	8.1	Sum	780
s.d.	12.7	SS	21,800
Count	96	Var	161.1

Figure D-6. Distribution of FMR, Zone 5, 45-OK-288.

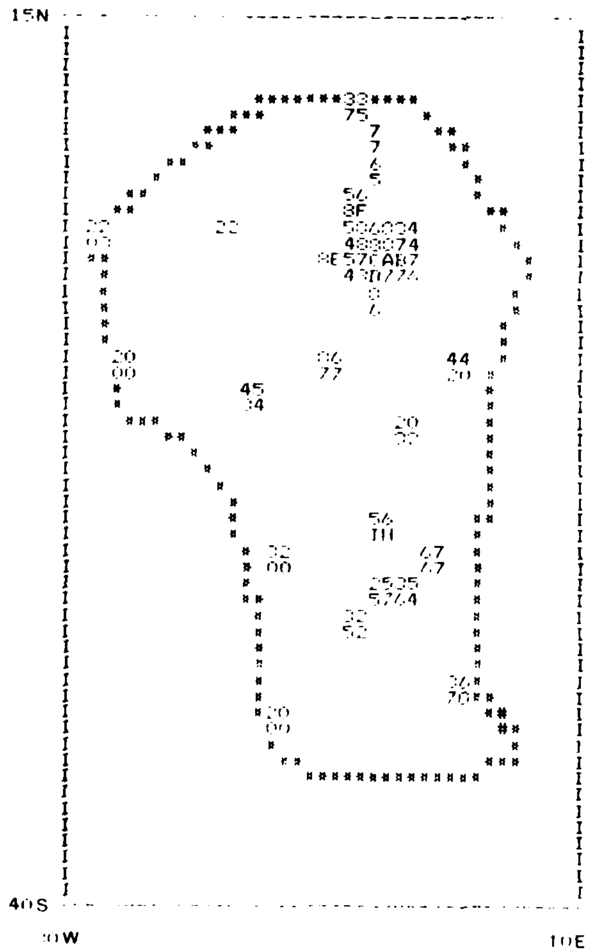


Figure D-7. Distribution of lithics, Zone 4, 45-OK-288.

KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	1	3
3	4	8
4	9	10
5	11	14
6	15	20
7	21	26
8	27	31
9	33	53

INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	53	F	35
B	51	G	35
C	49	H	35
D	43	I	33
E	38		

STATISTICS

Mean	15.1	Sum	1,475
s.d.	12.6	SS	37,869
Count	98	Var	159.9

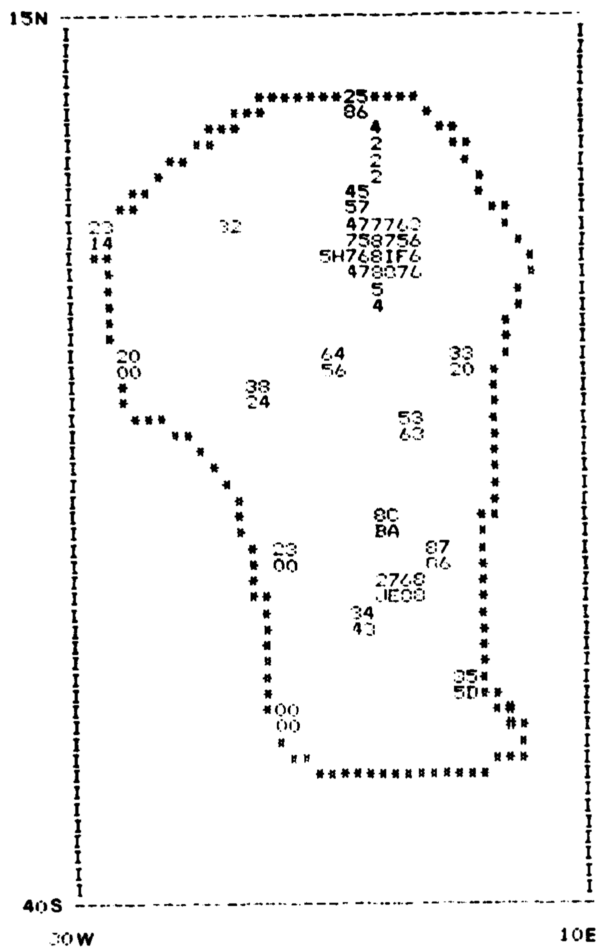


Figure D-8. Distribution of bone, Zone 4, 45-OK-288.

KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	4
2	6	18
3	22	30
4	38	56
5	57	71
6	74	93
7	96	127
8	128	176
9	199	2,327

INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	2,327	F	240
B	542	G	236
C	457	H	212
D	274	I	210
E	245	J	199

STATISTICS

Mean	105.9	Sum	10,374
s.d.	242.1	SS	6,839,960
Count	98	Var	58,590.0

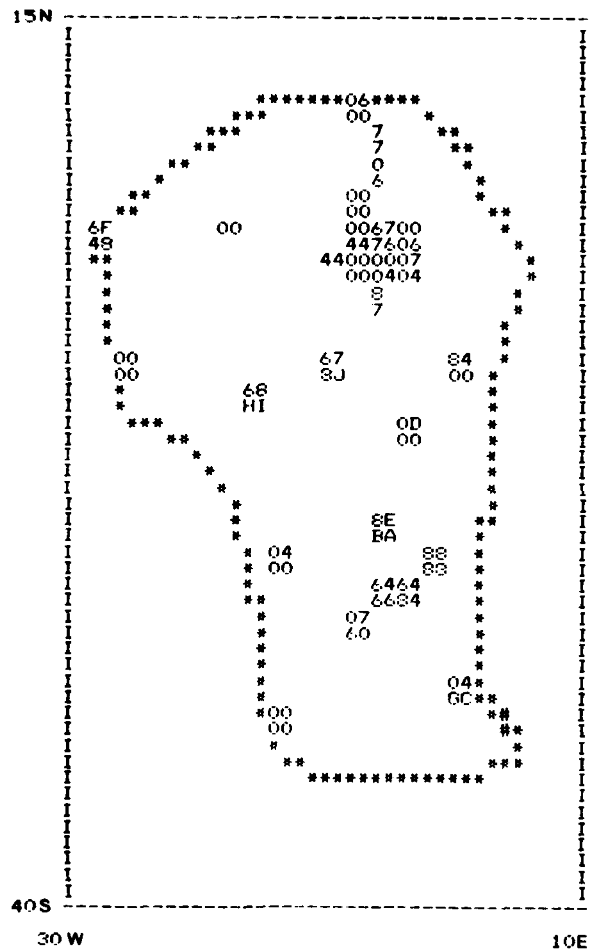


Figure D-9. Distribution of FMR, Zone 4, 45-OK-288.

KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	-99	-99
3	-99	-99
4	1	1
5	-99	-99
6	2	3
7	4	7
8	8	13
9	14	84

INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	84	F	19
B	37	G	16
C	31	H	15
D	22	I	15
E	21	J	14

STATISTICS

Mean	4.9	Sum	482
s.d.	10.5	SS	13,198
Count	98	Var	110.5

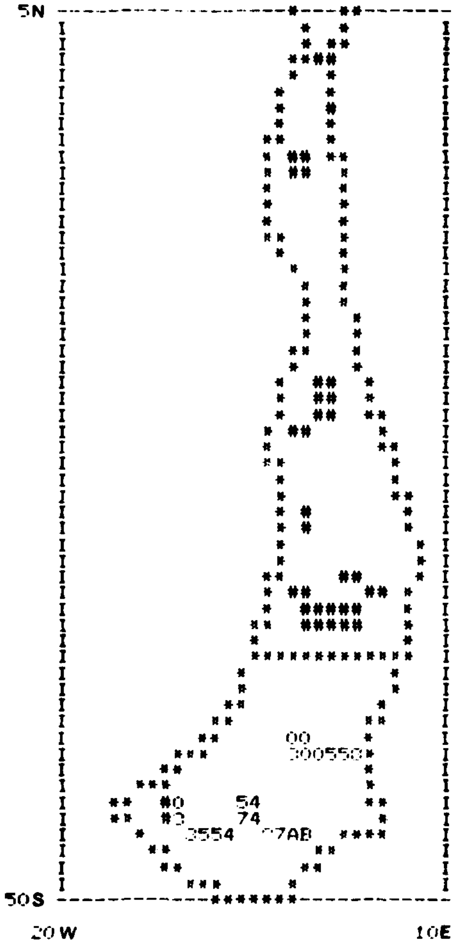


Figure D-10. Distribution of lithics, Zone 4, 45-OK-287.

KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	-99	-99
3	1	1
4	2	2
5	3	3
6	-99	-99
7	6	9
8	11	15
9	17	39

INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	39	B	17

STATISTICS

Mean	5.5	Sum	121
s.d.	8.7	SS	2,333
Count	22	Var	75.8

Figure D-10. Distribution of lithics, Zone 4, 45-OK-287.

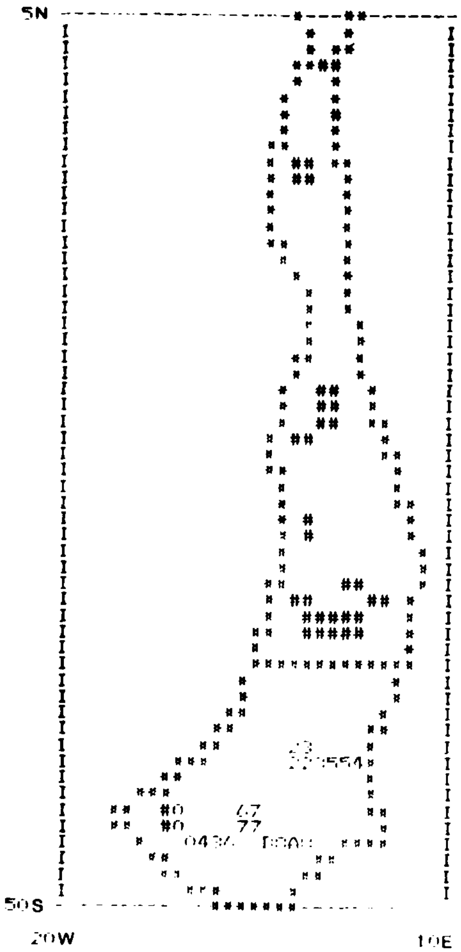


Figure D-11. Distribution of bone, Zone 4, 45-OK-287.

KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	1	1
3	5	8
4	10	10
5	11	16
6	28	30
7	31	66
8	207	332
9	386	476

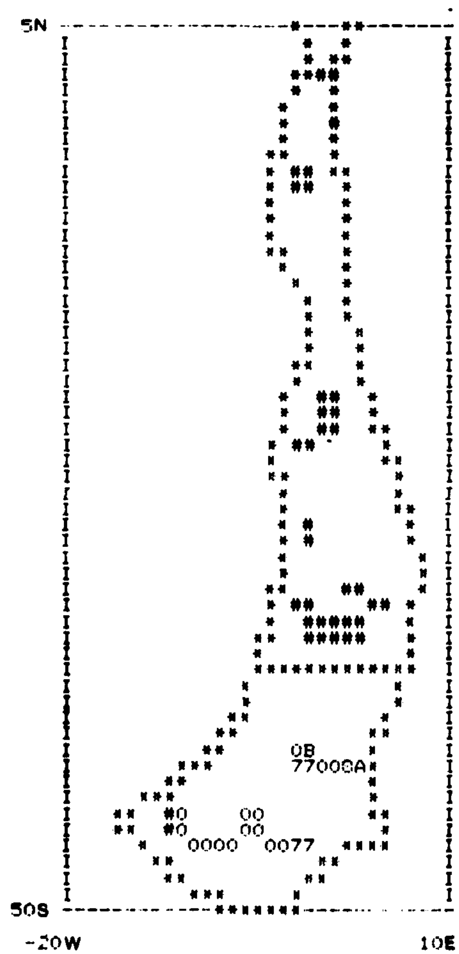
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	476	B	386

STATISTICS

Mean	77.3	Sum	1,701
s.d.	136.7	SS	542,335
Count	22	Var	18,673.5

Figure D-11. Distribution of bone, Zone 4, 45-OK-287.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	-99	-99
3	-99	-99
4	-99	-99
5	-99	-9
6	-99	-99
7	1	1
8	2	2
9	8	8

