THE WYOMING ARCHAEOLOGIST

VOLUME 30(1-2)
SPRING 1987

THE WYOMING ARCHAEOLOGIST

THE WYOMING ARCHAEOLOGICAL SOCIETY, INC.

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Membership period is from January through December. All subscriptions expire with the Winter Issue and renewals are due the first part of January each year. Continuing members whose dues are not paid by March 30 of the new year will receive back issues only upon payment of $5.00 per issue.

If you move or have a change of address, please notify the Executive Secretary/Treasurer. Your WYOMING ARCHAEOLOGIST <u>will not be forwarded</u> unless a payment of $1.00 is received for return and forwarding postage.

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State Society yearly subscription rates are as follows:

Individual Associate Member @ $10.00
Single Active Member @ $6.00
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Institutional Member @ $15.00
Other Memberships, including Supporting and Contributing are available. Contact the Executive Secretary/Treasurer for information. Local chapter dues are in addition to the state society dues listed above. The Wyoming Archaeological Society is a Non-Profit Organization.

THE UNIVERSITY OF WYOMING
DEPARTMENT OF ANTHROPOLOGY
UNIVERSITY STATION, BOX 3431
LARAMIE, WYOMING 82071

April 21, 1987

TO: Department Faculty, Staff, Students, Ex-Students, Friends, State of Wyoming Archaeologists and Staff, and All Other Participants.

FROM: George Frison [signature]

Monday, April 13, 1987 has to be a lifetime highlight for the recognition expressed at the surprise luncheon and by the Vince Valdez bronze, mountain sheep head. Nothing could be more rewarding than to know that one's cohorts, students, and friends would take their time, efforts, and resources to express their feelings. The efforts are deeply appreciated and will be long remembered.

GCF/tlc

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WYOMING ARCHAEOLOGICAL SOCIETY
1987 SPRING MEETING, MINUTES

The 1987 business meeting of the Wyoming Archaeological Society was held on Friday, April 3, 1987 at Casper College. The meeting was called to order at 7:10 P.M. by President Carolyn Buff.

Certification of Delegates

Voting delegates and alternates presented their credentials. A roll call of delegates was taken by the Executive Secretary, Kerry Lippincott.

Secretary's Report

A motion was made by Patt Brown and seconded by Bonnie Johnson that the minutes of the last business meeting be approved as published in the Spring 1986 issue of The Wyoming Archaeologist. The motion passed.

Treasurer's Report

The financial statements for the Society and Foundation were presented for auditing by Treasurer Milford Hanson. John Albanese and B.J. Earle audited the statements. A motion was made by Frank Zeller and seconded by Grover Phelan that the statements be accepted as audited. The motion carried. A copy of those statements is appended.

Editor's Report

Editor George Brox stated that it had been a pleasure to have served as editor. He said that in some ways he was sorry not to continue as editor, but thought that after 12 years, it was someone else's turn to hold the office. He was applauded by the membership for his efforts in the office.

Librarian's Report

In the absence of the librarian, Mark Miller reported that the Society's library and permanent records are on file and available to members at the Department of Anthropology, University of Wyoming.

Committee Reports

The Scholarship Committee will meet on Saturday to discuss the applicants for the Mulloy and Frison Scholarships.

Chapter Reports

Written reports of chapter activities for 1986-1987 were presented by the Fremont County, North Big Horn Basin, Rawlins, Cheyenne, and Sweetwater County Chapters. An oral presentation was given by the High Plains Chapter.

Old or Unfinished Business

Mark Miller reported on two bills introduced before the 1987 Wyoming Legislative session. A bill was passed which codified into law the executive order of several years ago in which the State Historic Preservation Office was transferred from the jurisdiction of the Recreation Commission to the Archives, Historical and Museum Department, and which divided several historic sites between the two agencies. House Bill 458 was introduced by Rep. Matilda Hanson. It was designed to make the State Archaeologist's office more comparable to that of the State Geologist. the bill did not make it onto the floor of the House, but it is planned that it will be reintroduced next year. Dr. Miller asked for the Society members' support in amending a final version of this bill.

New Business

President Carolyn Buff reported that there was no money available for publication of The Wyoming Archaeologist. The budget has been cut for the Wyoming Recreation Commission, which had previously paid for the print of the Archaeologist. She reported that the Executive Committee had discussed the possibility of a dues increase, but had not wanted to act without discussion with the membership. An extensive discussion ensued covering printing costs, quality control, postal rates, possible means of reducing expenditures, and other ways to increase income. In the end, a motion was passed which would allow the use of $750.00 of the Society's money to pay for the printing of the Archaeologist.

In addition, a motion was made and

seconded to change the Society's By-Laws so that the positions of Executive Secretary and Treasurer would be combined. After a discussion of the complexity of communication between various officers spread across the state, and the efficiency of a computerized mailing list, the motion was passed. The change in the By-Laws will take effect 90 days after this vote.

Discussion of the availability and prices for back issues of the Archaeologist led to a motion by Susan Hughes, seconded by Patt Brown, that a committee or individual be appointed to report to the Executive Committee on that matter. The motion passed.

Election of Officers

A nominating committee headed by George Brox presented as a slate of officers the following:

President -- Alan Korell
1st Vice Pres. -- William Scoggin
2nd Vice Pres. -- Frank Zeller

A unanimous vote placed these individuals in those positions. Alan Korell wished to express, for the society, his gratitude to the retiring officers: Carolyn Buff, Milford Hanson, and George Brox.

Summer Meeting

Dave Eckles presented some of the results of last summer's meeting at the Edness Kimball Wilkins State Park and plans for future work at the site. However, he felt that there would not be enough area opened up to have another summer meeting there. In lieu of a summer meeting, a Fall Workshop at the University was well attended last year, and it was recommended that it be continued on a subject of interest to the membership.

Spring Meeting

The Spring Meeting for 1988 was tentatively set for the Lander-Riverton area, pending discussion with, and approval by, the Fremont County Chapter.

Announcements

Announcements were made for Sunday's Field Trip, Mary Leakey's lectures, and the conversion to Daylight Savings Time.

Adjournment

At 9:15 P.M., a motion was made and seconded to adjourn the meeting. The motion passed.

SCHOLARSHIP COMMITTEE REPORT

The Scholarship Committee decided not to award any scholarships this year due to budget uncertainties.

GOLDEN TROWEL AWARD

President Carolyn Buff asked George Brox to present the Golden Trowel Award this year to June Frison, in recognition of her long standing support of Wyoming archaeology. [see pictures following].

PROGRAM

On Saturday, April 4th, the program of the annual meeting was held at the College Center, Casper College. A copy of the program is appended.

BANQUET AND GUEST SPEAKER

The annual banquet was held at the Downtowner Motor Hotel. The banquet speaker was Dr. Cynthia Irwin-Williams of the Desert Research Institute, Reno, Nevada. She gave a lecture and slide presentation on her excavations at Salmon Ruin, New Mexico.

Respectfully submitted,

(signed)

Kerry Lippincott
Executive Secretary

WYOMING
ARCHAEOLOGICAL SOCIETY, INC.

WYOMING ARCHAEOLOGICAL SOCIETY
1986-87
FINANCIAL STATEMENT

3/14/86	Balance - Checking		$ 2,014.10
	Income to 3/14/87		1,216.50
			$ 3,230.60
	Expenditures:		
	Scholarships	700.00	
	Sec'y of State	3.00	
	Editor	150.00	
	Spring Meeting	1,345.88	
	Treasurer	66.00	
	Safety Deposit	10.00	
	Secretary	100.00	-2,374.88
	Total		855.72
3/14/87	Balance - Checking		$ 855.72
	Cert. of Deposit		10,028.53
	Net Worth		$10,884.25

This report respectfully submitted by:

Milford F. Hanson, Treasurer, W.A.S.

Audit Committee:

1. ______________________

2. ______________________

3. ______________________

Wyoming Archaeological Foundation

WYOMING ARCHAEOLOGICAL FOUNDATION

1986-87
FINANCIAL STATEMENT

3/14/68	Balance-Checking	$ 785.79
	Donations	959.06
		$1,744.85
	Expenditures:	
	N.B.H.B. (Carbon dates)	300.00
	Sec'y. of State	3.00
		-303.00
		1,441.85
3/14/87	Balance-Checking	$ 1,441.85
	GNMA	15,594.10
	Net Worth	$17,035.95

This report respectfully submitted by:

Milford Hanson, Treasurer, W.A.F.

Audit Committee:

1.

2.

3.

George Brox, past State President of the Wyoming Archaeological Society, and recently resigned editor of The Wyoming Archaeologist is seen here presenting the 1987 Golden Trowel Award to Mrs. June Frison. The Golden Trowel Award is an annual award given by the Wyoming Archaeological Society to an amateur archaeologist who has contributed to the advancement of archaeological knowledge in the state. Mrs. Frison was presented the award to honor her long commitment to keeping field crews happy.

A collection of Indian artifacts from southeastern Wyoming was recently donated to the Wyoming Archives, Museums, and Historical Department by Dave Cook, author and life-long resident of Cheyenne. He is shown here (second from left) with his collection and (l-r) Grant Wilson, State Museum Volunteer and member of the Wyoming Archaeological Society; Bob Gant, Curator of Collections; and Mike Mayfield, Curator of Anthropology and Natural History. (AMH Photo by Linda Rollins).

George C. Frison, University of Wyoming Anthropology Department Head, and former Wyoming State Archaeologist is seen receiving a bronze mountain sheep head in appreciation of his tenure as department head and his long term commitment to the advancement of Wyoming archaeology. Presenting the bronze on behalf of the many present and former students and associates of Frison´s who contributed to the purchase are Cary Craig-Ingbar (left), a former student of Frison´s, and Terri Craigie, Anthropology Department secretary, at a recent luncheon honoring Frison.

George Frison and his bronze mountain sheep head.

1987 Annual Meeting of the Wyoming Archaeological Society

List of Topics

Paper 1	Carl Spath (State Historic Preservation Office) "Public Involvement in Site Preservation"
Paper 2	Elizabeth Cartwright (University of Wyoming) "Dendroclimatic Analysis of Bighorn Sheep Traps in the Absaroka Mountains"
Paper 3	David Reiss (Wyo. State Archaeologist Office) "Report of a Late Prehistoric Period Bone Grease Manufacturing Area, 48NA1152"
Paper 4	Dale Wedel (University of Wyoming) "An Overview of Historical Archaeology Along Keyhole Reservoir"
Paper 5	Dennis Eisenbarth (High Plains Chapter) "Salvage Archaeology in Eastern Wyoming"
Paper 6	Brian Waitkus (Wyo. State Archaeologist Office) "A Woodland-Besant Occurrence in Central Wyoming"
Paper 7	Danny Walker (Wyo. State Archaeologist Office) "Archaeological Evidence for the Use of Small Mammals by Prehistoric Inhabitants on the Northwestern Plains"
Paper 8	Jennifer Woodcock (Laramie, Wyoming) "Dental Pathology of the University of Wyoming Amerind Osteological Collection"
Paper 9	James Truesdale (Wyo. State Archaeologist Office) "A Preliminary Analysis of Burial Attributes From Records Available at the University of Wyoming"

BUSH SHELTER (48WA324): A MULTI-COMPONENT DRY ROCKSHELTER IN THE FOOTHILLS OF THE BIG HORN MOUNTAINS

KAREN G. MILLER

ABSTRACT

Bush Shelter (48WA324) is a multi-component dry rockshelter in the southwestern foothills of the Big Horn Mountains of Wyoming. Paleoindian and Early Plains Archaic cultural levels are overlain by disturbed deposits containing Middle and Late Plains Archaic projectile points. A small but diverse assemblage of stone, bone, shell and perishable artifacts was recovered. Perishable items included fragments of cordage, sewn leather, worked wood and basketry. Analysis of the cultural assemblage indicates that an array of activities were undertaken at the site. Numerous remains of small mammals and preserved macrofloral materials are contained within the three meters of stratified archaeological sediments.

INTRODUCTION

Bush Shelter (48WA324) is located 50 km southeast of Tensleep, Wyoming along the South Fork of Little Canyon Creek (Figure 1), at an elevation of 1825 m. The environment near the site is transitional between the plains of the Bighorn Basin and the mountain slopes of the southern Big Horn Mountains. Chipped stone artifacts were initially observed on the surface in

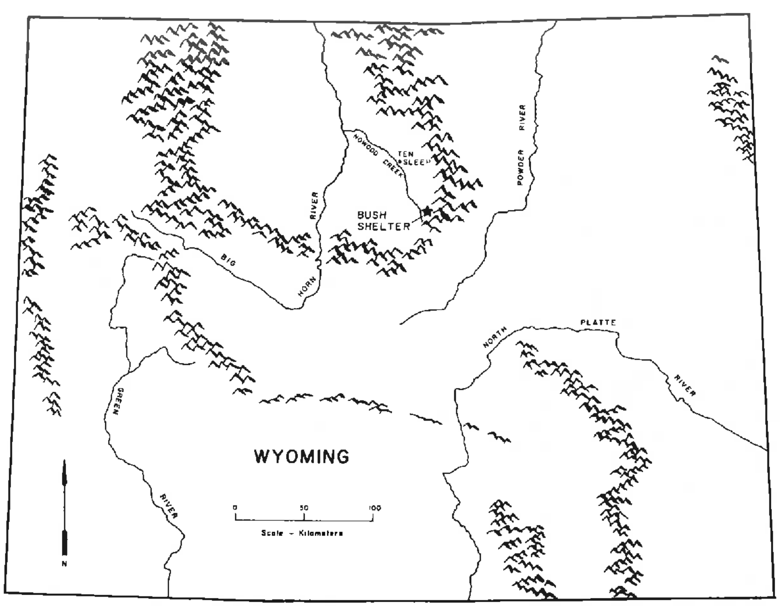

Figure 1: Location of Bush Shelter (48WA324) in relation to major physiographic features in Wyoming.

front of the south facing exposure of Tensleep Sandstone (Figure 2).

Because of the depositional setting of the site, a testing program was initiated in 1977. The primary purpose of the testing program was to determine presence, age and integrity of archaeological deposits at the site. A secondary goal was to assess the potential of Bush Shelter to contribute to research problems of prehistoric adaptation to the foothill environment of the Big Horn Mountains.

Excavation of an exploratory trench (Figure 3) showed that three meters of stratified archaeological deposits were located under the overhang. Middle and Late Plains Archaic projectile points were recovered within the first meter of deposits (Figure 4). This level has been disturbed by rodent burrowing and pack rat nests. A hearth in this level was dated to 3960 ± 80 BP (UCR-2047). The radiocarbon date falls within the Middle Plains Archaic period. However, an associated projectile point would have suggested a Late Plains Archaic date. It thus seems likely that cultural materials from at least two occupations have been mixed in this upper meter of deposits.

Perishable items were common throughout this level. Artifacts such as cordage, leather, hair, basketry and worked wood were recovered, along with pine cones, seeds, twigs, branches, snail shells and fecal pellets.

Below this disturbed deposit, a dark-colored stratigraphic level contained many stone tools and flakes. An associated projectile point is similar to Early Plains Archaic points recovered at Laddie Creek (Frison 1978), Mummy Cave (McCracken et al. 1978) and Sorenson (Husted 1969). Charcoal from this level provided a radiocarbon date of 5700 ± 80 BP (UCR-2045). This date indicates at least one occupation late in the Early Plains Archaic period.

Sixty-five centimeters below the Early Plains Archaic level is another dark gray stratigraphic level also containing archaeological materials. A concave-base, lanceolate projectile point recovered from this level is similar to one excavated at Medicine Lodge Creek (Frison 1983). The Medicine Lodge Creek projectile point was from a level dated to 9700 ± 620 BP (RL-172; Frison 1975). Two radiocarbon dates were obtained from this level at Bush Shelter. A date of 9000 ± 240 BP (RL-1407; Frison 1983) was obtained from a hearth feature. An associated packrat midden with burned organic matter provided a date of 9530 ± 100 (UCR-2048). This Paleoindian

Figure 2: Tensleep Sandstone outcrop at Bush Shelter.