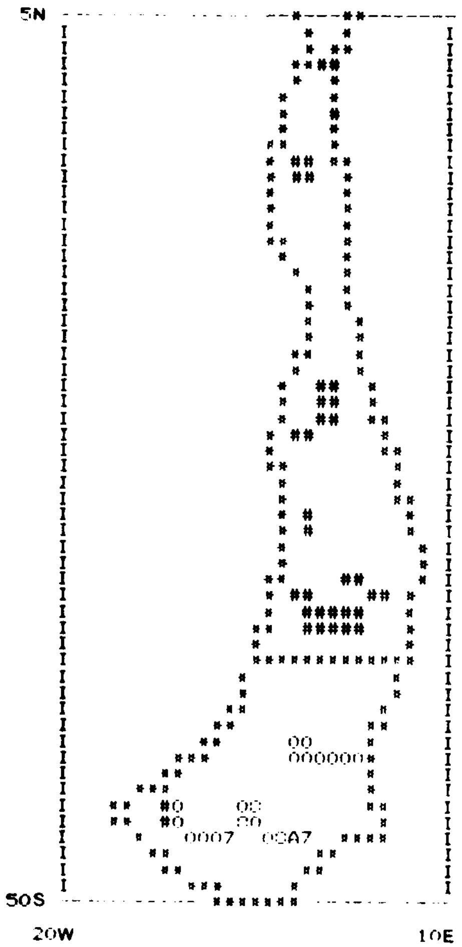
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	8	B	8

STATISTICS

Mean	1.0	Sum	22
s.d.	2.3	SS	136
Count	22	Var	5.2

Figure D-12. Distribution of FMR, Zone 4, 45-OK-287.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	-99	-99
3	-99	-99
4	-99	-99
5	-99	-99
6	-99	-99
7	1	1
8	2	2
9	9	9

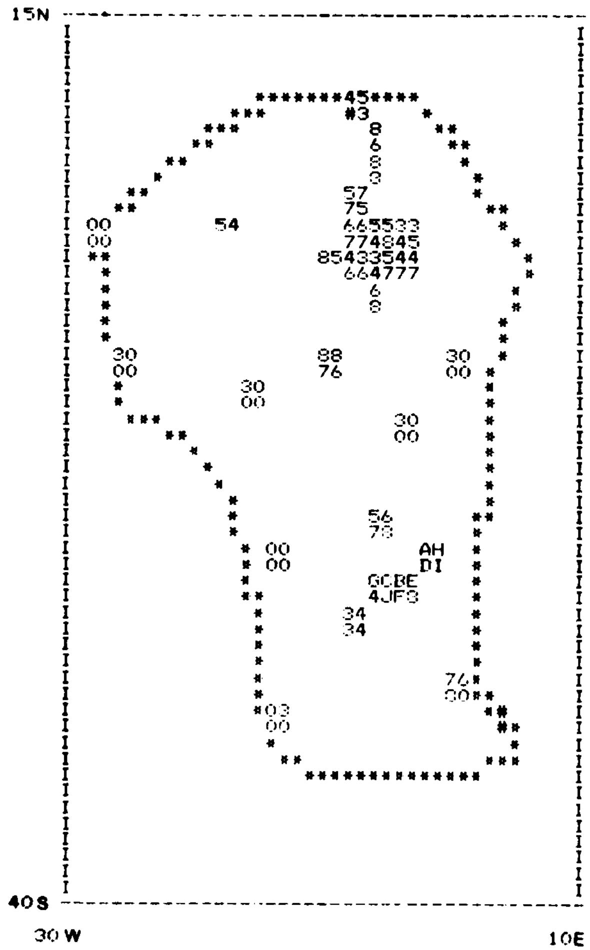
INTERVAL 9 SUBDIVISIONS

Division	Value
A	9

STATISTICS

Mean	.8	Sum	17
s.d.	1.9	SS	95
Count	22	Var	3.7

Figure D-13. Distribution of shell, Zone 4, 45-OK-287.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	-99	-99
3	1	3
4	4	5
5	6	7
6	8	10
7	11	15
8	16	41
9	43	156

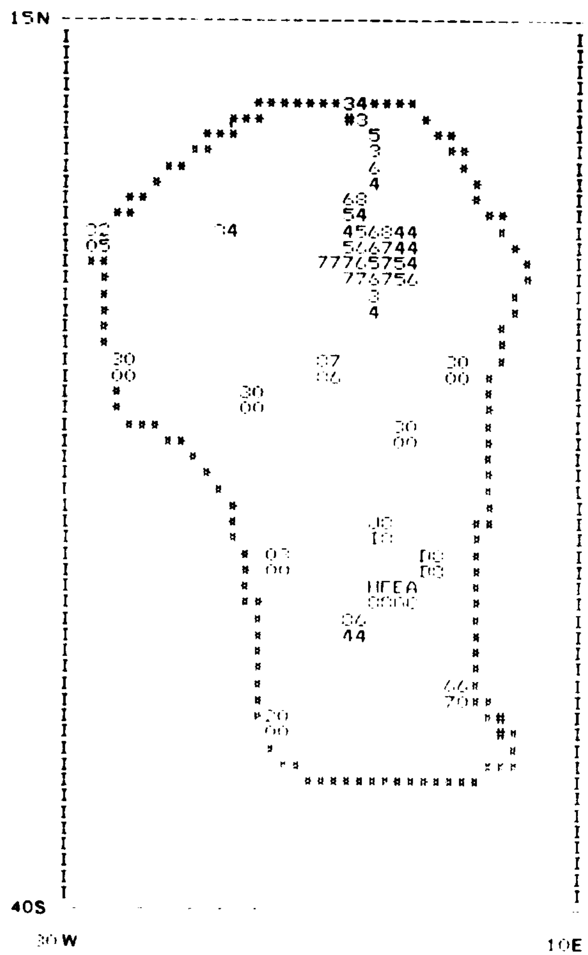
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	156	F	57
B	153	G	46
C	131	H	46
D	104	I	45
E	94	J	43

STATISTICS

Mean	15.4	Sum	1,497
s.d.	29.3	SS	106,653
Count	97	Var	861.3

Figure D-14. Distribution of lithics, Zone 3, 45-OK-288.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	2	2
3	3	11
4	13	21
5	23	30
6	31	44
7	45	61
8	70	483
9	504	2,152

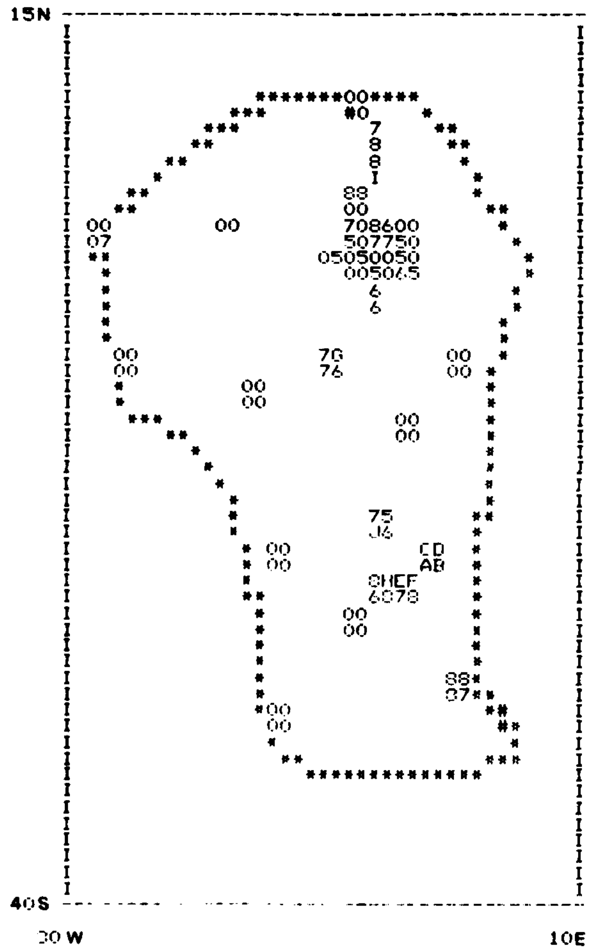
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	2,152	F	1,112
B	1,784	G	851
C	1,686	H	676
D	1,369	I	516
E	1,245	J	504

STATISTICS

Mean	162.2	Sum	15,737
s.d.	396.6	SS	17,813,729
Count	97	Var	157,325.8

Figure D-15. Distribution of bone, Zone 3, 45-OK-288.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	-99	-99
3	-99	-99
4	-99	-99
5	1	1
6	2	3
7	4	5
8	7	23
9	25	127

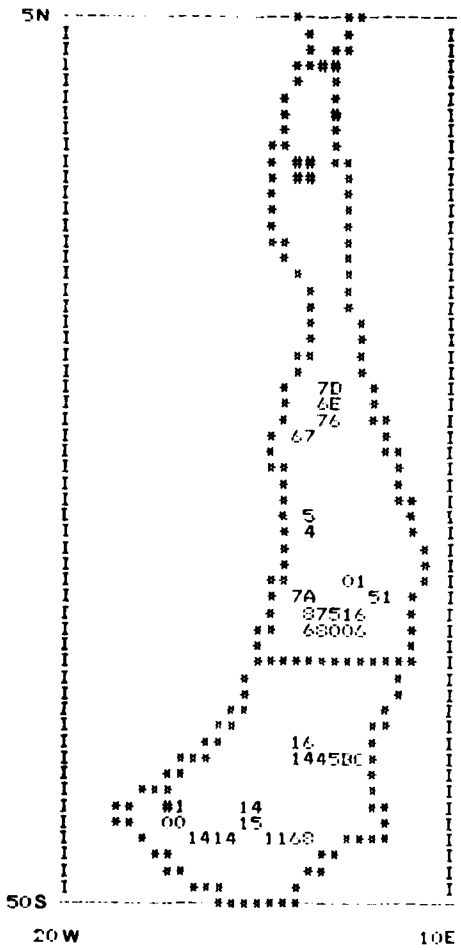
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	127	F	46
B	80	G	38
C	68	H	38
D	67	I	26
E	48	J	25

STATISTICS

Mean	7.9	Sum	769
s.d.	19.4	SS	42,449
Count	97	Var	374.8

Figure D-16. Distribution of FMR, Zone 3, 45-OK-288.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	1
2	-99	-99
3	-99	-99
4	2	2
5	3	3
6	4	7
7	8	10
8	11	13
9	17	38

INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	38	D	22
B	26	E	17
C	23		

STATISTICS

Mean	6.0	Sum	294
s.d.	7.7	SS	4,648
Count	49	Var	58.9

Figure D-17. Distribution of lithics, Zone 3, 45-OK-287.

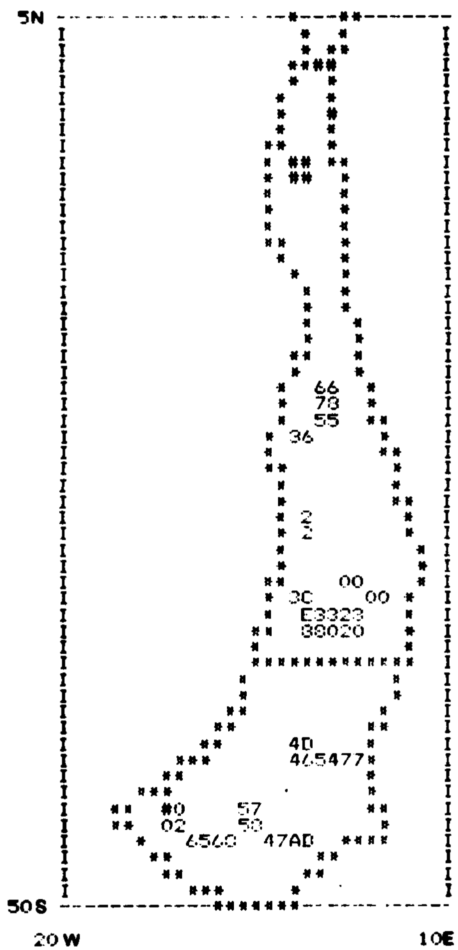


Figure D-18. Distribution of bone, Zone 3, 45-OK-287.