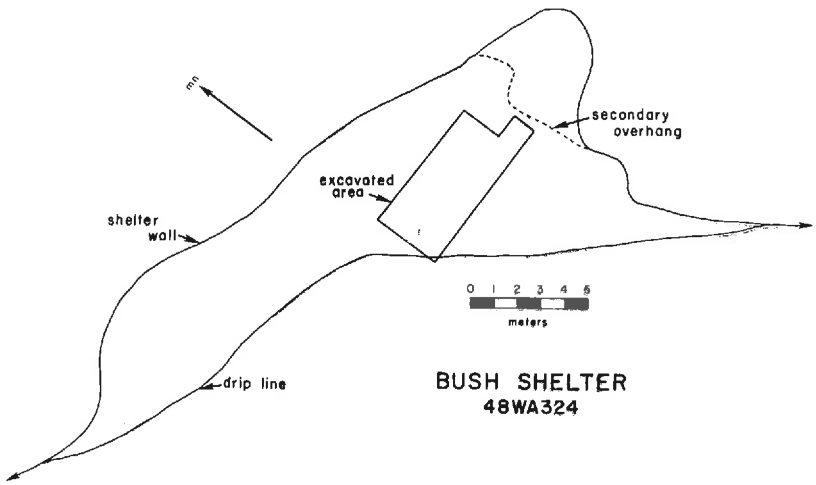

Figure 3: Excavated area at Bush Shelter.

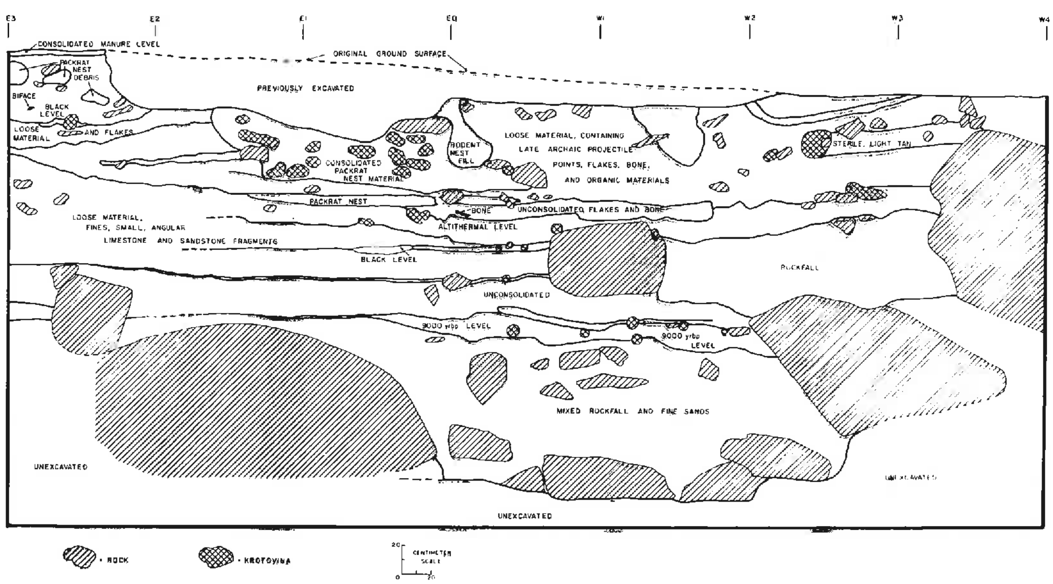

Figure 4: East-west profile of south wall of excavated area at Bush Shelter.

occupation is truncated in several areas of the site by extensive rockfall.

Where large boulders did not prevent excavation, stratified sediments continued below the Paleoindian level with no suggestion of earlier cultural occupations. Skeletal remains of numerous species of small mammals, particularly microtine rodents, are abundant through the sequence, especially in these lower levels. The presence of these ecologically sensitive microtines has been used to examine changing paleoenvironmental conditions in the southern foothills of the Big Horn Mountains during the Late Pleistocene and early Holocene (Walker et al. 1985).

Analyses of soils, macrofloral remains, pollen and phytoliths from within the hearth features and sediments may also indicate paleoclimatic changes. Long term shifts in precipitation and temperature patterns would effect regional distribution of floral and faunal resources. Ethnographic observations of historic hunters and gatherers in northern Wyoming indicate that yearly settlement activities were based on a thorough knowledge of resource distribution and seasonal availability (Fowler 1965; Fox 1976). Archaeological evidence suggests that prehistoric hunters and gatherers of the region also exploited specific resources within a seasonal cycle of residential mobility (Frison 1978; Loendorf 1973).

An understanding of modern environmental dynamics is crucial to discussions of changing resource distribution patterns. The modern environment near Bush Shelter is diverse with many exploitable plants and animals. Climate, local geology, soil and vegetation are interelated factors important to development, growth and maintenance of vegetative communities.

ENVIRONMENTAL SETTING

Climate

The Absaroka, Owl Creek and Big Horn Mountains encircle the Bighorn Basin (Figure 1). The only non-mountainous entrance into the basin is from the plains of southern Montana to the north.

Although the Bighorn Basin is physiographically related to the Great Plains, the basin is too dry to support a true plains grassland. The rain shadow affect of the surrounding mountains prevent extensive moisture bearing storm systems from entering the basin. Rainfall amounts in the Great Plains average 30.5 to 40.6 cm per year (Brown 1980). The interior Bighorn Basin receives 13.0 to 28.0 cm of rain per year (Becker and Alyea 1964) and supports a natural vegetation dominated by desert shrubs. Approximately half of the annual rainfall is received during the months of April, May and June. During this period storm systems tend to enter the basin through the open plains corridor to the north. These spring storms, sweeping in from the north, are an important source of precipitation to the southern foothills. As these systems continue south, they lose moisture when they rise to cross the southern flanks of the Big Horn Mountains.

Between 1965 and 1986 average yearly rainfall at the weather recording station 25 km southeast of Tensleep was 34.2 cm at an elevation of 1426 m (National Oceanic and Atmospheric Administration 1965-1986). Seasonal precipitation patterns at this station have the characteristic spring peak, with a dry period during July and August. Most summer rainfall is from localized thunderstorms.

A smaller precipitation peak occurs in September and October. The winter months are dry, but subject to variation from year to year. Annual precipitation also varies from one year to the next. During 20 years of weather records for the Tensleep station, the amount of precipitation per year ranged from a low of 25.3 cm in 1973 to a high of 48.4 cm in 1978.

Monthly average temperatures reflect long cold winters and short hot summers. Temperature extremes of -35° C in the winter and +33° C in the summer are not uncommon. Average temperatures at the Tensleep station also varied considerably from year to year. For instance, annual average temperature in 1985 was 3.8° C, while in 1981, it was 7.3° C.

Although the Tensleep weather recording station is 400 m lower in elevation, recorded temperature and precipitation amounts closely approximate the Bush Shelter modern climatic pattern. Slightly higher precipitation and lower temperatures would be expected at Bush Shelter.

Geology

Local geology must also be considered when describing modern vegetation community distribution. Initially, the texture and chemical constituents of the soil are byproducts of bedrock decomposition. Plant species have specific environmental requirements related to soil depth and texture, chemical composition and water availability (Despain 1973).

The Big Horn Mountains are a faulted eliptical uplift (Darton 1906). Concentric layers of sedimentary deposits are tilted against the Precambrian granitic core, exposed at the central Big Horns summit. The mountain fronts are steep and rugged with deeply incised drainage channels. Sedimentary layers resistant to erosion have formed cliffs, ledges and scarps along larger streams and slopes where they are exposed.

The Tensleep Sandstone, a resistant member of the Amsden formation, is prominent along canyons of the Paintrock, Little Canyon, Otter and Tensleep drainages and locations along Nowood River (Darton 1906). The Pennsylvanian Tensleep Sandstone is a massive white to beige sandstone that ranges up to 350 feet in thickness. On the eastern flanks, the steeply tilted sandstone forms high jagged cliffs along a narrow band across the mountain front. In many areas on the northwestern flanks, the Tensleep sandstone is thin and outcrops only as an inconspicuous ledge (Darton 1906). The sandstone is thicker on the southwestern flanks and due to local faulting, has a lesser angle of tilt. This results in a broad band of exposure in the southwestern foothills. The internal structure of the sandstone varies between the eastern and western flanks. On the western flanks, the sandstone is softer and has more internal variation from top to bottom. Upper layers of outcrops tend to be harder than bottom. Larger outcrops on the western flanks have a tendency to be undercut (Darton 1906). Shallow caves and protected overhangs are common in large exposures on the western flanks of the central and southern Big Horns.

These protected overhangs and shallow caves were used by prehistoric hunters and gatherers (Frison et al. 1986). At Bush Shelter, evidences of prehistoric occupation were preserved as sandstone detritus and eolian sediments accumulated under the protected overhang.

LOCAL SITE SETTING

Soils and Vegetation

Vegetation at Bush Shelter is strongly influenced by decomposition of underlying geologic formations and erosion of soils derived from that decomposition. Six plant communities (discussed below) are found within a mile of Bush Shelter (Figure 5). Specific vegetation communities are associated with distinct soils differing in parent bedrock, soil depth and the rate of erosion (Soil Conservation Service 1983) (Table

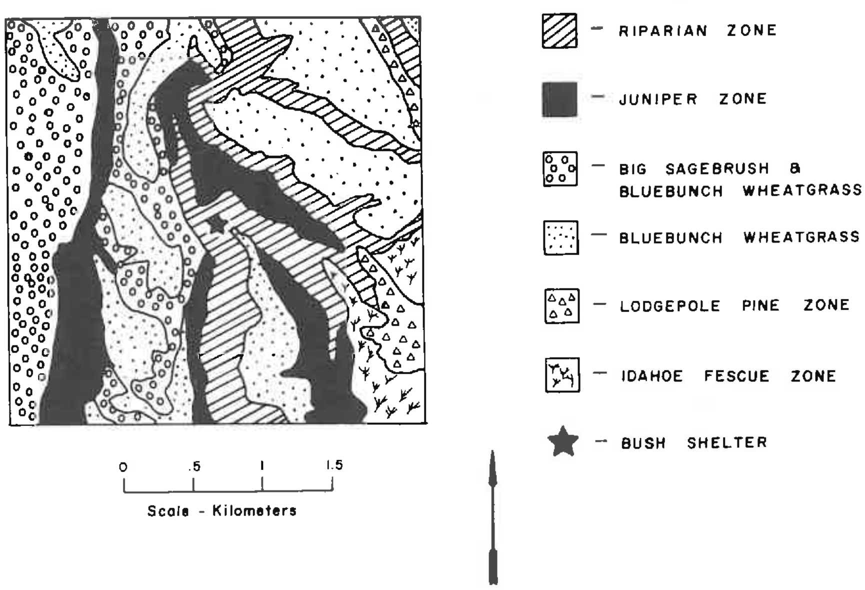

Figure 5: Major soil and vegetative communities within 1.5 km of Bush Shelter (adapted from Soil Conservation Survey 1983).

1).

Riparian Zone

Soils along the South Fork of Little Canyon Creek near Bush Shelter, are products of decomposing limestone bedrock. They are shallow, rocky and well drained. The soil erosion rate is high with no deep accumulations of soil. Water is available for plant growth and several species of grasses, forbes and shrubs are present (Miller 1964). This community is dominated by curlleaf mountain mahogany (Cercocarpus ledifolius). Of the 55 plant species documented by Miller (1964), 21 are edible (Table 2) (Harrington 1967) and could have been available prehistorically near Bush Shelter.

The riparian community is diverse with exploitable plant resources available at several different times of the year. The shoots are most palatable in the spring. Berries, seeds and tubers are available for consumption or storage in the late summer and early fall.

Juniper Zone

On western facing slopes above Bush Shelter soils are shallow, well drained and bright red in color (Soil Conservation Survey 1983). This coloration is from decomposition of red sands and siltstones of the Triassic Chugwater formation. Vegetation in this zone is distinctly different from the adjacent riparian area. Stands of Rocky Mountain (Juniperus scopulorum) and Utah Juniper (Juniperus osteosperma) dominate the community. Only 19 plant species were documented from this zone near Tensleep (Robinson 1966). Stands of juniper are intermixed with big sagebrush (Artemisia tridentata), needleandthread (Stipa comata), and bluebunch wheatgrass (Agropyron spicatum).

Dominant Plant Species	Parent Bedrock	Origin of Soil	Soil Depth
Curlleaf Mtn. Mahogany (Cercocarpus ledifolius)	Limestone	decomposition of bedrock	very shallow
Rky. Mtn. Juniper (Juniperus scopulorum)	Red Siltstone	decomposition of bedrock	shallow
Bluebunch Wheatgrass (Agropyron spicatum)	Tensleep SS Red Sandstone	alluvium derived from bedrock	variable
Sagebrush (Artemisia tridentata)	Tensleep SS	alluvium derived from bedrock	deep
Idaho fescue (Festuca idahoensis) and Columbia needlegrass (Stipa columbiana)	Sandstone	alluvium derived from bedrock	deep
Lodgepole pine (Pinus contorta) and Idaho fescue (Festuca idahoensis)	Sandstone	alluvium derived from bedrock	very deep stony loam

TABLE 1. Major soil and vegetative associations near Bush Shelter (adapted from Soil Conservation Survey, Washakie County 1983).

Species	Common Name	Edible Portion
Taraxicum officianlis	dandelions	shoots and leaves
Viola vallicola	violets	stems and leaves
Lactura ludoviciana	wild lettuce	young leaves
Alliuum textile	onion	bulbs
Descuainia pinnata	tansy mustard	shoots and seeds
Sedum stenopetalum	stonecrop	shoots
Cerastuim arbense	chickweed	shoots
Ribes cereum	squaw currents	fruit
Ribes setosum	gooseberries	fruit
Symphoricarpos vaccinoides	whortleberry	fruit
Amerlanchier alnifolia	western serviceberries	fruit
Prunus melanocarpa	chokecherries	fruit
Juniperus scopulorum	Rocky Mountain Juniper	fruit
Rhus trilobata	skunkbush sumac	fruit
Koelaria cristata	junegrass	seeds
Oryzopsis hymenoides	Indian ricegrass	seeds
Elymus cinerus	giant wild rye	seeds
Pinus flexilis	limber pine	pine cone seeds
Chenopodium album	lamb's quarters	seeds and shoots
Calochortus nuttallii	sagolilly	bulbs and flowers
Stellaria jamesiana	starwort	bulbs

Table 2: Edible species of plants identified in the mountain mahogany community of the western canyons of the Big Horn Mountains (derived from Miller 1964; Harrington 1967; Galvan 1976).

Utilization of floral and faunal resources of the juniper community may have been crucial during periods of winter food shortage. Although there are fewer edible plant species in this community, Rocky Mountain juniper may have been an invaluable source of food. Ethnographically, Rocky Mountain juniper provided a wide variety of products to Southwestern Indian groups (Bailey 1940; Burgh and Scoggin 1948; Castetter 1935; Chamberlain 1911; Cushing 1920; Palmer 1871; Robbins et al. 1916; Whiting 1939). Juniper berries have a high sugar content and were eaten raw, dryed, boiled, roasted and ground. Berries remaining on the plants are edible throughout the winter. In times of starvation the inner trunk bark was eaten.

This zone may also have been utilized prehistorically for seasonal hunting. Studies on habitat requirements of big game animals indicate that the juniper/mountain mahogany zones are important winter browse areas for mule deer and elk, especially during severe winters (Hanson 1974; Gerhardt 1976; Short et al. 1977).

Bluebunch Wheatgrass Zone

Soil depth in this zone is variable and not as subject to erosion as the previous two zones. Topographic relief is not as steep. Areas of soil accumulation support a grassland community dominated by bluebunch wheatgrass, needleandthread, Indian ricegrass and prickly pear (Opuntia polyacantha). This community occurs in patches along the front slopes and on gently sloping ridges and hillsides. Detailed documentation of plant species has not been compiled for this zone.

Big Sagebrush/Grassland Zone

This zone occurs in areas of sediment accumulation, such as alluvial fans. The soil is deep and well drained, but water availability for plants with deep tap roots is high. Plants observed in this community include big sagebrush, bluebunch wheatgrass, and Indian ricegrass (Soil Conservation Survey 1983).

Lodgepole Pine Zone

Lodgepole pine (Pinus contorta) dominate north facing slopes at an elevation of 1920 m. Soils are deep stony loams derived from alluvium of the sandstone bedrock. Idaho fescue, Columbia needlegrass, thickspike wheatgrass (Agropyron dasystachyum) and bluebunch wheatgrass are major plant species of this community. Despain (1973) documented four edible plants in association with lodgepole pine (Table 3). Lodgepole pine in the Big Horn Mountains is most commonly located in an elevational zone between 2130 m and 2900 m on a granitic bedrock (Despain 1973). Since the stand near Bush Shelter is outside its normal range, associated plant species may differ from those observed by Despain. Big game animals use this community year round (Soil Conservation Survey 1983).