KEY

FREQUENCY INTERVALS

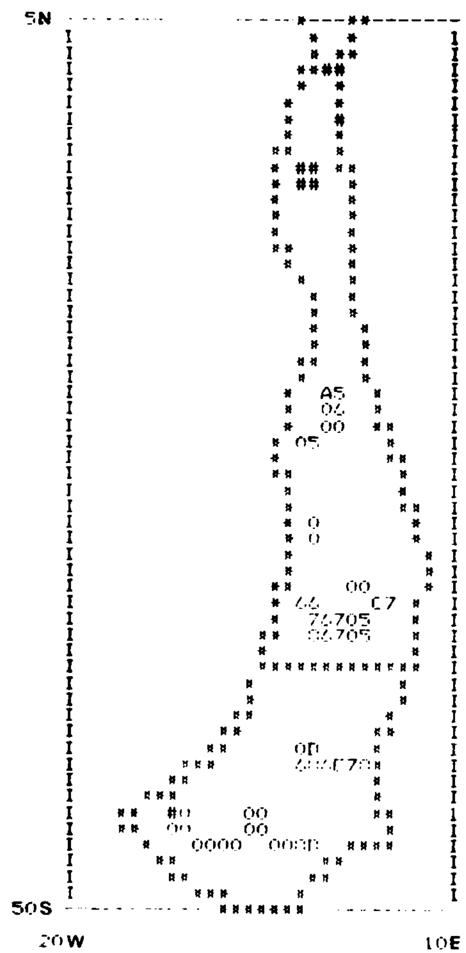
Interval	Minimum Value	Maximum Value
1	0	0
2	1	1
3	3	4
4	7	7
5	8	11
6	12	16
7	20	27
8	28	38
9	57	177

INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	177	D	65
B	121	E	57
C	104		

STATISTICS

Mean	20.4	Sum	999
s.d.	33.2	SS	74,429
Count	49	Var	1,103.3



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	-99	-99
3	-99	-99
4	-99	-99
5	1	2
6	3	5
7	6	8
8	9	13
9	15	31

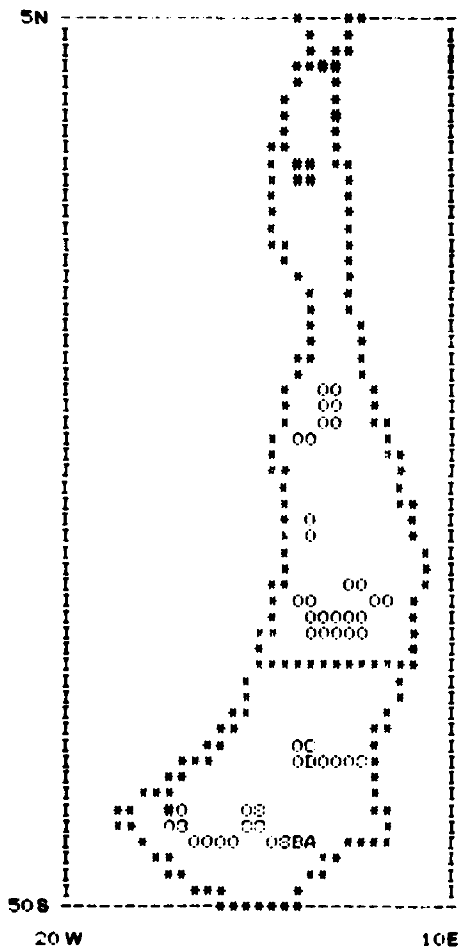
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	31	D	17
B	24	E	15
C	19		

STATISTICS

Mean	4.4	Sum	214
s.d.	6.8	SS	3,188
Count	49	Var	46.0

Figure D-19. Distribution of FMR, Zone 3, 45-OK-287.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	-99	-99
3	-99	-99
4	-99	-99
5	-99	-99
6	-99	-99
7	-99	-99
8	1	2
9	3	14

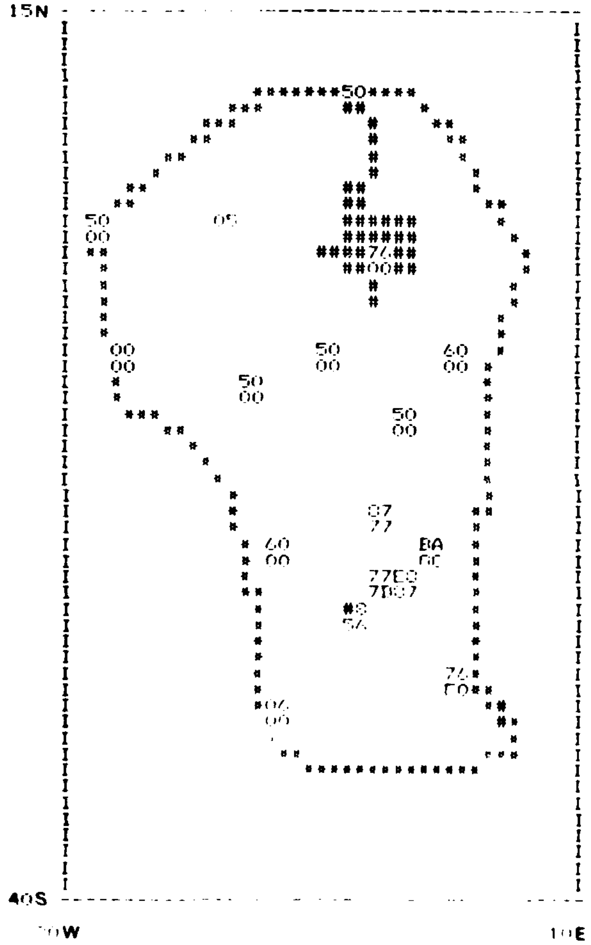
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	14	C	4
B	4	D	3

STATISTICS

Mean	.7	Sum	33
s.d.	2.2	SS	249
Count	49	Var	4.8

Figure D-20. Distribution of shell, Zone 3, 45-OK-287.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	-99	-99
3	-99	-99
4	-99	-99
5	1	1
6	2	2
7	3	6
8	7	11
9	13	32

INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	32	E	15
B	27	F	14
C	25	G	13
D	16		

STATISTICS

Mean	3.8	Sum	238
s.d.	6.8	SS	3,780
Count	63	Var	45.9

Figure D-21. Distribution of lithics, Zone 2, 45-OK-288.

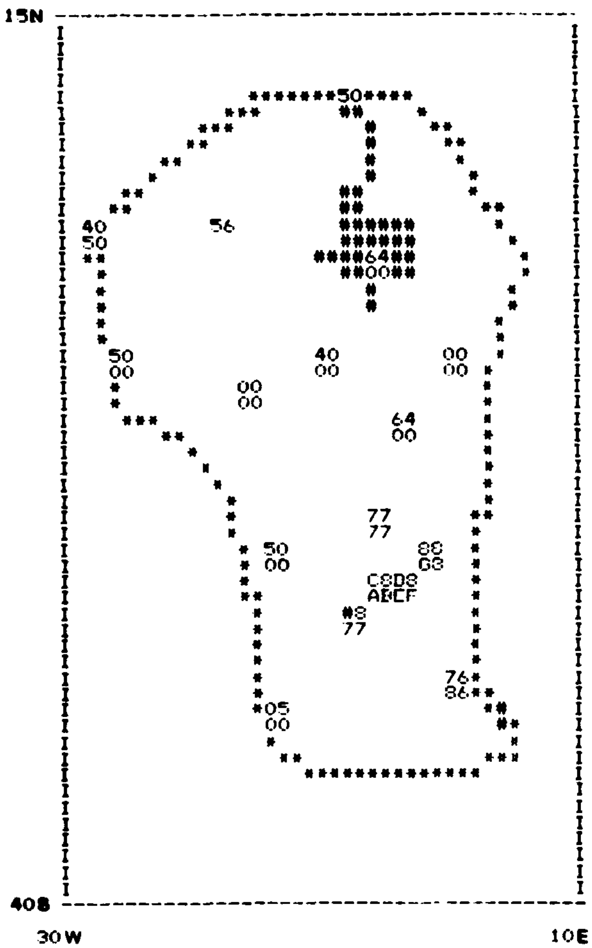


Figure D-22. Distribution of bone, Zone 2, 45-OK-288.

KEY

FREQUENCY INTERVALS

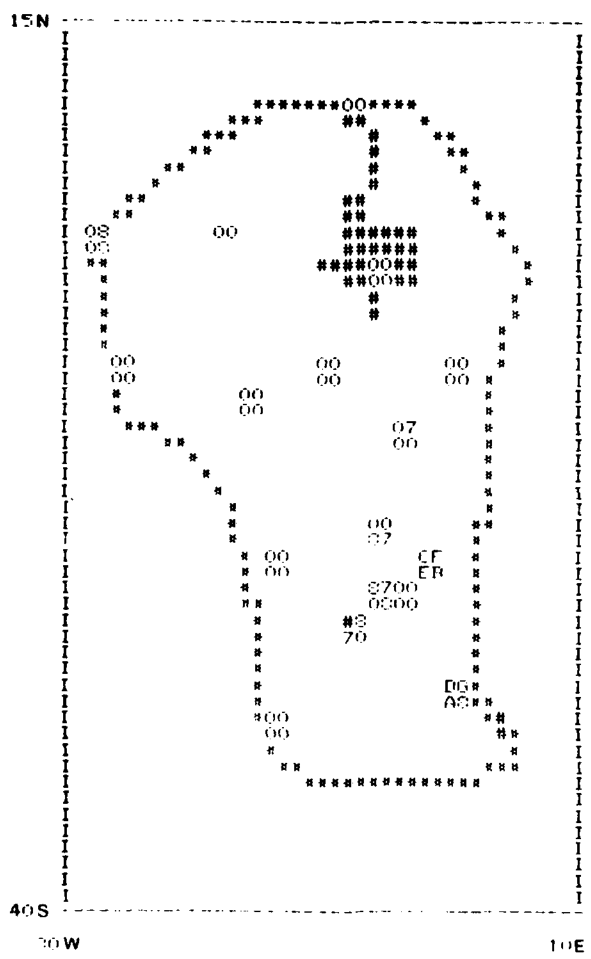
Interval	Minimum Value	Maximum Value
1	0	0
2	-99	-99
3	-99	-99
4	1	1
5	2	3
6	6	10
7	11	62
8	74	115
9	120	504

INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	504	E	158
B	236	F	137
C	197	G	120
D	163		

STATISTICS

Mean	38.3	Sum	2,411
s.d.	80.6	SS	501,511
Count	63	Var	6,495.9



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	-99	-99
3	-99	-99
4	-99	-99
5	-99	-99
6	-99	-99
7	1	1
8	3	6
9	8	37

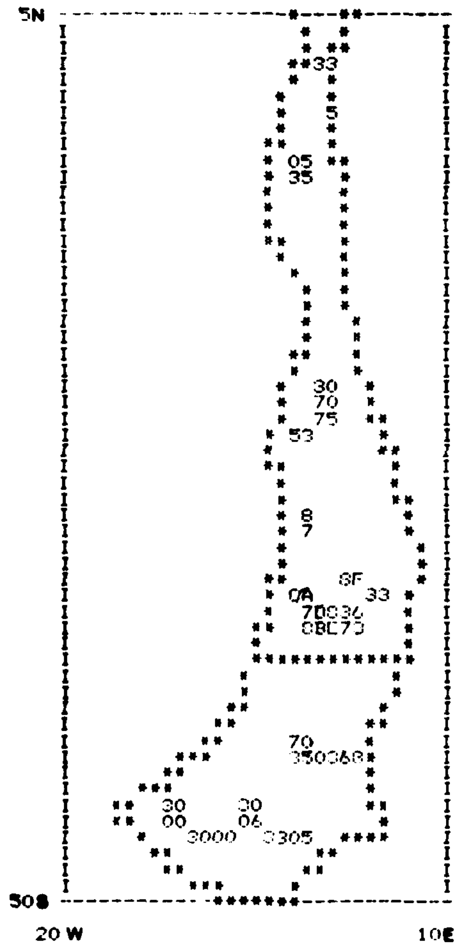
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	37	E	14
B	19	F	11
C	15	G	8
D	14		

STATISTICS

Mean	2.4	Sum	153
s.d.	6.1	SS	2,679
Count	63	Var	36.6

Figure D-23. Distribution of FMR, Zone 2, 45-OK-288.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	-99	-99
3	1	1
4	-99	-99
5	2	2
6	3	3
7	4	5
8	6	11
9	12	23

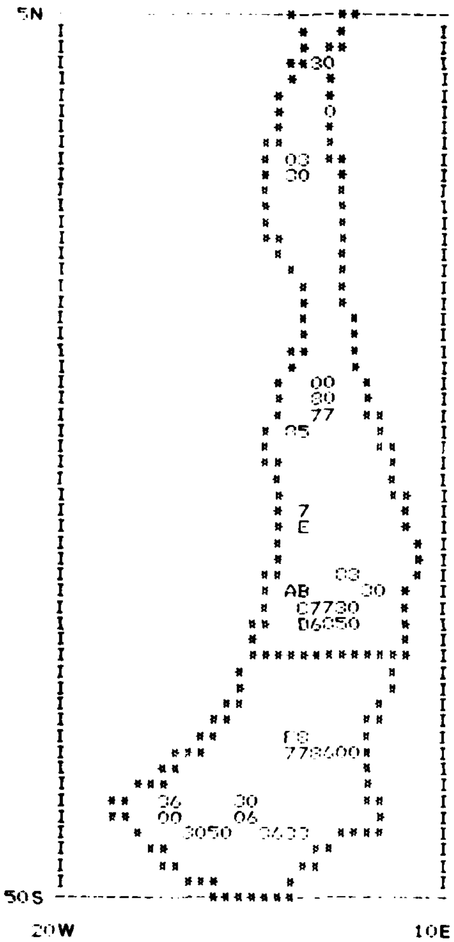
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	23	D	13
B	20	E	12
C	20	F	12