Idaho Fescue/Columbia Needlegrass Zone

A small area of this grassland community is found 1.6 km southeast of Bush Shelter. Idaho fescue (Festuca idahoensis), Columbia needlegrass (Stipa columbiana), spike fescue (Hasperochloa kingii) and big sagebrush are species found in the stony sandstone alluvium of this zone.

Fauna

Larger game animals move into higher elevations during the summer and are not limited or diagnostic of vegetative community or elevational zone. Extant fauna common in the Big Horn Mountains include elk (Cervus elaphus), mule deer (Odocoileus hemionus), coyote (Canis latrans), white tailed jack rabbit (Lepus townsendii), snowshoe hare (Lepus americanus) and cottontail (Sylvilagus spp.). Big horn sheep (Ovis canadensis), moose (Alces alces), black bear (Ursus americanus) and cougar (Felis concolor) have been reduced historically. Grizzly bear (Ursus arctos), grey wolf (Canis lupus) and bison (Bison bison) were present historically, but are now extripated from the Big Horn Mountains (Miller 1964).

In contrast, smaller mammals, particularly microtine rodents, have specific environmental requirements. Ranges may be limited to specific ecological zones determined by temperature, precipitation, vegetation, or substrate (Robinson 1966; Miller 1964). Miller (1964) documented six species of small mammals from the mountain mahogany zone in the western canyons: least chipmunk (Eutamias minimus), bushy-tailed woodrat (Neotoma cinereus), montane vole (Microtus montanus), Ord's Kangaroo rat (Dipodomys ordii), western jumping mouse (Zapus princeps) and deer mouse (Peromyscus maniculatus). Robinson (1964) documented four species of small mammals from the adjacent juniper community: deer mouse, Bushy-tailed wood rat, least chipmunk, and Richardson's ground squirrel (Citellus richardsonii).

STRATIGRAPHY

The stratigraphic profile at Bush

Species	Common Name	Edible Portion
Vaccinium scoparium	whortleberry	fruit
Epilobium angustifolium	willow herb	leaves, shoots, stem
Frageria virginiana	wild strawberry	fruit
Arctostaphylos uva-ursi	kinnikinnick	leaves and fruit

Table 3: Edible species of plants identified in lodgepole pine community of Big Horn Mountains (adapted from Despain 1973 and Harrington 1967).

Shelter is complicated. Upper levels of the south trench wall (Figure 4) appear to be more disturbed than those along the east wall (Figure 6). The east wall profile will be used in a brief discussion of the stratigraphy. Gross differences in sediment color and texture were used to delineate stratigraphic levels. The following is a brief description of each level as mapped (Figure 6). Both dark-gray cultural levels, seen in the south wall profile (Figure 4), pinched out immediately to the west of the east east trench wall and are not included in this description. Few artifacts were recovered during excavation of the units adjacent to the east wall.

Consolidated Manure Level

This layer is an indurated level of modern cow manure that ranged from two to four cm in thickness. The manure is mixed with fecal pellets of packrats that have active nests at the rear of the overhang. Although there are artifacts in this level, they have no contextual integrity.

Dark Brown Sand

This level is a stratified dark brown sand containing horizontal layers of seeds, sticks, leaves and rodent fecal pellets. Skeletal remains of small mammals are common throughout this level. Flat lying sandstone fragments averaging five to seven centimeters in length were mixed with the brown sand. Almost all perishable cultural artifacts and many of the flakes and stone tools were recovered from this level.

Gray Ash Level

This unit is a homogeneous gray ash level with small pieces of charcoal up to 1.5 cm in size. There are many burned small mammal bones visible in the profile. There are no concentrations of charcoal or bone and no evidence of internal stratification. No cultural artifacts were recovered from this level.

Reddish Brown Sand

The sediment in this level is a brown silty sand with a slight red cast. There are no pebbles or rocks in this unit. Pack rat scats and macrofloral remains are less common in this level than above. No horizontal banding in the sediments is visible.

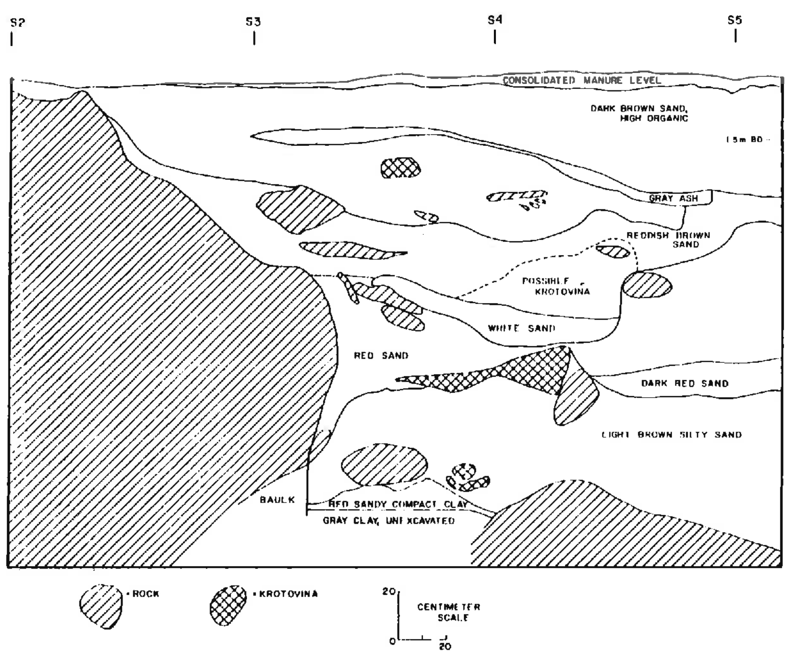

Figure 6: North-south profile of east wall of excavated area at Bush Shelter.

White Sand

This is a light beige colored sand intermixed with thin levels of fine light brown sand and a band of red/brown sediment similar to the reddish brown sand above. Macrofloral remains are visible in the profile but appear to be broken into smaller fragments than those in the upper stratigraphic levels. No concentrations of macrofloral remains or pack rat feces were visible. A band of small white spherical mineralizations is found at the bottom of this level. This band is visible in the south wall as well.

Red Sand

This banded level is a red brown silty sand mixed with small rocks approximately 1-2 cm in size. Larger sandstone fragments were mixed in this level. Small mammal bones occur occasionally in the profile with no apparent concentrations. The Early Plains Archaic cultural level, profiled in the south wall, pinches out about half way through this unit.

Dark Red Sand

This level is a band of red silty sand with no pack rat feces or vegetation visible in the profile. There were no cultural artifacts from this level in the two excavation units west of the profiled wall. A few small rocks, 1-3 cm in size were mixed with the sediments in this level. When excavated the sediment was damp and clumped into 0.5 cm spherical balls and would not pass through a 1/16" mesh screen, suggesting a clay component as well. The Paleoindian cultural level seen in the south wall, pinches out at approximately the depth of this level.

Light Brown Silty Sand

This level is a very fine light gray/brown sand with an included band of darker brown sand. Horizontal banding is not visible in the light gray/brown sand. There are few small rocks present. Krotovina were evident in the profile in this unit.

Red Sandy Compact Clay

No rocks or pebbles were evident in this unit. The clay content of this banded reddish brown sand was high. When excavated, the sand was damp and clustered into clay balls that would not pass through the 1/16" mesh screen. An impermeable mud formed when the soil was forced through the screen with a high pressure water hose in the lab.

Gray Clay

This compact gray clay soil had a slight green cast. When excavated, the exposed surface was damp, shiny and felt elastic to the touch. Not enough of this level was excavated to make observations on horizontal bedding and inclusive floral and faunal materials.

THE CULTURAL ASSEMBLAGE

A diverse cultural assemblage was recovered from the 19 units excavated in the shelter. Perishable items, shell beads, grinding stones, bone and stone tools were recovered. The stone tool assemblage consisted of six diagnostic projectile points, eight broken projectile point fragments, one stemmed bifacially flaked knife, 30 bifaces and biface fragments and 127 retouched and utilized flakes. Eighty-five percent of the stone tools are manufactured from locally available red Phosphoria chert. Nodules of this distinctive chert outcrop in the Permian Phosphoria Formation on the slopes above Bush Shelter. The quality of this chert is highly variable, with few known sources of high grade materials (Francis 1983).

Perishables

Basketry

Frison et al. (1986) previously reported that two rimless wall basketry fragments (Figure 7) from Bush Shelter were probably from the same water-tight, flat tray. They described the tray as

> "made on a stacked half rod and welt foundation sewn with noninterlocking

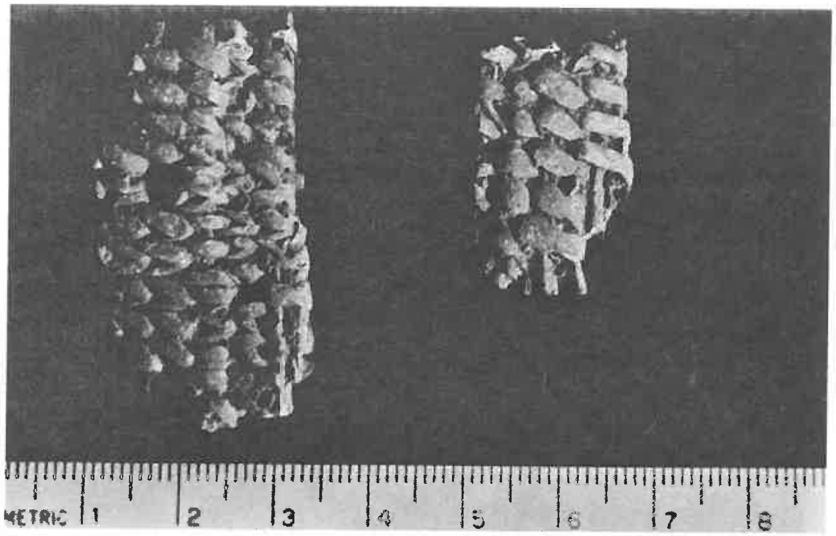

Figure 7: Rimless basketry wall fragments from Bush Shelter.

stitches. The half rod has the flat side down and stitches wrap instead of piercing the rods or welts. Accidental split stitches occur on both surfaces. Work surface is concave and work direction is right to left. The specimens are undecorated, unmended and unpitched. There are two coils per centimeter and three stitches per centimeter in both specimens. Wall thickness measures 5.6 and 5.9 mm" (Frison et al. 1986).

Cordage

Six pieces of cordage were recovered from the disturbed level (Table 4). All cordage fragments are 2 ply Z-twist (Figure 8).

Leather

From the upper disturbed level, three pieces of leather were recovered. The first two are thin delicate pieces of hide or gut. No cultural modification was observed on either fragment. The third is a square piece of thick hide that has been sewn with a piece of 2 ply Z-twist cordage. The piece is 50 mm by 41 mm and is 1.5 mm thick. One end of the leather piece has been punctured with a series of holes through which cordage has been sewn to create a drawstring affect (Figure 8).

Worked Wood

Two small wooden cylinders were recovered along with a long wooden stake. The cylinders are 66 mm and 54 mm long with a diameter of 7 mm and 10 mm respectively (Figure 8). They appear to have been manufactured from a twig spilt through the middle along the long axis. Both ends of each cylinder were cut and rounded with one end thicker than the other. The larger cylinder has an area of burning that almost looks like a notch.

The wooden stake is 30.5 cm long and 11 mm in diameter. It is a small branch with the bark removed. The bottom has a pointed end with the top being lipped.

Shell Beads

Shell beads (Figure 8) were recovered from the Early Plains Archaic level

Length	Width	Twists per cm
101 mm	3.7 mm	3
52 mm	2.0 mm	5
59 mm	3.8 mm	2
43 mm	3.9 mm	2
40 mm	unraveled	2
37 mm	unraveled	2

Table 4: Measurements of cordage fragments from Bush Shelter.

Figure 8. Cordage, leather, worked wood, and shell beads from Bush Shelter.

in close association with one another (Table 5). The complete shell bead was cut and drilled. Striations are visible on both upper and lower surfaces and along the edge.

Bone Tools

Four bone awls were recovered from the upper disturbed level. Patterned striations are visible on the long axis of the bone tools, although the angle is variable. A burned fragment of a small animal long bone shaft was recovered with polish on the exterior surface and diagonal striations along the long axis. All bone tools are well worn and polished (Table 6). One (Figure 9) appears to be the distal metatarsal of a deer-sized ungulate.

Stone Tools

Projectile Points

Two of six diagnostic projectile points recovered are Paleoindian (Table 7). One is a broken base of a concave lanceolate with a transverse flaking pattern (Figure 10). A second base fragment of the same projectile point style was also recovered. Two Early Plains Archaic points are side-notched with straight to slightly convex bases. A Middle Plains Archaic Oxbow projectile point of white chert was recovered within 10 cm of the surface. This point is broad and thin with a concave base. A projectile point diagnostic of the Late Plains Archaic was recovered near a hearth feature in the disturbed level. This point has a convex base and corner

Diameter	Thickness	Diameter of Hole	Portion
17 mm	2.9 mm	4.5 mm	complete
13 mm	2.4 mm	4.9 mm	broken in half
12 mm	1.2 mm	4.9 mm	broken in half
30 mm	1.8 mm		shell fragment

Table 5: Measurements of shell beads at Bush Shelter.

Length	Width	Portion	Direction of Striations
170	8	complete	diagonal
100	11	complete	steeply diagonal
73	8	tip	perpendicular
40	8	tip	diagonal
47	5	shaft	diagonal

Table 6: Measurements (in mm) of bone tools from Bush Shelter.

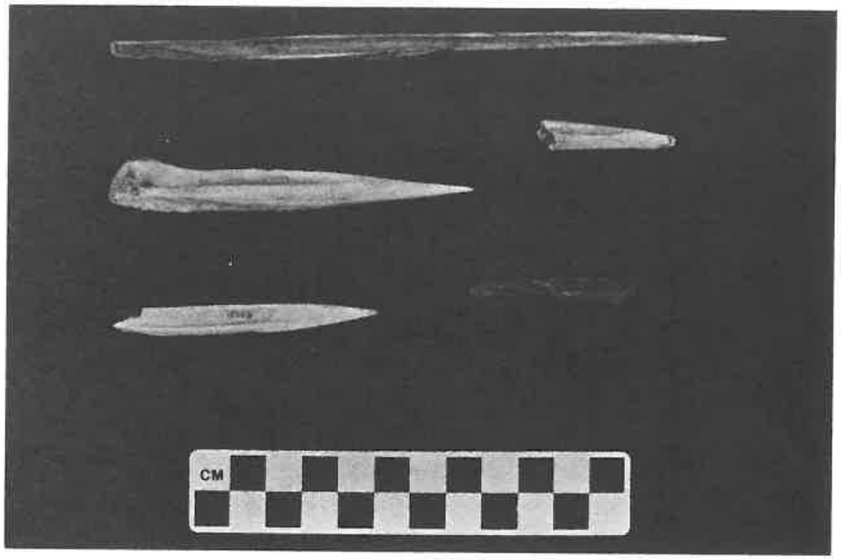

Figure 9: Bone tools from upper disturbed level at Bush Shelter.

Figure 10: Diagnostic projectile points and bifacially flaked knife from Bush Shelter.

notches. Two projectile point tips were also recovered in this level. Six projectile point fragments were recovered in the Early Plains Archaic level. These fragments appear to represent five different projectile points. The two burned basal fragments of tan quartzite appear to be from the same point but do not conjoin.

Bifacially Flaked Stemmed Knife

This artifact, probably hafted was found on the surface (Figure 10). It was manufactured from a flat, thin nodule of beige chert. Cortex is visible on both surfaces. The knife is 7.0 cm long and 3.3 cm at the maximum blade width.

Bifaces

Seven complete and eight fragmentary bifaces were recovered from the upper disturbed level (Table 8; Figure 11). Five complete bifaces were large

Diagnostic Complex	Material Type	Portion	L	W	Th	Wt	Level
Late Plains Archaic	brown quartzite	complete	39	21	7	5.1	upper
Oxbow	white chert	complete	37	22	4	3.9	upper
unknown	brown quartzite	tip	13	12	3	0.5	upper
unknown	red Phosphoria	tip	20	20	3	1.1	upper
Early Plains Archaic	blue/gray chert	complete	40	17	6	4.2	upper
Early Plains Archaic	tan quartzite	complete	47	21	6	6.2	E.P.A.
unknown	black chert	tip	22	16	3	0.5	E.P.A.
unknown	red Phosphoria	tip	11	8	3	0.4	E.P.A.
unknown	pink chert	midsection	25	8	4	0.8	E.P.A.
unknown	red Phosphoria	midsection	8	20	4	1.2	E.P.A.
unknown	tan quartzite	base	15	17	4	1.2	E.P.A.
unknown	tan quartzite	base	19	15	3	1.0	E.P.A.
Paleoindian	red Phosphoria	base	22	25	5	4.1	Paleo
Paleoindian	red Phosphoria	base	15	10	5	0.7	Paleo

Table 7: Measurements on complete and fragmentary projectile points recovered from Bush Shelter. E.P.A. = Early Plains Archaic, L = length, W = width, Th = thickness and Wt = weight in gms. All measurements in mm.

Figure 11: Bifaces from upper disturbed level at Bush Shelter.

crude forms manufactured from red Phosphoria chert cobbles and a waxy white chert. The brown chert biface is a small tool that has fine bifacial retouch along one edge. The seventh complete biface was manufactured on a large flake of glossy gray chert. The smooth ventral flake surface is still visible on the tool.

Three of the fragmentary bifaces appear to have been broken during manufacture. These three have classic outrepassé breaks (Crabtree 1972). These flakes are produced when a thinning flake is removed which breaks the biface. The flakes from Bush Shelter retain the struck edge, exterior surfaces, and edges from the opposite side of the biface. These three appear to have broken because of inclusions in the red Phosphoria chert.

A fourth fragment is a midsection

Material Type	Portion	Length mm.	Width mm.	Thickness mm.	Weight gm.	Breakage Type
Red Phosphoria	complete	41	38	9	17.6	none
Red Phosphoria	complete	49	40	15	32.0	none
Red Phosphoria	complete	60	37	13	36.3	none
Red Phosphoria	complete	35	20	6	3.7	none
Brown Chert	complete	12	15	3	.8	none
White Chert	complete	44	43	12	32.0	none
Gray Chert	complete	61	32	8	16.7	none
Red Phosphoria	fragment	46	16	7	7.6	thermal
Red Phosphoria	fragment	21	31	10	7.7	bend
Red Phosphoria	fragment *	31	43	6	12.4	bend
Red Phosphoria	fragment	34	26	4	6.3	outrepassé
Red Phosphoria	fragment	34	34	8	13.1	outrepassé
Red Phosphoria	fragment	55	20	9	9.3	outrepassé
Gray Chert	fragment	20	12	4	1.1	bend
White Chert	fragment *	43	29	4	25.0	radial

Table 8: Measurements on biface and biface fragments recovered from upper disturbed level at Bush Shelter (48WA324). * = biface fragments display post-breakage utilization.

of a thermally-altered biface. The thin biface shattered when inclusions in the Phosphoria chert caused uneven heating. Three of the eight fragments had bend breaks that may have occurred during manufacture or use. This type of breakage pattern results when excessive force is placed on the biface and the tool snaps when it is bent beyond its tensile strength (Frison and Bradley 1980). Only one of the artifacts with bend breaks from the upper disturbed level had evidence of utilization after breakage.

The eighth fragment appears to be from a waxy white chert biface that was broken intentionally. Broken edges on the radial break were rounded with steep step fractures. Irregularly spaced flake scars were also evident on the utilized edges. Radial breaks occur when a flat-lying biface is struck from above (Frison and Bradley 1980). The biface breaks in a radial pattern producing pie-wedge fragments with 90° edge angles. Frison and Bradley (1980) concluded from their analysis of the Hanson site bifaces that although radial breaks may occur during manufacture, most were intentional breaks to produce tools.

Three complete and twelve fragmentary bifaces were recovered from the Early Plains Archaic level (Table 9; Figure 12). The complete red Phosphoria chert biface is manufactured on a large cobble. Cortex is visible on both ends of the thick, oval stone artifact. The brown chert biface also has cortex visible and appears to have been manufactured from a small stream cobble. The tan quartzite biface was one of two tools recovered at Bush Shelter with evidence of extensive wear. Utilized edges appeared heavily worn and glossy. This biface is manufactured from the same raw material as the Early Plains Archaic projectile point recovered from this level.

Four of the fragments display bend breaks. None of these tool fragments had evidence of use as a tool after breakage. A sixth fragment appears to have been broken during heating. Potlids and crazing (Crabtree 1972) are evident. This artifact appears to have been utilized as a scraping tool after breakage. A small thick biface of red Phosphoria chert was also utilized after

Material Type	Portion	Length mm	Width mm	Thickness mm	Weight gm	Breakage Type
Red Phosphoria	complete	62	44	19	55.7	none
Tan Quartzite	complete	50	32	7	19.1	none
Brown Chert	complete	38	36	8	13.3	none
Red Phosphoria	fragment	30	33	7	10.5	bend
Red Phosphoria	fragment *	17	42	5	5.9	perverse
Red Phosphoria	fragment	40	42	4	8.4	bend
Red Phosphoria	fragment *	21	56	18	11.8	thermal
Red Phosphoria	fragment *	35	27	7	8.8	radial
Red Phosphoria	fragment	32	25	6	5.0	perverse
Red Phosphoria	fragment	43	32	6	9.4	bend
Red Phosphoria	fragment *	43	14	8	5.1	perverse
Gray Chert	fragment	38	30	7	11.5	bend
Clear Chert	fragment *	50	24	5	7.8	perverse
Brown Chert	fragment *	32	20	5	4.1	perverse
Brown Chert	fragment *	22	20	5	2.1	perverse

Table 9: Measurements of bifaces and biface fragments from Early Plains Archaic level at Bush Shelter (48WA324). * = biface fragments display post-breakage utilization.

Figure 12: Bifaces recovered from Early Plains Archaic level at Bush Shelter.

it sustained a radial break.

The remaining six fragments had perverse fractures. Crabtree (1972) defined this type of breakage as "a helical, spiral or twisting break initiated at the edge of an objective piece. Natural flaws, excessive force and mass to be removed add to the possibility of perverse fracture." Five of the artifacts with perverse fractures had evidence of use as tools after breakage. Four were utilized, while one was retouched to produce a small graver. The two brown chert fragments were halves of the same biface.

Flake tools

Sixty-five retouched and utilized flakes were recovered from the upper disturbed level. Fifty-two were red Phosphoria chert with another seven being tan/brown quartzite. The remainder were a semi-opaque waxy chert ranging in color from white to dark pink. Five red Phosphoria chert flake tools were sidescrapers and endscrapers made on primary reduction flakes (Figure 13).

Sixty-two retouched and utilized flake tools were recovered from the Early Plains Archaic level (Figure 14). Most were red Phosphoria chert, although several other material types occurred in small numbers. One of these rarer material types was a brown/yellow chert endscraper. Working edges on the distal endscraper fragment were heavily worn and polished. Striations are visible on the ventral surface. This tool was one of two recovered at the site that were heavily utilized and displayed considerable wear.

Four flake tools were recovered from the Paleoindian level. Three of

Figure 13: Flake tools from upper disturbed level at Bush Shelter.

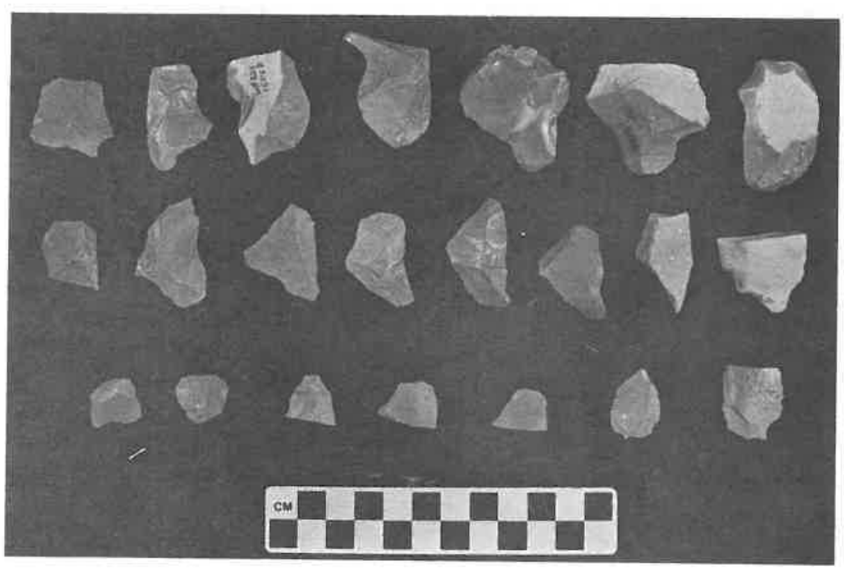

Figure 14: Flake tools from Early Plains Archaic level at Bush Shelter.

these had acute utilized edges on bifacial thinning flakes. The fourth flake tool was a utilized blocky debitage piece. All four tools were made of red Phosphoria chert. The stone tool assemblage from the Paleoindian level was limited to two projectile point fragments and these four flake tools.

Cores

Three cobble cores were recovered during excavation (Figure 15). Two of these were from the upper disturbed level. A gray chert stream cobble, weighing 233 gms, had three overlapping flake scars on one end. At the other end of the oval shaped cobble two large flakes had been detached to set up a platform from which two more flakes had been removed. It appears the cobble was then abandoned. There is no evidence of utilization or use as a hammerstone. A distal core fragment of red Phosphoria chert, weighing 33 gm was also recovered from this level. After its detachment from the larger core it was utilized as a multi-purpose tool. Several of the edges display varying degrees of wear, utilization and unifacial retouch.

Another distal core fragment of red Phosphoria chert was recovered in the Early Plains Archaic level. The core fragment weighed 136 gms and had flake scars on the ventral surface where it detached from the original core. Platform remnants were heavily ground with steep step fractures still visible.

Grinding stones, hammer stones, and fire cracked rock

Two manos and a hammerstone made of Flathead Sandstone cobbles were found within 15 cm of the surface (Figure 15; Table 10). Firecracked cobbles of this same material were present in the upper level. The Flathead Sandstone, a hard sandstone that has been subjected to a considerable amount of geologic pressure and heat, outcrops on the mountain slopes above Bush Shelter. Cobbles of this material show considerable variation. Some appear as if they were a quartzite, while others show cross bedding of the original sandstone. The manos and firecracked rock at Bush Shelter were most likely brought to the site

Artifact Type	Length mm	Width mm	Thick. mm	Weight gms
mano	92	81	51	480.3
mano	117	90	43	716.8
hammerstone	98	73	37	356.1

Table 10: Measurements of grinding and hammerstones from upper disturbed level at Bush Shelter.

Figure 15: Cores, manos, and hammerstone from Bush Shelter.

from the streambed of the South Fork of Little Canyon Creek.

CONCLUSIONS

Three meters of stratified archaeological sediments are present at Bush Shelter with intact Paleoindian and Early Plains Archaic cultural levels. The upper meter of deposits in the shelter are disturbed by rodent burrowing. Other areas of the site may yield intact levels from Middle and Late Plains Archaic occupations. Future research at Bush Shelter within the context of a multidisciplinary research design may produce data applicable to three current archaeological research problems.

Paleoenvironmental data from the combined efforts of archaeologists, botanists, geologists and zoologists promises to be a most productive area of research at the site. Intact sediments dating from at least 12,000 BP indicate changing faunal and floral communities in the plains-foothill transition zone (Walker et al. 1985).

During this period, the climate was changing from cold glacial conditions of the Pleistocene towards the equable climatic regime of the Holocene. The exact nature and magnitude of these climatic changes on floral and faunal resources is not understood. Major shifts in resource distribution would effect cultural groups utilizing the region. Adaptation to changing patterns of resource distribution may have resulted in a reorganization of the seasonal settlement pattern, changes in the composition of utilized food resources, or both. Data from sediments at Bush Shelter and other sites in the foothill transition zone may be significant to explaining the emergence of Paleoindian mountain-foothills oriented groups (Husted 1969; Frison 1973; Frison and Grey 1980).

The period of transition from the Early Plains Archaic to the Middle Plains Archaic is also of current research interest. Resource exploitation data from diverse ecological settings is needed to understand the adaptive changes observed in the Middle Plains Archaic. The number of archaeological sites increases along with an apparent increased dependence on floral resources during the Middle Plains Archaic. Hearth features and artifact assemblages from the Early Plains Archaic occupation at Bush Shelter should provide data on season or seasons of occupation and specific resources targeted for exploitation.

The presence of an Oxbow projectile point and a dated hearth from the Middle Plains Archaic indicate that Bush Shelter continued to be utilized as a focus of exploitive activity from the late Early Plains Archaic into the Middle Plains Archaic. Other areas of the site may yield a better stratigraphic context for these occupations. Differences in artifact assemblages and hearth feature contents may indicate shifts in seasonal settlement activities at Bush Shelter during this period of cultural transition.

A third archaeological research problem that may be addressed at Bush Shelter is a chronological/technological one. The Paleoindian projectile point chronology of the Big Horn Mountains has yet to be completed (Frison 1983). The concave based projectile points found at Bush Shelter and Medicine Lodge Creek have not been satisfactorily analyzed from dated archaeological contexts. Analysis of an assemblage of projectile points and tools from the Paleoindian level at Bush Shelter may be significant to understanding technological changes in Paleoindian stone tool assemblages.

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DAYS DIG

It's early morning light,
    The walk in was quite a fright.
I stand by my unit hole,
    Knowing the day's work will be slow.
The progress is going well,
    I'm not missing much, the screens tell.
With each centimeter I uncover,
    Less lithics I discover.
My mind starts to drift,
    When suddenly my heart gets a lift.
Some bone my trowel has found,
    The mandible of a canine hound!
Was he part of a ritual feast,
    Or did a child cry over his decease?
It's questions such as these,
    That make tedious mapping seem a breeze.
The day is done,
    The long hike out has begun.
With the crew truck in sight,
    Everyone is feeling all right.
Because as the sun starts to wain,
    It's Miller time again!

F. B. Zeller
Cody, Wyoming

INDIAN CAMPSITE PATTERNS IN SOUTHWESTERN WYOMING

JOE BOZOVICH

ABSTRACT

Amateur and professional archaeologists recognize that there are definite topographical circumstances which are common to many sand dune campsites belonging to prehistoric hunter/gatherers. This paper presents a variety of statistical measurements which portray such patterns, as developed by computer analysis of an amateur collection that represents over 570 such sites located in southwestern Wyoming. This analysis identifies major patterns to site location in terms of topography, distance to water, wind protection and view direction and angle.

INTRODUCTION

This paper presents results obtained by performing a systematic analysis of sites found by members of the Bozovich family over a period of fifty years of surface hunting for Indian artifacts. These sites were catalogued using an expanded version of the IMACS (INTERMOUNTAIN ANTIQUITIES COMPUTER SYSTEM) method. All data describing the sites, e.g., location & topography, -were then entered into a computer using the methods described by Bozovich (1985). Appendix A contains the essential items from the form in abbreviated detail. Certain key definitions are provided within the body of this paper. Using the computer to store the extensive data involved in the IMACS system provides an excellent basis for detecting any patterns that might exist within the variety of site locations located in that part of Wyoming. The specific data included in the IMACS form and used in this study is found in Table 1.

In the sections to follow, each of these data types will be discussed and summary data presented, in order to specify any detectable patterns to the locations and topography of the 570 sites analyzed.

ANALYSES OF THE SITE DATA

Once all data was entered into the computer, a series of analyses were performed according to the various data types contained in the IMACS form. These analyses all centered around determination of the distribution of the sites across specific topographical circumstances. In the following paragraphs, a series of tables and accompanying comments about the interpretation of the data in those tables is presented. Through this series of presentations, it will be possible to detail what would appear to be definite campsite preferences for the Indians of the cultures represented by these sites in southwestern Wyoming.

THE PRIMARY LANDFORM

The data on the primary landform (Table 2) at the various site localities seems to show that a ridge site was most popular, with hill, valley and plain sites also being popular. Such a site location obviously provides a good view of the surrounding country. Other advantages might include sun exposure, water drainage or defense control.