STATISTICS

Mean	3.6	Sum	207
s.d.	5.3	SS	2,331
Count	57	Var	27.7

Figure D-24. Distibution of lithics, Zone 2, 45-OK-287.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	-99	-99
3	1	1
4	-99	-99
5	2	2
6	3	7
7	8	14
8	15	27
9	28	74

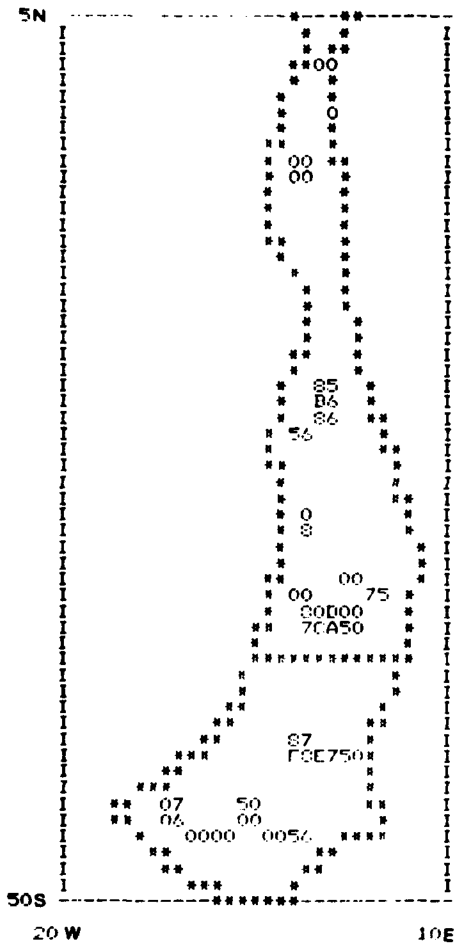
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	74	D	40
B	53	E	34
C	44	F	28

STATISTICS

Mean	9.0	Sum	515
s.d.	15.1	SS	17,595
Count	57	Var	227.1

Figure D-25. Distribution of bone, Zone 2, 45-OK-287.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	-99	-99
3	-99	-99
4	-99	-99
5	1	1
6	2	3
7	4	8
8	9	18
9	28	181

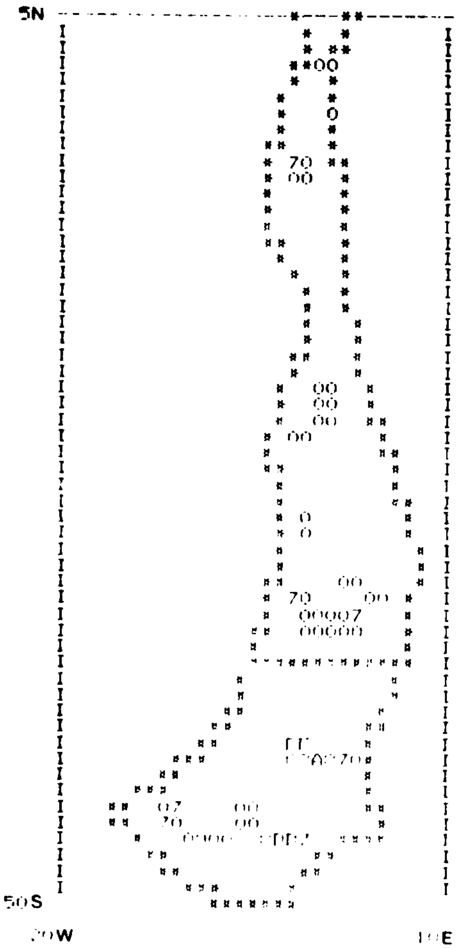
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	181	D	31
B	61	E	30
C	45	F	28

STATISTICS

Mean	8.8	Sum	499
s.d.	25.8	SS	42,353
Count	57	Var	666.4

Figure D-26. Distribution of FMR, Zone 2, 45-OK-287.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	-99	-99
3	-99	-99
4	-99	-99
5	-99	-99
6	-99	-99
7	1	1
8	2	3
9	4	6

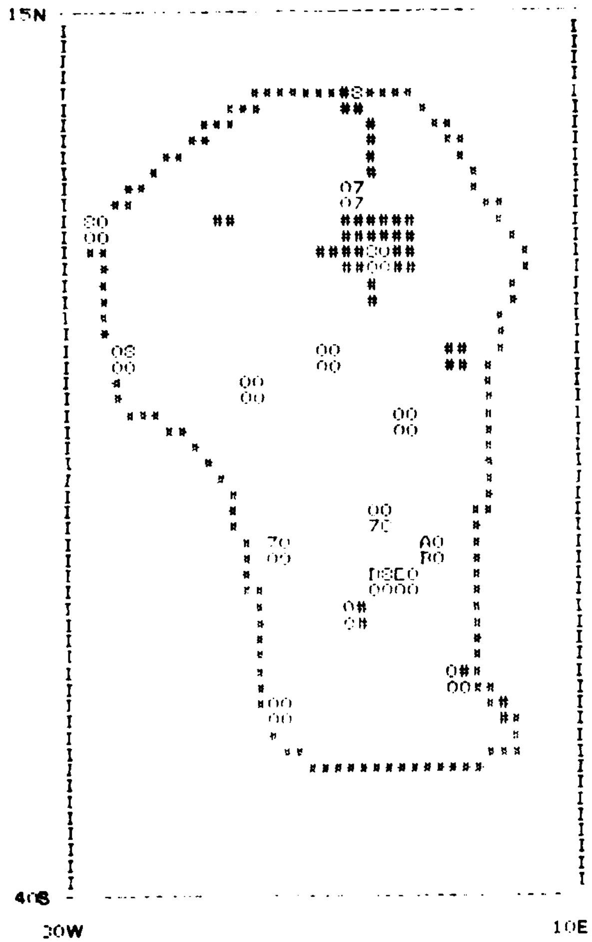
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	6	D	4
B	5	E	4
C	5	F	4

STATISTICS

Mean	.7	Sum	42
s.d.	1.5	SS	158
Count	57	Var	2.2

Figure D-27. Distribution of shell, Zone 2, 45-OK-287.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	-99	-99
3	-99	-99
4	-99	-99
5	-99	-99
6	-99	-99
7	1	1
8	2	2
9	3	10

INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	10	D	7
B	6	E	3
C	8		

STATISTICS

Mean	.9	Sum	50
s.d.	2.1	SS	310
Count	58	Var	4.6

Figure D-28. Distribution of lithics, Zone 1, 45-OK-288.