DATA TYPES	DESCRIPTION
Primary landform	Topography of the site, e.g., mountain spine, hill, mesa, ridge, valley, plain and canyon.
Primary position	Position of the site on the landform, e.g. crest, slope, saddle or bench.
Secondary landform	Secondary topography, e.g., arroyo, basin, cave or cliff.
Secondary position	Position of the site within the secondary landform, e.g. top edge, slope, toe or saddle.
Distance to water	Mileage distance to permanent water.
Dune form	Location with respect to an adjacent sand dune, e.g., windward, leeward, washout or pocket.
View direction	The primary viewing direction from the site, e.g. north, south, west or east.
View angle	The angle of view available from the site.
Wind protection	Presence, or lack, of protection from the prevailing wind.
Depositional context	Nature of the specific context at the site, e.g., outcrop, marsh or stream/terrace.
Vegetation	Nature of the vegetation at or around the site, e.g. aspen, sagebrush or pinon/juniper.
Non-Architectural	Hearths, stone circles, Features petroglyphs or rock alignments.
Artifacts & debris	Lithic scatter, burned stone, ground stone or organic remains.
Lithic debitage	Estimated total quantity of debris associated with artifact manufacture.

Table 1: Brief description of IMACS data types.

THE PRIMARY POSITION

The primary position distribution (Table 3) at these sites seems to favor the slope. This is understandable, especially if the slope is facing to east, southeast or south. It is possible that wind protection was a major reason for selection of such a position. This choice also ties in with the ridge landform preference described above.

LANDFORM	% OF SITES (NUMBER)	BRIEF DESCRIPTION
Mountain	0 (0)	Mountains are the largest spine elevated landform in the landscape, they are over 1000 ft. in elevation, and have been created by volcanic deposition or uplift.
Hill	10 (60)	A hill is an isolated prominence with a peak or crest, generally less then 1000 ft. in elevation.
Tableland/	3 (16)	A mountain-sized landform mesa with a flat or gentle top bounded by steep cliffs on one side.
Ridge	60 (343)	A ridge is an elevated, relatively narrow landform, usually steep on one side.
Valley	13 (72)	A valley is a low-lying land surrounded by mountains, traversed by a stream or lake.
Plain	12 (71)	A plain is generally level (1-3 degrees), of considerable extent and not broken by elevations or depressions.
Canyon	1 (8)	A canyon is any steep-walled feature which was cut by running water and has slopes and sides.
Island	0 (0)	An island is an area of dry land completely surrounded by marsh.

Table 2: Site distribution by primary landform.

THE SECONDARY LANDFORM

The secondary landform site distribution (Table 4) favors locations on dunes, with about 75% of the sites being located on this landform. It seems reasonable that these sites represent the debris of nomads who preferred a sandy type soil for their campsite. One

POSITION	% OF SITES (NUMBER)	BRIEF DESCRIPTION
TOP/CREST/PEAK	3 (19)	On spines or ridges which have flat, rather than convex surfaces and the highest surface of mesas. The crest is the highest point or line of a convex surface from which the surface dips downwards. The peak is the very highest point of a mountain or hill.
EDGE	11 (52)	Edge is a term denoting the position of a site on a landform. Usually at sharp topographic breaks.
SLOPE	54 (311)	The inclined surface of any convex landform including mesas, mountains, hills, dunes, tablelands, ridges and morraines.
TOE/FOOT	21 (120)	The toe is the most distal end of a ridge, fan, talus, slide or slump. The foot is the bottom and lower part of a sloping surface such as the side of a ridge, hill or terrace riser. The bottom is a term referring to the position of a site in the primary landforms valley and canyon.
SADDLE/PASS	8 (4)	A saddle is a low point on a ridge or spine. A pass is a gap, defile or a low break in a mountain range, where a trail or road can pass.
BENCH/LEDGE	3 (20)	A bench is usually a linear feature, a relatively level area of soil or rock on a ridge, and can also be formed by slides, slumps and faults. A ledge is a narrow, flat surface or shelf, usually of rock, that projects from a cliff face.
INTERIOR	6 (34)	A term denoting the position of a site on a landform which has a flat or plane surface.

Table 3: Site distribution by primary position.

LANDFORM	% OF SITES (NUMBER)	BRIEF DESCRIPTION
ARROYO	3 (16)	Otherwise called a gully.
CLIFF	.7 (4)	A high steep rock face.
DUNE	75 (426)	A dune is drifted sand, silt, or clay transported by the action of wind (aeolian deposition). Dunes take many forms which are dependent on grain size, wind velocity, surface topography, etc. They generally appear as mounds, ridges or small hills.
MESA/BUTTE	.8 (5)	A hill or small mountain with a flat top, bounded on at least one side by a steep cliff.
PLAYA	1	A Playa is a dry lake or pond and is usually an extinct lake bed.
TERRACE/BENCH	10 (56)	Stream terrace or bench.
TALUS SLOPE	9 (50)	Talus is formed of colluvium or material being moved downslope, mainly by gravity.
OUTCROP	.2 (13)	A portion of a geological stratum which appears above the surface of the ground.

Table 4: Site distribution by secondary landform.

speculation for this is that such a choice made living conditions much better than a site on a hard surface would provide.

THE SECONDARY POSITION

The secondary position site distribution (Table 5) favors the slope, just as it did in primary position data. These data also seem to tie in pretty well with the secondary landform. As a general rule with the prevailing winds from the west and coming over the ridge, a dune will naturally occur on the slope when there is a supply of sand for deposition.

POSITION	% OF SITES (NUMBER)	BRIEF DESCRIPTION
TOP/CREST/ PEAK	3 (16)	See primary position.
EDGE	4 (21)	See primary position.
SLOPE	83(476)	See primary position.
TOE/FOOT BOTTOM	6(32)	See primary position.
INTERIOR	6 (34)	See primary position
STEP	.01 (6)	Step is a flat or gently sloping surface of a terrace or bench.
FACE	2 (13)	A face is a vertical element of a landform such as a cliff. Rock art is usually displayed on a face.

Table 5: Site distributions by secondary positions.

THE DEPOSITIONAL CONTEXT

Quite often these depositional contexts (Table .6) occur in combinations. Table 7 presents site distributions for such combinations, using the codes from Table 6 to indicate which combinations are most prevalent. Since the majority of the sites are in dunes, note that 57% of the sites are with a combination of alluvium and eolian sand mixture (Table 7). It is reasonable to speculate that such conditions were present at the time of occupation, although some of the sites were partially covered or partially exposed. The sites that are on a talus slope are always changing, although rather slowly, depending on the gravity or the steepness of the slopes. Sites that are only in eolian or wind blown sand are always changing, continuously being covered or uncovered. Sites that are on the alluvial plain are usually near canyon bottoms or near the highest stream terraces. Sites that are on desert pavement or washouts are nearly always on the eolian or alluvial sand mixtures, and are being either covered or uncovered. Sites that are on stream terraces are usually on desert pavement or washouts.

CONTEXT	CODE	% OF SITES (NUMBER)	BRIEF DESCRIPTION
TALUS	B	5 (28)	See secondary landform
DUNE	C	75 (426)	See secondary landform
STREAM/ TERRACE	D	2 (12)	See secondary landform
PLAYA	E	(2)	See secondary landform
OUTCROP	O	2 (13)	See secondary landform
ALLUVIAL PLAIN	H	7 (40)	Alluvium is a material (as clay or gravel) deposited by running water, usually filling canyons and valley bottoms.
COLLUVIUM	I	(3)	Colluvium is rock and soil transported mainly by gravity, rather than by water. Colluvium is loose, incoherent and poorly sorted (particles are of many different sizes).
AEOLIAN	S	6 (32)	Aeolian is wind-transported material, including windblown sand, silts and wind-carried volcanic ash.
DESERT	P	3 (14)	Washouts or hardpan. Quite often these depositional contexts occur in combinations. Following are site distributions for such combinations, using the codes from the table above to indicate which combinations are most prevalent.

Table 6: Site distribution by depositional context.

CONTEXT COMBINATION	% OF SITES	# OF SITES
BCHS	9	54
CHS	57	323
BCS	3	18
HCS	6	35
CDH	4	22
CDHS	4	20
CEHS	1	5
CHIS	1	5
CS	10	58
CDPS	2	13

Table 7: Depositional context combinations.

SITE VEGETATION

Vegetation types (Table 8) also frequently occur in certain combinations. Analysis of the sites in this data demonstrated such vegetation combinations (Table 9).

With 75% of the sites being in sand dunes, it should be understandable that tall sage and low sage will be able to take root, since the sand will hold moisture quite well. Also, the sage brush supplied the material for heat, cooking, wind protection, building brush shelters and pithouse covers. Probably some type of food supply was also available with this vegetation. Sites that are located in aspen, spruce, pinon or cedars had the same capabilities.

NON-ARCHITECTURAL FEATURES

The data shows that 85% of the sites had fire hearths of various types (Table 10). Experience also showed that if debitage was found, there nearly always was also a fire hearth. Some sites had a fire hearth, but very little debitage. These were most likely cooking fires, probably only used while traveling or moving to a new area.

DISTANCE TO PERMANENT WATER

The data on distance to permanent water (Table 11) are very interesting. Notice that the data show that the heaviest site concentration is from 1 to 4 miles from a permanent water location, rather than right at the location. This seems to be true for all types of water sources. If this accurately reflects the Indians' favorite area to camp, one possible reason was to let the game go to water so that hunting opportunities would be protected. It could also be that the site selected for camping had to posses other good features, which the water site did not provide, such as better wind protection, dunes or a good food supply. These water locations were found by using the latest U.S.G.S. topographic maps with all of their data on rivers, creeks and springs. In certain cases springs were found that are not on the U.S.G.S. topographic maps. These were plotted also. All measuring was done up to ten miles. There were 128 sites that were over ten miles from the nearest known water.

VEGETATION	CODE	% OF SITES TYPE (NUMBER)
ASPEN	A	0 (2)
SPRUCE	B	0 (2)
TALL SAGE	P	42 (240)
LOW SAGE	Q	85 (486)
PINON/JUNIPER/ WOODLAND	H	11 (64)

Table 8: Site distribution by vegetation type.

VEGETATION COMBINATIONS:	% OF SITES	# OF SITES
PO	60	345
HO	11	61
HOP	4	24
H	11	64

Table 9: Site vegetation combinations.

FEATURE	% OF SITES	# OF SITES
UNLINED HEARTH/FIREPIT:	70	401
LINED HEARTH/FIREPIT:	15	85
NO HEARTH:	9	49
PETROGLYPHS:	.01	10
STONE CIRCLES:	.01	7

Table 10: Site distribution by non-architectural features.

WIND PROTECTION

It seems that wind protection (Table 12) was a very important factor in choosing a campsite, as the data suggests with 81% of the sites having some sort of wind protection.

TYPE OF WATER SOURCE		MILES FROM WATER LOCATION													
Spring:	Miles	.0	.3	.4	.5	1	2	3	4	5	6	7	8	9	ALL
	#	28	2	1	25	45	59	50	48	17	23	11	5	3	294
Seep:	Miles	.0	.3	.4	.5	1	2	3	4	5	6	7	8	9	ALL
	#	15	2	0	6	11	1	3	1	0	0	0	1	0	40
Creek:	Miles	.0	.3	.4	.5	1	2	3	4	5	6	7	8	9	ALL
	#	7	2	4	13	20	16	11	13	2	4	5	5	7	103
River:	Miles	.0	.3	.4	.5	1	2	3	4	5	6	7	8	9	ALL
	#	0	0	0	1	1	5	4	2	2	3	0	1	0	19
Lake:	Miles	.0	.3	.4	.5	1	2	3	4	5	6	7	8	9	ALL
	#	0	0	0	0	0	0	1	0	0	0	0	0	0	1

Table 11: Distance to permanent water.

WIND PROTECTION	% OF SITES (NUMBER)	BRIEF DESCRIPTION
YES	81 (480)	Sites that had some sort of wind protection, e.g. dune pocket, leeward side of dune, rocks in a ditch or high sage brush.
NO:	19 (108)	Sites that did not have any kind of wind protection at all.

Table 12: Site distribution by wind protection.

POSITION	% OF SITES (NUMBER)	BRIEF DESCRIPTION
Windward	44 (255)	Windward side of dune.
Leeward	23 (132)	Leeward side of dune.
Pocket	17 (96)	Pocket between dunes.
Windward/ Leeward	38 (219)	Windward side and leeward side.
Windward/ Leeward/ Pocket	30 (170)	Windward side, leeward, and pocket.
Leeward/ Pocket	15 (84)	Leeward side and pocket
Windward/ Pocket	7 (38)	Windward side and pocket
Washouts	3 (17)	Washouts or desert pavement.

Table 13: Site distribution by dune-form position.

DUNE-FORM POSITION

The data suggest that the Indians of these cultures liked to have their campsites on the windward side of the dune (Table 13), but that other locations were also used quite frequently. Quite a number of sites were surveyed in the winter with snow on the ground. It was observed that the leeward side and dune pockets had more drifted snow than did the windward side of the dune. If the brush shelters, and/or pit houses were in that type of location, it would be a little warmer and they also had some wind protection.

PRIMARY VIEW DIRECTION

All prehistoric campsites have a

primary viewing direction (Table 14), with many having a nice overview. It is seldom that a site will be down in a deep gully with no view at all. The north/south and east/ west primary sites are usually in canyons or valleys. The data suggests that the east, southeast and south directions were the favorite primary viewing directions.

VIEWING ANGLE

The viewing angle is the angle or area covered by the primary view. Although it might not seem important to the average person, it was very important to hunter/gatherers (Table 15). As mentioned earlier in this paper, the larger the viewing area, the better chance to locate large game animals or other people.

LITHIC DEBITAGE QUANTITY

The quantity of lithic debitage (Table 16) in a site depended mostly on the amount of raw source material that is available in the area surrounding the site. The sites in the area around Cedar Mountain had the heaviest concentration of different colors and types of chert. The Church Buttes area had the most amount of green chert. The Church Buttes and Granger areas had the most amount of agate (some call it Church Buttes agate and Granger agate). Oolitic chert was found in the northern portion of this survey, but some oolitic chert also came from the Delaney Rim area. The sites in the Black Buttes area contained the largest amount of grey quartzite. Naturally, some sites contained material that was carried in from other areas. Some obsidian debitage looked like it was from small cobble stones found along the Green River terraces and then converted into artifacts of different kinds. Also, some obsidian was carried in from the Yellowstone Park and adjacent areas. A large number of the sites had both fine-grained quartzite and coarse-grained quartzite. This material was used in making artifacts of different kinds and was also used as fire rocks for cooking, heating water and heating rocks for

DIRECTION	% OF SITES (NUMBER)	BRIEF DESCRIPTION
NORTH	12 (71)	Primary view to the north.
SOUTH	49 (280)	Primary view to the south.
WEST	12 (67)	Primary view to the west.
EAST	15 (88)	Primary view to the east.
NORTH/SOUTH	5 (28)	Primary view to the north and south.
WEST/EAST	4 (25)	Primary view to the west and east.
SOUTH/WEST	12 (69)	Primary view to the south and west.
SOUTH/EAST	25 (141)	Primary view to the south and east.
NORTH/EAST	5 (28)	Primary view to the north and east.
NORTH/WEST	2 (13)	Primary view to the north and west.

Table 14: Site distribution by primary view direction.

TOTAL ANGLE (DEGREES)	% OF SITES (NUMBER)	BRIEF DESCRIPTION
360	44 (253)	Viewing area in all directions
270	45 (260)	Viewing area in three of four major directions
180	12 (57)	Viewing area in two of four major directions, such as canyons or valleys.

Table 15: Site distributions by viewing angles.

% OF SITES (NUMBER)	ESTIMATED TOTAL QUANTITY ON SITE
2 (16)	NONE
7 (38)	1 -- 9
12 (64)	10 -- 25
24 (129)	25 -- 100
39 (205)	100 -- 500
21 (118)	500+

Table 16: Site distribution by debitage quantity.

other domestic uses. All sites that had over 500 pieces of debitage were primarily large base campsites. In some cases there had been a large amount of preform chipping, especially in the areas where there was a large amount of material.

ARTIFACTS AND DEBRIS

The eastern portion of Sweetwater County contained all of the burned sandstone (Table 17). This probably occurred because the supply of quartzite was limited, although a few of the sites did have an isolated quartzite burned stone. Quartzite would have been preferred, if available, since it holds heat longer. The northern, western and southern portion of this study had all quartzite since it was readily available. The east side of the Rock Springs uplift contained the largest amount of burned sandstone. The northeastern portion of this study also had some burned slate.