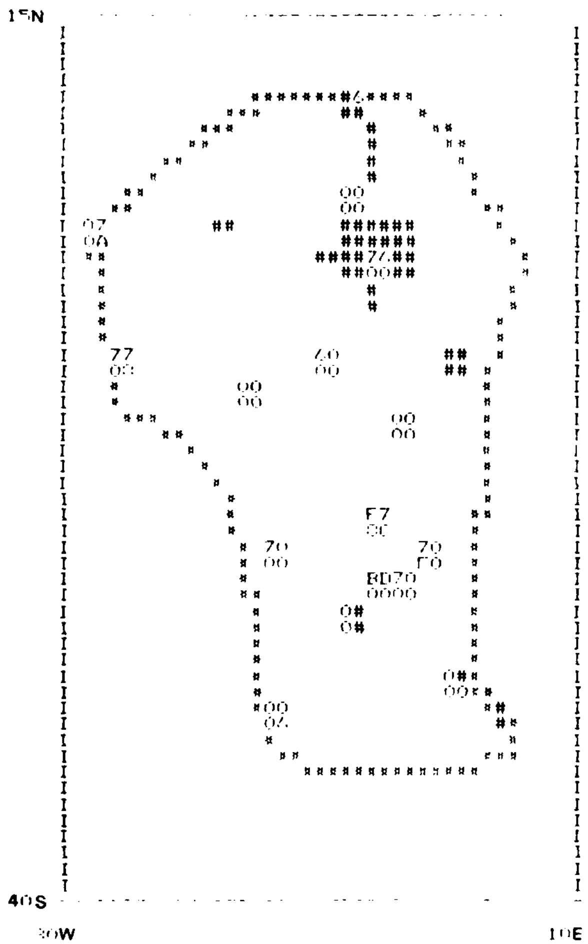


Figure D-29. Distribution of bone, Zone 1, 45-OK-288.

KEY

FREQUENCY INTERVALS

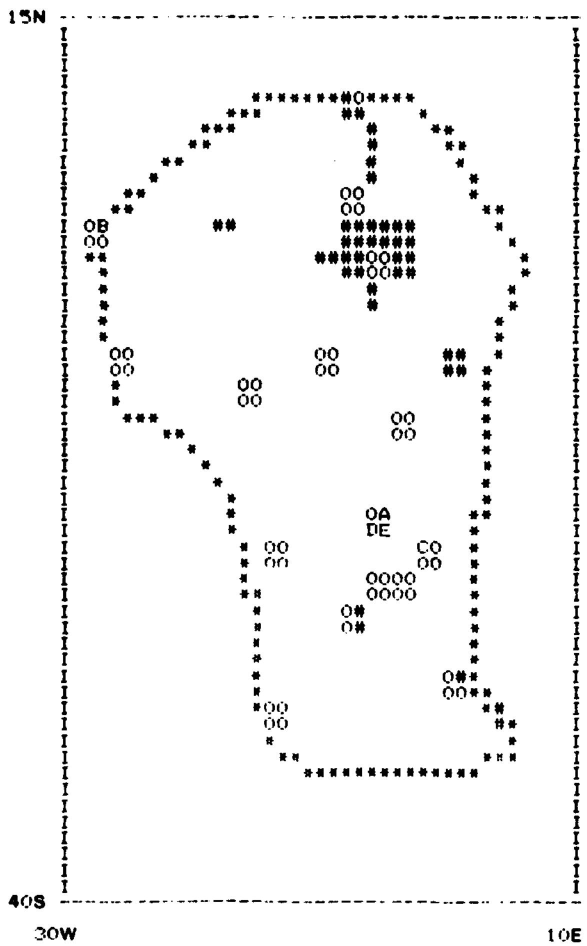
Interval	Minimum Value	Maximum Value
1	0	0
2	-99	-99
3	-99	-99
4	-99	-99
5	-99	-99
6	1	1
7	2	5
8	7	8
9	10	124

INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	124	D	34
B	46	E	10
C	36	F	10

STATISTICS

Mean	5.4	Sum	313
s.d.	18.0	SS	20,429
Count	58	Var	323.1



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	0	0
2	-99	-99
3	-99	-99
4	-99	-99
5	-99	-99
6	-99	-99
7	-99	-99
8	-99	-99
9	1	2

INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	2	D	1
B	1	E	1
C	1		

STATISTICS

Mean	.1	Sum	6
s.d.	.4	SS	8
Count	59	Var	.1

Figure D-30. Distribution of FMR, Zone 1, 45-OK 288.

APPENDIX E:

DESCRIPTION OF CONTENTS OF UNCIRCULATED APPENDICES

Detailed data from two different analyses are available in the form of hard copies of computer files with accompanying coding keys.

Functional analysis data include provenience (site, analytic zone, excavation unit and level, and feature number and level (if applicable); object master number; abbreviated functional object type; and coding that describes each tool on a given object. Data normally are displayed in alphanumeric order by site, analytic zone, functional object type, and master number. Different formats nay be available upon request depending upon research focus.

Faunal analysis data include provenience (site, analytic zone, excavation unit and level, feature number, and level (if applicable); taxonomy (family, genus, species); skeletal element; portion; side; sex; burning/butchering code; quantity; and age. Data normally are displayed in alphanumeric order by site, analytic zone, provenience, taxonomy, etc.

To obtain copies of the uncirculated appendices contact U.S. Army Corps of Engineers, Seattle District, Post Office Box C-3755, Seattle, Washington, 98124. Copies also are being sent to regional archives and libraries.

END

FILMED

2-86

DTIC