% OF SITES (NUMBER)	BRIEF DESCRIPTION
0.07 (44)	Lithic scatter
0.02 (13)	Ceramic scatter
0.04 (24)	Isolated artifact
0.02 (12)	Organic remains
0.18 (106)	Burned stone
0.11 (64)	Ground stone
24.00 (137)	Lithic scatter, burned sandstone
60.00 (346)	Lithic scatter, burned quartzite
0.03 (18)	Lithic scatter, burned sandstone, ground stone
0.08 (46)	Lithic scatter, burned quartzite ground stone

Table 17: Site distribution by artifacts and debris.

1 - PRIMARY LANDFORM	Ridge - 343 or 60%
2 - PRIMARY POSITION	Slope - 311 or 54%
3 - SECONDARY LANDFORM	Dune - 426 or 75%
4 - SECONDARY POSITION	Slope - 476 or 83%

Table 18: Pattern summaries for analyzed sites.

SUMMARY AND CONCLUSIONS

The research on this project was very interesting. It required much checking and rechecking of notes, maps and surveying the sites out in the field. All of the data was then entered into the computer. A project of this kind would be impossible to do without a computer. With the computer then properly programed, it was interesting to see the different patterns developing in the statistics.

Table 18 summarizes the major patterns in site location seen during this study. These patterns should be understandable. The prevailing winds or air currents are from the west, so with the wind going over the ridge and down the slope you will have the ingredients conducive to sand dune development. Eventually the sand dune will stabilize when sage brush and the different kinds of grasses take hold. Since most sand dunes will hold moisture, it is possible that the Indians used the dunes to get some water. The sites are then on a slight slope with variations in degrees of pitch from level to about 10 degrees. It would appear that throughout the extended period represented by these sites there was a strong preference to camp on a sand dune. This well recognized observation translates into a broad classification of these sites as members of a so-called sand dune culture. At least in southwestern Wyoming, there were three major factors considered in choosing a campsite:

(1) - There must be a good supply of food (both large and small animals). With 23% of the sites surveyed having had some sort of ground stone, the data indicate that they were also gathering their food supply from the different kinds of grasses, roots etc. At certain times of the year, e.g., during the late spring, summer and fall, they would have opportunities for considerable gathering. In some campsites large amounts of small pieces of burned stone were noted. These probably were used over and over

in their cookingfires, hence the reason that they were so small. Some sites had many small pieces of fractured or crushed bone, like rabbit, sage chicken, gopher, prairie dog and birds, to name a few. Some sites had larger crushed bones like deer, antelope and bison. This probably resulted from their harvesting of bone marrow. The northern and southern portion of the Rock Springs Uplift had quite a few sites with fractured bones large and small.

(2) - Wind protection was very important, as the data suggest that 81% of the sites had wind protection. The survey showed that there was a preference for campsite locations in and around sand dunes, near high sage brush, or in ditches, or at the base of cliffs facing east to south, but usually with wind protection and early sunshine.

(3) - Water was obviously very important, although the data show that the preferred locations to camp were usually about one to four miles away from the nearest water source, regardless of the nature of the water supply. One can only speculate that reasons for selecting a distant camp-site might include: (a) they were leaving the water source free in order to facilitate hunting animals that went there; (b) the food supply was better farther away from water; (c) they could always go for water, with some sort of container, like the stomach or pouch of a larger animal; (d) during the winter they melted snow; (e) during the summer they trapped water whenever it rained, using hides stretched out between pegs and watching for water pockets on large boulders or ditches; (f) they had a system for catching moisture and water that accumulated during the night in certain weather conditions. Cactus also had some moisture and food value.

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APPENDIX A: THE IMACS SITE FORM

The following headings are those from the INTERMOUNTAIN ANTIQUITIES COMPUTER SYSTEM, which were also used in this article.

PART A - ENVIRONMENTAL DATA

1. Distance to permanent water:
   Mileage ________

2. Type of water source: ____________
   Describe ____________

3. Topographic location: (Check one under each heading)

PRIMARY LANDFORM

Mountain spine (A)
Hill (B)
Tableland/Mesa (C)
Ridge (D)
Valley (E)
Plain (F)
Canyon (G)
Island (H)

Describe ____________

PRIMARY POSITION

Top/Crest/Peak (A)
Edge (B)
Slope (C)
Toe/foot/bottom/ mouth (D)
Saddle/Pass (E)
Bench/ledge (F)
Rim rock (G)
Interior (H)

Describe ____________

SECONDARY LANDFORM

Alluvial fan (A)
Alcove/ rockshelter (B)
Arroyo (C)
Basin (D)
Cave (E)
Cliff (F)
Delta (G)
Detached Monolith (G)
Dune (I)
Floodplain (J)
Ledge (K)
Mesa/Butte (L)
Playa (M)
Port. Geo. feature (N)
Plain (O)
Ridge/Knoll (P)
Slope (Q)
Terrace/Bench (R)
Talus slope (S)
Island (T)
Outcrop (U)
Spring mound/bog (V)
Valley (W)
Cutbank (X)
Riser (Y)

Describe ____________

SECONDARY POSITION

Top/Crest/Peak (A)
Edge (B)
Slope (C)
Toe/Foot/Bottom/ Mouth (D)
Interior (G)
Step (H)
Riser (I)
Patterned Ground (N)
Face (O)
Saddle/Pass (P)

Describe ____________

4. ON-SITE DEPOSITIONAL CONTEXT

Fan (A)
Talus (B)
Dune (C)
Stream Terrace (D)
Playa (E)
Morraine (J)
Flood Plain (k)
Marsh (L)
Landslide/Slump (M)
Delta (N)
Outcrop (O)
Extinct Lake (F)
Extant Lake (G)
Alluvial Plain (H)
Colluvium (I)
Desert Pavement (P)
Stream Bed (R)
Aeolian (S)
None (T)
Residual (U)

Description of soil ____________

5. VEGETATION

Aspen (A)
Spruce/Fir (B)
Douglas/Fir (C)
Alpine tundra (D)
Ponderosa pine (E)
Lodgepole pine (F)
Mixed confer (G)
Pinon/juniper woodland (H)
Wet Meadow (I)
Dry Meadow (J)
Oak Maple Shrub (K)
Riparian (L)
Grassland/steppe (M)
Desert lake shore (N)
Shadscale (O)
Tall sagebrush (P)
Low sagebrush (Q)
Barren (R)
Marsh/swamp (S)
Lake/Reservoir (T)
Agricultural (U)
Blackbrush (V)
Creosote (Y)

Describe ____________

PART B -- PREHISTORIC SITES

6. SUMMARY OF ARTIFACTS AND DEBRIS

Lithic Scatter (LS)
Ceramic Scatter (CS)
Basketry/Textiles (BT)
Burned Stone (BS)
Ground Stone (GS)
Isolated Artifact (A)
Organic Remains (VR)
Shell (SL)
Lithic Sources (S)

Describe ____________

7. LITHIC DEBITAGE - ESTIMATED TOTAL QUANTITY

None (A)
1 - 9 (B)
10 - 25 (C)
25 - 100 (D)
100 - 500 (E)
500 - +

Describe ____________

8. NON - ARCHITECTURAL FEATURES

Hearth/Firepit (HE)
Midden (MD)
Depression (DE)
Earthen Mound (EM)
Burial (BU)
Talus Pit (TP)
Rubble mound (RM)
Stone Circle (SC)
Rock Alignment (RA)
Water Control (WC)
Petroglyphs (PE)
Pictograph (PI)

Describe ____________

ARCHAEOLOGICAL INVESTIGATIONS AT 48TE1076: A WALLED STRUCTURE IN JACKSON HOLE, WYOMING

DANNY N. WALKER

INTRODUCTION

The prehistoric archaeology of northwestern Wyoming, in particular Jackson Hole, has not been researched and studied to the extent as other regions of Wyoming (see Frison 1978). Many sites are known from Jackson Hole (Wright 1984), but few have been formally recorded just east of Jackson, Wyoming (Love 1972; Wyoming SHPO Records 1986). This report presents preliminary studies on a small rockshelter on the east side of Jackson Hole. A portion of the rockshelter contains a four-sided structure formed by construction of two artificial walls. The other two sides are formed by bedrock outcrop and the rockshelter back wall.

NATURAL SETTING

Site 48TE1076 is located in Curtis Canyon, a steep-walled drainage on the east side of Jackson Hole. Curtis Canyon was formed by Twin Creek, a perennial stream which eventually drains into the Flat Creek drainage, just north of the town of Jackson, Wyoming. Local relief in Curtis Canyon is as much as 46 m near the mouth of the canyon. The elevation at the site is approximately 2149 m. Depending on exposure, the walls of Curtis Canyon are covered with either pine forest or sagebrush/juniper communities.

48TE1076 is on the northwest slope of the main canyon area, about 46 m above the floor of the canyon (Figure 1). The site is a small rockshelter, hidden from view from the canyon floor by a large juniper tree growing in front of the rockshelter. The immediate area around the rockshelter is a juniper/sagebrush/grassland community, with the valley floor being a small mountain meadow. The opposite wall of Curtis Canyon is coniferous forest. The majority of the trees are ponderosa pine, along with some scattered spruce.

Just below and southwest of the rockshelter, there is an active spring area along Twin Creek. The floral community around the spring, and along the rest of Twin Creek itself, is more typical of riparian than coniferous forest communities. However, some conifers are also present in this riparian community next to Twin Creek.

PREVIOUS ARCHAEOLOGICAL INVESTIGATIONS

Love (1972) has provided the only regional discussion of the archaeology of this portion of eastern Jackson Hole. Love recorded numerous sites in the area, including a series of stone circle sites at the mouth of Curtis Canyon. Several springs along streams north of Curtis Canyon yielded evidence of prehistoric occupation. Some of these occupations dated to the Middle Plains Archaic Period. Most sites in eastern Jackson Hole appeared to date from the Late Prehistoric Period. No rockshelter sites were recorded from this portion of Jackson Hole by Love (1972).

Two additional sites near 48TE1076 are on record at the Wyoming State His-

Figure 1: View from valley floor, up slope to 48TE1076. Rockshelter lies behind largest juniper in center of photograph. Person is standing on top of bedrock outcrop forming the rockshelter.

toric Preservation Officer's (SHPO) Cultural Records Office. 48TE395 is a campsite around a large spring area about three miles northeast of 48TE1076. Projectile points, tools, debitage, and bone were found eroding from cutbanks. 48TE393 is a stone circle site lying on a ridge about one mile northeast of 48TE1076. Only limited information is available on both these sites in the SHPO files.

48TE1076

The rockshelter containing 48TE1076 is at the base of a small limestone outcrop (Figure 1). The outcrop is about ten to twelve meters long, and only two or three meters high. The rockshelter is less than one and a half meters from front to back. The floor of the rockshelter is formed by the same limestone bed as the back wall.

The structure placed within the rockshelter consists of two constructed rock walls (south and east), the back wall of the rockshelter (west), and a natural "wall" of limestone (north) (Figure 2). The two constructed walls meet at the base of the juniper tree growing in front of the rockshelter. This tree is a solid anchor for the corner of these two walls. It also provides visual shelter from the canyon floor.

The south wall is the larger of the two constructed walls (Figure 2). It lies at an azimuth of 282^{o}. Length of the wall is 170 cm, with a maximum height at the tree of 70 cm. The height of the south wall at the back of the rockshelter is 80 cm. The wall is formed primarily from limestone boulders, probably from the outcrop itself. The largest of these limestone pieces is 78 by 24 cm across the largest face. Two rocks in the wall are some form of metamorphosed granite, measuring 13 x 8 x 7 cm and 13 x 7 x 3 cm. No source for these granite pieces was seen in the immediate area. There are five courses of rock at the east end of this wall, next to the tree and four courses at the west end. Most of these rocks are lying flat and not vertical.

Most of these rocks have several lichens growing on them (Figure 3). Some of the lichens are large, while others appear much smaller and younger.

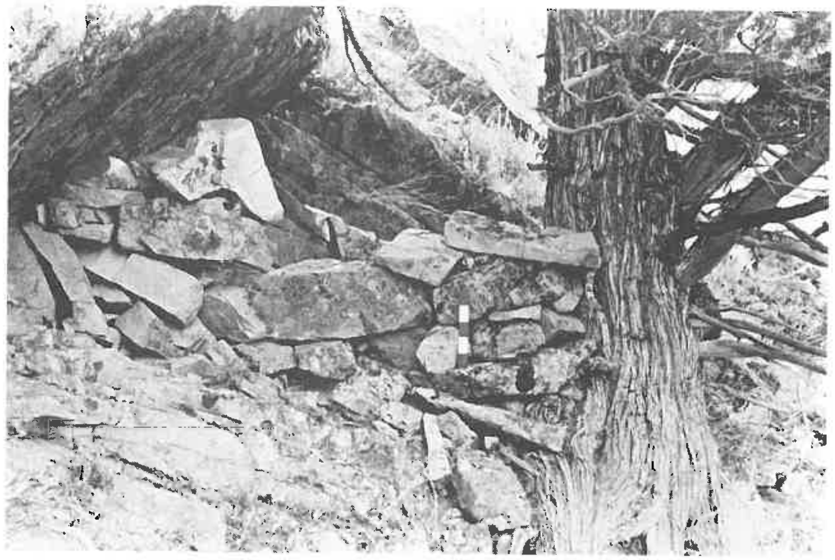

Figure 2: 48TE1076 from south. Note rocks anchored against juniper tree. East wall of structure is directly behind tree. Scale = 25 cm.

Figure 3: Closeup of southeastern corner of 48TE1076. Note lichens growing from south wall, fourth rock from top, onto small, dead limb of juniper tree. Lichens are also growing across space between rocks in same wall. Scale = 25 cm.

There may be more than one species of lichen present. On the second lowest rock course next to the tree, one large lichen (43 mm diameter) has grown across the junction between the rock and a small dead limb of the tree. This suggests some degree of antiquity to the formation of the wall (Figure 3). A similar lichen growth (also 43 mm) across rock and tree limb was also seen on the top rock of this wall.

The east wall is 100 cm in length,

with most of these rocks placed in a vertical position (Figure 4). Most of this wall consists of one rock 61 x 40 cm in size. Only four or five rocks form the rest of the wall. The azimuth of this wall is 350°. There is one large rock lying on the northern end of this wall that appears to have fallen eastward from the actual wall itself. This rock would have filled a gap in the northeast corner of the structure. Examination of earlier photographs taken when the rockshelter was first discovered in the early 1980s show this rock was part of the wall. It has collapsed during the intervening time.

The two remaining walls are formed from the actual bedrock outcrop (Figure 4). The west wall is the back and roof of the rockshelter itself. This overhanging roof of the shelter dips northwest at 41°. The north wall of the structure appears to be a natural collection of decomposing bedrock. Unlike the south and west walls, it does not appear to have been artificially formed. Some minor modification may have occurred to this natural outcrop to increase its usability as a wall, but this was not discernible. This wall is oriented at an azimuth of 300°. It is about 140 cm in length.

The area enclosed by the structure is 170 cm east-west by 105 cm north-south. Most of the structure floor consists of limestone bedrock. A small area (about 25 x 25 cm) in the south-eastern corner of the structure was filled with decomposing juniper needles, twigs and windblown dust. This area was tested for subsurface artifactual materials and stratigraphy. Nothing was found in this test.

SUMMARY

48TE1076 is a small rockshelter site in Jackson Hole, Wyoming. The rockshelter contains a small artificially constructed structure, The structure is anchored by a large juniper tree in the southeastern corner. No artifacts were found during limited testing of a small area within the structure walls, nor were any seen outside the structure.

Some degree of antiquity to the construction of the structure is suggested by at least two large (43 mm) lichens growing across rocks in the wall

Figure 4: View of 48TE1076 from northeast. 25 cm scale lies against south wall. East wall begins behind three dead limbs extending from trunk of tree. Note vertical placement of east wall rocks. Also note fallen large rock in foreground which originally formed northeast corner of structure.

and small limbs extending off the trunk of the tree. Lichenometric studies would provide a minimum age for the construction of the rock walls. Similarly, dendrochronologic ageing of the juniper tree would provide a maximum age for the construction of the wall.

The investigation of 48TE1076 discussed here was conducted on September 8, 1985. Bridger-Teton National Forest provided permission to examine the site. Their assistance and concern about Wyoming's prehistory is gratefully acknowledged. I would like to acknowledge and express my appreciation to two people who helped with the field work, Mr. Robert C. Rudd, Curator of the Jackson Hole Museum and Mr. Bert Raynes, avocational archaeologist and co-discoverer (along with Mrs. Meg Raynes) of the site.

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Laramie, WY 82071

THE SONG OF THE INDIAN

I left my tools just lying there --
Had to rush off, not without care.
Thought I'd be back in a few days,
But then I learned of other ways.

It was sundown when we saw them
Roaming the hills -- big, black and awesome.
Our clothes they wore around their girth.
Their meat we want, to give us rebirth.
Their bones, their horns, we use them all,
There can be no waste in this season Fall.

They move and we followed
South and west, forever flowing.
Like the waters of the river, going, going.
We moved in for the kill on the day they stopped,
Ready now to harvest our crop.

Closer, closer, quickly to them. We meet.
Our arrows ready, their flesh to greet..
One stood tall, quite and still,
Clinged to life, defied the kill.

Pierced by his horns, today I died;
On this my first great hunt. The Spirits cried.
I left my tools just lying there
But not without care.

I see them coming, not far off,
With picks and shovels and other stuff.
Canes and water, food to spare;
Coming to claim the tools I left lying there.

My home they'll find, my hearth too.
They'll dig in the earth, amidst the dew.
I hear them coming, two by two.
Great Spirits Wind and Sun and Rain,
Do not hold them in disdain.
They seek a humble treasure to share...
My tools which I left lying there.

Gloria Seline
Glendive, Montana

WYOMING RADIOCARBON DATES - SUPPLEMENT 1

TERRI L. CRAIGIE

This listing of Wyoming radiocarbon dates is a continuation of my earlier compilation, including new dates run since the earlier publication, as well as additional dates which were brought to my attention.

As with the previous compilation, I have attempted to prevent inclusion of errors. I have checked these dates as well as possible, based on the form of submission to me. I would greatly appreciate anyone finding errors to let me know so that they may be corrected in future continuations of this listing. Likewise, anyone wishing to add new dates to the list is more than welcome to do so. This is the only way the data base will become accessible to all.

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in prep The Sheehan site. Unpublished Cultural Resource Management Report, on file, Archaeological Services, Western Wyoming College, Rock Springs, Wyoming.

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Greer, J., and G. L. Moore

1986a Inspection and testing along a planned AMOCO Production

Site Name	Lab No.	Date	Comments	Reference
ALBANY COUNTY (48AB)				
48AB342 Dead Man Cave	UCR-2043	2590 ± 100	Charcoal	OWSA/Walker
BIG HORN COUNTY (48BH)				
48BH988	Beta-12634	1070 ± 50 BP	Isolated hearth	BLM, Worland
CAMPBELL COUNTY (48CA)				
48CA1391	Beta-17006	2830 ± 50 BP	Charcoal	Albanese
48CA1391	Beta-17007	2760 ± 60 BP	Charcoal	Albanese
48CA1391	Beta-17008	1790 ± 100 BP	Charcoal	Albanese
CARBON COUNTY (48CR)				
48CR40	Beta-3138	3160 ± 160 BP	Component 1	Ruest & Creasman 1983
48CR304 Scoggin	Beta-12917	4410 ± 90 BP		BLM
48CR2213	Beta-5397	720 ± 70 BP		Creasman et al. 1983
48CR3815 5	Beta-11886	6570 ± 130 BP	Hearth char., 6630 ± 140 BP C-13 adj.	OWSA
48CR3815 9	Beta-11867	7800 ± 100 BP		OWSA
48CR4001 2	Beta-14038	3250 ± 60 BP	Carbon from bison bone level	OWSA
48CR4089	Beta-10519	3410 ± 100 BP	Fire hearth Locality A	Arch. Energy Cons.
48CR4114 Sheehan Site	Beta-11038	1440 ± 90 BP	Component 2 Feature 3	Bower, in preparation
48CR4114 Sheehan Site	Beta-11040	1190 ± 60 BP	Component 2 Feature 6	Bower, in preparation
48CR4114 Sheehan Site	Beta-11039	4010 ± 160 BP	Component 1 Feature 5	Bower, in preparation
48CR4140 Lost Minkey Site	Beta-15730	3990 ± 80 BP (2040 BC)	Bulk med carbon/48SW5981	Grant, et al. 1986
48CR4140 Lost Minkey Site	Beta-16353	5265 ± 80 BP (3315 BC)	Bulk med carbon/48SW5981	Greer and Moore 1986b
48CR4435 White Site #1	Beta-13400	870 ± 90 BP		OWSA
CONVERSE COUNTY (48CO)				
48C0287 Little Box Elder Cave	UCR-2052	10,500 ± 200	Grizzly Bear Scat	OWSA/Walker
48C01267 5	Beta-17829	2365 ± 105 BP	Charcoal	OWSA
48C01134 6	Beta-13966	670 ± 60 BP	Charcoal	OWSA
48C01135 7	Beta-13921	590 ± 60 BP	Charcoal	OWSA
48C01144 138 Deer Creek	Beta-13532	2830 ± 60 BP	Hearth charcoal	OWSA
CROOK COUNTY (48CK)				
48CK7 6541	Beta-15871	1210 ± 80 BP		OWSA
48CK7 6542	Beta-15870	850 ± 60 BP		OWSA
48CK43	Beta-13076	1580 ± 90 BP		BurRec
48CK806 69	Beta-14915	1260 ± 90 BP	Hearth Charcoal	OWSA
48CK864-1	Beta-15872	1720 ± 70 BP		OWSA

Site Name	Lab No.	Date	Comments	Reference
48CK1124 1	Beta-17382	1750 ± 90 BP	Hearth charcoal	OWSA
48CK1124 2	Beta-17383	1550 ± 60 BP	Hearth charcoal	OWSA
48CK1124 3	Beta-17384	1770 ± 130 BP	Hearth charcoal	OWSA
FREMONT COUNTY (48FR)				
48FR113 Crooks Creek Site	Beta-15136	2000 ± 70 BP (50 BC)	Bulk med carbon	Grant, et al. 1986
48FR113 Crooks Creek Site	Beta-15137	1190 ± 80 BP (AD 760)	Bulk med carbon	Grant, et al. 1986
48FR113 Crooks Creek Site	Beta-15138	1520 ± 70 BP (AD 430)	Bulk med carbon	Grant, et al. 1986
48FR113 Crooks Creek Site	Beta-17232	6220 ± 110 BP	Charcoal/Poss. House Pit	Overland Associates, Inc.
48FR113 Crooks Creek Site	Beta-17233	2610 ± 100 BP	Charcoal/Poss. House Pit	Overland Associates, Inc.
48FR113 Crooks Creek Site	Beta-17234	4970 ± 110 BP	Charcoal/Poss. House Pit	Overland Associates, Inc.
48FR113 Crooks Creek Site	Beta-17235	2980 ± 110 BP	Charcoal/Poss. House Pit	Overland Associates, Inc.
48FR113 Crooks Creek Site	Beta-17236	2330 ± 110 BP	Charcoal/Poss. House Pit	Overland Associates, Inc.
48FR113 Crooks Creek Site	Beta-17237	3900 ± 120 BP	Charcoal/Poss. House Pit	Overland Associates, Inc.
48FR113 Crooks Creek Site	Beta-17238	4470 ± 150 BP	Charcoal/Poss. House Pit	Overland Associates, Inc.
48FR113 Crooks Creek Site	Beta-17307	3940 ± 120 BP	Charcoal/Poss. House Pit	Overland Associates, Inc.
48FR424 Sand Wash Site	Beta-17228	3930 ± 70 BP	Charcoal/Poss. House Pit	Overland Associates, Inc.
48FR424 Sand Wash Site	Beta-17229	3300 ± 80 BP	Charcoal/Poss. House Pit	Overland Associates, Inc.
48FR424 Sand Wash Site	Beta-17230	5670 ± 100 BP	Charcoal/Poss. House Pit	Overland Associates, Inc.
48FR424 Sand Wash Site	Beta-17231	3760 ± 100 BP	Charcoal/Poss. House Pit	Overland Associates, Inc.
48FR424 Sand Wash Site	Beta-17296	2550-± 90 BP	Charcoal/Poss. House Pit	Overland Associates, Inc.
48FR424 Sand Wash Site	Beta-17297	4340 ± 100 BP	Charcoal/Poss. House Pit	Overland Associates, Inc.
48FR1484 1393	Beta-12461	5430 ± 70 BP	Hearth charcoal	OWSA
48FR1484 1394	Beta-12462	5240 ± 130 BP	Hearth charcoal	OWSA
48FR1484 1395	Beta-12463	5490 ± 80 BP	Hearth charcoal	OWSA
48FR1484 1396	Beta-12464	4430 ± 60 BP	Hearth charcoal	OWSA
48FR1484 1397	Beta-12465	5700 ± 80 BP	Hearth charcoal	OWSA
48FR1484 1386	Beta-12079	5870 ± 180 BP	Feature 4-1	OWSA
48FR1484 1387	Beta-12080	5340 ± 80 BP	Feature 4-2	OWSA
48FR1484 1388	Beta-12081	5130 ± 100 BP	Feature 4-3	OWSA
48FR1484 1389	Beta-12082	3400 ± 90 BP	Feature 4-4	OWSA
48FR1484 1390	Beta-12083	5350 ± 100 BP	Feature 4-5	OWSA
48FR1484 1391	Beta-12084	4670 ± 100 BP	Feature 4-6	OWSA
48FR1484 1392	Beta-12085	5030 ± 70 BP	Feature 4-7	OWSA
48FR1561 356	Beta-15299	3660 ± 90 BP		OWSA
48FR1561 357	Beta-15300	2660 ± 90 BP		OWSA
48FR1933	Beta-12523	950 ± 50 BP	Charcoal	Albanese - site monitor
48FR1933	Beta-12524	1030 ± 60 BP	Charcoal "uncorrected dates"	Albanese - site monitor
48FR2043	Beta-14274	1460 ± 80 BP	Hearth 1 -.9% organic carbon	BLM-Lander Resource Area
48FR2043	Beta-13913	3240 ± 80 BP	Hearth soil 0.7	BLM-Lander Resource Area
48FR2043	Beta-13914	3250 ± 70 BP	Hearth soil 1.2	BLM-Lander Resource Area
48FR2064 Sandtrap Site	Beta-17298	1330 ± 90 BP	Charcoal/Poss. Hous Pit	Overland Associates, Inc.
48FR2064 Sandtrap Site	Beta-17299	1170 ± 90 BP	Charcoal/Poss. Hous Pit	Overland Associates, Inc.
48FR2064 Sandtrap Site	Beta-17330	1100 ± 100 BP	Charcoal/Poss. Hous Pit	Overland Associates, Inc.
48FR2064 Sandtrap Site	Beta-17301	2310 ± 110 BP	Charcoal/Poss. Hous Pit	Overland Associates, Inc.
48FR2064 Sandtrap Site	Beta-17302	1130 ± 70 BP	Charcoal/Poss. Hous Pit	Overland Associates, Inc.
48FR2064 Sandtrap Site	Beta-17303	1060 ± 90 BP	Charcoal/Poss. Hous Pit	Overland Associates, Inc.
48FR2064 Sandtrap Site	Beta-17304	470 ± 100 BP	Charcoal/Poss. Hous Pit	Overland Associates, Inc.
48FR2064 Sandtrap Site	Beta-17305	3670 ± 120 BP	Charcoal/Poss. Hous Pit	Overland Associates, Inc.

Site Name	Lab No.	Date	Comments	Reference
48FR2064 Sandtrap Site	Beta-15140	1150 ± 70 BP	Hearth Charcoal	Overland Associates, Inc.
48FR2064 Sandtrap Site	Beta-15141	1190 ± 80 BP	Hearth Charcoal	Overland Associates, Inc.
48FR2064 Sandtrap Site	Beta-15142	1090 ± 80 BP	Hearth Charcoal	Overland Associates, Inc.
48FR2230	Beta-17469	5950 ± 100 BP	Hearth Charcoal/MG-4-1	OWSA
48FR2230 5	Beta-17825	2030 ± 70 BP	Hearth charcoal	OWSA
48FR2230 4	Beta-17826	2580 ± 210*	Given quadruple counting time	OWSA
48FR2230 3	Beta-17827	1350 ± 60 BP	Hearth charcoal	OWSA
JOHNSON COUNTY (48JO)				
48J011 77	Beta-14646	5360 ± 95 BP	Burned soil horizon level, charcoal	OWSA
48J011 76	Beta-14647	3140 ± 95 BP	Burned cultural level, soil	OWSA
48J011 78	Beta-14645	2380 ± 80 BP	Hearth charcoal	OWSA
48J011 214	Beta-15357	1530 ± 80 BP	Hearth charcoal	OWSA
48J013 22	Beta-13529	1250 ± 90 BP	Hearth charcoal	OWSA
48J013 21	Beta-13530	1680 ± 100 BP	Hearth charcoal	OWSA
48J015 21	Beta-13531	3300 ± 170 BP	Hearth charcoal	OWSA
48J015 22	Beta-13882	2860 ± 100 BP	Charcoal	OWSA
48J015 23	Beta-13883	3220 ± 90 BP	Charcoal	OWSA
48J015 24	Beta-13884	5360 ± 130 BP	Charcoal	OWSA
48J015 91	Beta-15650	2250 ± 70 BP		OWSA
48J0343 24	Beta-13522	1790 ± 100 BP	Hearth charcoal	OWSA
48J0343 23	Beta-13523	1850 ± 120 BP	Hearth charcoal	OWSA
48J0343 25	Beta-13888	1500 ± 70 BP	charcoal	OWSA
48J0354 16	Beta-13528	830 ± 80 BP	Hearth charcoal	OWSA
48J0356 58	Beta-13885	1690 ± 100 BP	Charcoal	OWSA
48J0356 59	Beta-13886	1300 ± 60 BP	Charcoal	OWSA
48J0356 60	Beta-13887	1450 ± 60 BP	Charcoal	OWSA
48J0356 61	Beta-14414	910 ± 70 BP	Hearth charcoal	OWSA
48J0356 62	Beta-14415	1410 ± 80 BP	Hearth charcoal	OWSA
48J0356 63	Beta-14416	840 ± 90 BP	Hearth charcoal	OWSA
48J0356 64	Beta-14417	1685 ± 80 BP	Hearth charcoal	OWSA
48J0356 65	Beta-14642	1870 ± 80 BP	Hearth charcoal	OWSA
48J0356 66	Beta-14643	1265 ± 85 BP	Hearth charcoal	OWSA
48J0357 10 Middle Fork	Beta-13525	1570 ± 60 BP	Hearth charcoal	OWSA
48J0357 9 " "	Beta-13526	3520 ± 100 BP	Hearth charcoal	OWSA
48J0357 8 " "	Beta-13527	3810 ± 170 BP	Hearth charcoal	OWSA
48J0357 11 " "	Beta-13524	1290 ± 70 BP	Hearth charcoal	OWSA
48J01019 1	Beta-14644	140 ± 50 BP	Hearth charcoal	OWSA
LARAMIE COUNTY (48LA)				
48LA304 Seven Mile Point	Beta-13063	1300 ± 60 BP	Plains Woodland Level	C.A. Reher
48LA304 Seven Mile Point	Beta-13064	1100 ± 50 BP	Plains Woodland Level	C.A. Reher
48LA307/312 Pine Bluffs Site	Beta-13065	1060 ± 90 BP	.6 BS below surface (meters)	C.A. Reher
48LA307/312 Pine Bluffs Site	Beta-13066	1620 ± 90 BP	.8 BS below surface (meters)	C.A. Reher
48LA307/312 Pine Bluffs Site	Beta-13067	3680 ± 80 BP	1.6 BSbelow surface (meters)	C.A. Reher
48LA549	Beta-12785	4370 ± 120 BP	Hearth charcoal	OWSA

Site Name	Lab No.	Date	Comments	Reference
LINCOLN COUNTY (48LN)				
48LN345	Beta-12974	3030 ± 90 BP	Feature 1	Swenson 1985
48LN1088	Beta-10920	5310 ± 120 BP	Feature 1 Testing	Hoefer et al. 1985
48LN1100	Beta-7081	1470 ± 85 BP	Feature 1	Western Research Arch.
48LN1100	Beta-7082	1880 ± 95 BP	Feature 2	Western Research Arch.
48LN1100	Beta-7083	3000 ± 110 BP	Feature 3	Western Research Arch.
48LN1100	Beta-7084	4030 ± 85 BP	Feature 4	Western Research Arch.
48LN1101	Beta-6974	8500 ± 120 BP	Feature 1	Western Research Arch.
48LN1101	Beta-6975	3240 ± 240 BP	Feature 2	Western Research Arch.
48LN1457	Beta-10921	3520 ± 80 BP	Feature 1 Testing	Hoefer et al. 1985
48LN1464	Beta-10923	4290 ± 90 BP	Feature 1 Testing	Hoefer et al. 1985
48LN1465	Beta-10924	1320 ± 80 BP	Feature 1 Testing	Hoefer et al. 1985
48LN1468 Taliaferro Site	Beta-13014	2850 ± 90 BP	Feature 38 Component III	Smith in preparation
48LN1468 Taliaferro Site	Beta-10925	2590 ± 90 BP	Feature 2, Testing (Feature 28) Comp. III	
48LN1468 Taliaferro Site	Beta-13013	5290 ± 190 BP	Feature 21 Comp. I	Hoefer et al. 1985
48LN1468 Taliaferro Site	Beta-13009	1500 ± 70 BP	Feature 17, Comp. IV	Smith in preparation
48LN1468 Taliaferro Site	Beta-13010	1310 ± 70 Bp	Feature 14, Comp. V	Smith in preparation
48LN1468 Taliaferro Site	Beta-13011	960 ± 60 BP	Feature 22, Comp. VI	Smith in preparation
48LN1468 Taliaferro Site	Beta-13012	1170 ± 60 BP	Feature 30 Comp. V	Smith in preparation
48LN1468 Taliaferro Site	Beta-13516	1910 ± 110 BP	Feature 20 Comp. III	Smith in preparation
48LN1469	Beta-10922	3160 ± 80 BP	Testing Comp I	Smith in preparation
48LN1469	Beta-12976	3000 ± 100 BP	Feature 2 Comp. I	Hoefer et al. 1985
48LN1550	Beta-12975	3665 ± 85 BP	Feature 1	McKern in preparation
				Swenson 1985
NATRONA COUNTY (48NA)				
48NA959 264	Beta-14894	4380 ± 140 BP	Hearth charcoal	OWSA
48NA960 6	Beta-13718	1040 ± 90 BP	Hearth charcoal	OWSA
48NA964 25	Beta-17938	4200 ± 370 BP	Feature 68, charcoal	OWSA
48NA969 EKW #1	Beta-16861	240 ± 80 BP	Charcoal	OWSA
48NA1000 72	Beta-17830	1660 ± 90 BP		OWSA
48NA1152 4	Beta-17446	250 ± 60 BP	Charcoal, bone bed	OWSA
48NA1162 2	Beta-16968	5540 ± 110 BP	Hearth charcoal	OWSA
PARK COUNTY (48PA)				
48PA829 2	Beta-14146	1460 ± 60 BP	Hearth charcoal	OWSA
48PA829 4	Beta-14147	1010 ± 100 BP	Hearth charcoal	OWSA
48PA829 5	Beta-14148	1210 ± 90 BP	Hearth charcoal	OWSA
48PA848 Platt Site	Beta-15276	880 ± 100 BP	0.4 gram carbon	OWSA
48PA848 Platt Site	need lab no.	1120 ± 50 BP (866 AD)		Susan Hughes
48PA852 34	Beta-14626	2860 ± 70 BP	Hearth charcoal	OWSA
48PA852 35	Beta-14627	2750 ± 80 BP	Hearth charcoal	OWSA
48PA852 36	Beta-14628	3270 ± 90 BP	Hearth charcoal	OWSA
48PA852 37	Beta-14629	2720 ± 60 BP	Hearth charcoal	OWSA
48PA852 38	Beta-14750	2660 ± 70 BP	Hearth charcoal	OWSA

Site Name	Lab No.	Date	Comments	Reference
48PA853 4	Beta-14630	2890 ± 90 BP	Sheep bone bed	OWSA
48PA853 5	Beta-14631	2850 ± 70 BP	Sheep bone bed	OWSA
48PA853 3	Beta-14037	2990 ± 90 BP	Carbon from sheep bone level	OWSA
48PA904	Beta-15275	2140 ± 70 BP	Horner terrace	OWSA
SUBLETTE COUNTY (48SU)				
48SU239	Beta-5871	3330 ± 150 BP	Feature 1	Western Research Arch.
48SU242	Beta-5872	1210 ± 70	Feature 1	Western Research Arch.
48SU242	Beta-5873	1910 ± 80 BP	Feature 2	Western Research Arch.
48SU242	Beta-5874	1600 ± 80 BP	Feature 3	Western Research Arch.
48SU242	Beta-6975	3080 ± 80 BP	Feature 8	Western Research Arch.
48SU266	Beta-5302	1770 ± 90 BP	Feature 1	Western Research Arch.
48SU266	Beta-5303	1740 ± 1390 BP	Feature 2	Western Research Arch.
48SU266	Beta-5304	1920 ± 100 BP	Feature 3	Western Research Arch.
48SU266	Beta-5875	3990 ± 100 BP	Feature 5	Western Research Arch.
48SU390	Beta-5360	3220 ± 100 BP	Feature 1	Western Research Arch.
48SU390	Beta-5361	3090 ± 80 BP	Feature 2	Western Research Arch.
48SU390	Beta-5876	1070 ± 100 BP	Feature 7	Western Research Arch.
48SU390	Beta-5877	2840 ± 260 BP	Feature 8	Western Research Arch.
48SU575 26	Beta-12779	5910 ± 85 BP	C-13 adjusted	OWSA
48SU575 27	Beta-12780	4410 ± 90 BP	Hearth charcoal	OWSA
48SU575 28	Beta-12781	2770 ± 90 BP	Hearth charcoal	OWSA
48SU575 29	Beta-12782	4760 ± 360 BP	Hearth charcoal, 0.2 gram carbon	OWSA
48SU575 30	Beta-12783	4150 ± 150 BP	Hearth charcoal, 0.3 gram carbon	OWSA
48SU846 McGinnis Site	Beta-12888	5680 ± 150 BP	Feature 1	Thomson in preparation
48SU867 Harrower Site	Beta-13876	13620 ± 140 BP	Geologic	Miller in preparation
48SU867 Harrower Site	Beta-10926	680 ± 50 BP	Feature 1	Hoefer et al. 1985
48SU871 Schaffer Site	Beta-10927	1730 ± 80 BP	Feature 1	Thompson 1985
48SU871 Schaffer Site	Beta-10928	960 ± 90 BP	Feature 2	Thompson 1985
48SU872	Beta-10929	280 ± 80 BP	Feature 6	Thompson in preparation
SWEETWATER COUNTY (48SW)				
48SW127 Tower Site	Beta-17226	4220 ± 100 BP	Charcoal/Poss House Pit	Overland Associates, Inc.
48SW127 Tower Site	Beta-17227	5130 ± 110 BP	Charcoal/Poss House Pit	Overland Associates, Inc.
48SW372	Beta-9473	1410 ± 90 BP	Charcoal	Mackey et al. 1985
48SW374	Beta-9416	1370 ± 170 BP	Charcoal	Mackey et al. 1985
48SW994 Lost Soldier Creek	Beta-15143	1720 ± 70 BP (AD 230)	Bulk med carbon	Grant, et al. 1986
48SW994 Lost Soldier Creek	Beta-15144	1990 ± 70 BP (40 BC)	Bulk med carbon	Grant, et al. 1986
48SW994 Lost Soldier Creek	Beta-15145	960 ± 70 BP (AD 990)	charcoal	Grant, et al. 1986
48SW994 Lost Soldier Creek	Beta-15147	850 ± 70 BP (AD 1100)	Bulk med carbon	Grant, et al. 1986
48SW994 Lost Soldier Creek	Beta-15150	2890 ± 70 BP (940 BC)	Charcoal	Grant, et al. 1986
48SW994 Lost Soldier Creek	Beta-15151	2540 ± 70 BP (590 BC)	Charcoal	Grant, et al. 1986
48SW994 Lost Soldier Creek	Beta-15149	25130 ± 550 BP (23180 BC)	Possible coal - non cultural component	
48SW998 Abel Creek Site	Beta-15131	950 ± 70 BP (AD 1000)	Bulk low carbon	Grant, et al. 1986
48SW998 Abel Creek Site	Beta-15132	1020 ± 70 BP (AD 930)	Bulk low carbon	Greer & Moore 1986a
48SW998 Abel Creek Site	Beta-15133	1480 ± 70 BP (AD 470)	Bulk med carbon	Greer & Moore 1986a

Site Name	Lab No.	Date	Comments	Reference
48SW998 Abel Creek Site	Beta-15134	2680 ± 70 BP (730 BC)	Bulk med carbon	Greer & Moore 1986a
48SW998 Abel Creek Site	Beta-15135	1930 ± 70 (AD 20)	Bulk med carbon	Greer & Moore 1986a
48SW998 Abel Creek Site	Beta-15146	2460 ± 90 BP (510 BC)	Bulk med carbon	Greer & Moore 1986a
48SW998 Abel Creek Site	Beta-15148	1620 ± 70 BP (AD 330)	Bulk med carbon	Greer & Moore 1986a
48SW998 1	Beta-17242	5950 ± 120 BP	0.4 gram carbon	OWSA
48SW998 2	Beta-17266	3440 ± 90 BP	0.7 gram carbon	OWSA
48SW1217 Antelope Kill Site	UGa-2048	645 ± 135 BP		Metcalf in preparation
48SW1217 Antelope Kill Site	UGa-2049	625 ± 50 BP		Metcalf in preparation
48SW1242 Locality 4b	Beta-11037	1350 ± 70 BP	Testing Comp. IV	Hoefer 1985
48SW1242 Locality 4b	Beta-13432	1540 ± 90 BP	Midden #1 Comp. IV	Hoefer in preparation
48SW1242 Locality 4b	Beta-13433	2170 ± 90 BP	Feature 7 Comp. II	Hoefer in preparation
48SW1366	Beta-8571	15,320 ± 190 BP	Date Rejected	Head 1984b
48SW1455 Deadman Wash	UGa-3786	555 ± 300 BP	Testing	Creasman et al. 1982
48SW1692 Great Divide Basin	Beta-5404	1510 ± 90 BP (AD 440)	was 48SW5016	Creasman 1983
48SW2590 Maxon Ranch	Beta-13308	4860 ± 110 BP		Harrell and McKern 1985
48SW2590 Maxon Ranch	Beta-13307	6000 ± 130 BP		Harrell and McKern 1985
48SW2590 Maxon Ranch	Beta-13017	1210 ± 60 BP		Harrell and McKern 1985
48SW2590 Maxon Ranch	Beta-13000	1140 ± 100 BP	Feature 5	Harrell and McKern 1985
48SW2590 Maxon Ranch	Beta-13001	2250 ± 100 BP	Feature 13	Harrell and McKern 1985
48SW2590 Maxon Ranch	Beta-13002	2180 ± 100 BP	Feature 21	Harrell and McKern 1985
48SW2590 Maxon Ranch	Beta-13003	4760 ± 130 BP	Feature 17	Harrell and McKern 1985
48SW2590 Maxon Ranch	Beta-13004	6480 ± 90 BP	Feature 22	Harrell and McKern 1985
48SW2590 Maxon Ranch	Beta-3264	2350 ± 80 BP		Gardner et al. 1982
48SW2590 Maxon Ranch	Beta-3618	2130 ± 70 BP		Gardner et al. 1982
48SW2590 Maxon Ranch	Beta-3620	3750 ± 90 BP		Gardner et al. 1982
48SW2590 Maxon Ranch	Beta-3261	390 ± 70 BP		Gardner et al. 1982
48SW2590 Maxon Ranch	Beta-3622	5560 ± 280 BP		Gardner et al. 1982
48SW3039A Playa #3	Beta-12418	5720 ± 100 BP	Charcoal	Mackey et al. 1985
48SW3039B Playa #3	Beta-9415	6560 ± 420 BP	Charcoal	Mackey et al. 1985
48SW3039B Playa #3	Beta-9414	3920 ± 220 BP	Charcoal	Mackey et al. 1985
48SW3655	Beta-4798	3600 ± 75 BP		Western Research Arch.
48SW3655	Beta-4799	3990 ± 85 BP		Western Research Arch.
48SW4358 1	Beta-17267	700 ± 70 BP	0.6 gram carbon	OWSA
48SW4397	Beta-4797	3805 ± 110 BP		Western Research Arch.
48SW5175 Sweetwater Creek	Beta-10511	3710 ± 60 BP	Feature 1, Comp. 3	Newberry & Harrison 1986
48SW5175	Beta-11427	4380 ± 200 BP	Feature 5, Comp. 2	Newberry & Harrison 1986
48SW5175	Beta-10510	5130 ± 90 BP	Feature 7a, Comp. 1	Newberry & Harrison 1986
48SW5222	Beta-8023	850 ± 60 BP	Soil sample	Western Research Arch.
48SW5222	Beta-8024	1230 ± 70 BP	Charcoal	Western Research Arch.
48SW5314	Beta-9352	1190 ± 60 BP	Charcoal	Mackey et al. 1985
48SW5315	Beta-11459	1050 ± 330 BP	Charcoal	Mackey et al. 1985
48SW5315	Beta-11460	5880 ± 420 BP	Charcoal	Mackey et al. 1985
48SW5316	Beta-11461	640 ± 270 BP	Charcoal	Mackey et al. 1985
48SW5377	Beta-10583	980 ± 90 BP	Feature 2	Harrison in preparation
48SW5377	Beta-13017	1210 ± 60 BP	Feature 7	Harrison in preparation
48SW5433	Beta-9417	1410 ± 70 BP	Charcoal	Mackey et al. 1985
48SW5436	Beta-9528	1160 ± 140 BP	Charcoal	Mackey et al. 1985
48SW5437	Beta-9422	4870 ± 400 BP	Humic soil	Mackey et al. 1985

Site Name	Lab No.	Date	Comments	Reference
48SW5593	Beta-9532	2240 ± 130 BP	Charcoal	Mackey et al. 1985
48SW5595	Beta-9419	4410 ± 140 BP	Charcoal	Mackey et al. 1985
48SW5684	Beta-9474	420 ± 130 BP	Charcoal	Mackey et al. 1985
48SW5685	Beta-9405	1640 ± 290 BP	Charcoal	Mackey et al. 1985
48SW5710	Beta-9358	1720 ± 90 BP	Charcoal	Mackey et al. 1985
48SW5717	Beta-9408	1850 ± 90 BP	Charcoal	Mackey et al. 1985
48SW5720	Beta-9360	970 ± 60 BP	Charcoal	Mackey et al. 1985
48SW5721	Beta-9359	4510 ± 80 BP	Charcoal	Mackey et al. 1985
48SW5727	Beta-9361	970 ± 90 BP	Charcoal	Mackey et al. 1985
48SW5731	Beta-9362	5820 ± 320 BP	Charcoal	Mackey et al. 1985
48SW5733	Beta-9400	7440 ± 440 BP	Charcoal	Mackey et al. 1985
48SW5734	Beta-9407	8330 ± 420 BP	Charcoal	Mackey et al. 1985
48SW5738	Beta-9363	1650 ± 100 BP	Charcoal	Mackey et al. 1985
48SW5740	Beta-9403	2400 ± 120 BP	Charcoal	Mackey et al. 1985
48SW5741	Beta-9364	2010 ± 240 BP	Charcoal	Mackey et al. 1985
48SW5752	Beta-9365	1890 ± 200 BP	Charcoal	Mackey et al. 1985
48SW5753	Beta-9366	1590 ± 160 BP	Charcoal	Mackey et al. 1985
48SW5757	Beta-9367	17370 ± 3870 BP	Charcoal	Mackey et al. 1985
48SW5758	Beta-9368	1100 ± 160 BP	Charcoal	Mackey et al. 1985
48SW5759	Beta-9369	5380 ± 150 BP	Charcoal	Mackey et al. 1985
48SW5760	Beta-9531	3470 ± 630 BP	Charcoal	Mackey et al. 1985
48SW5764	Beta-9475	860 ± 160 BP	Charcoal	Mackey et al. 1985
48SW5769	Beta-9476	2370 ± 180 BP	Charcoal	Mackey et al. 1985
48SW5787	Beta-9477	4080 ± 170 BP	Charcoal	Mackey et al. 1985
48SW5798	Beta-9478	600 ± 180 BP	Charcoal	Mackey et al. 1985
48SW5798	Beta-9413	1310 ± 120 BP	Charcoal	Mackey et al. 1985
48SW5799	Beta-9421	5000 ± 140 BP	Humic soil	Mackey et al. 1985
48SW5799	Beta-9479	1700 ± 130 BP	Charcoal	Mackey et al. 1985
48SW5800	Beta-9491	1290 ± 70 BP	Humic soil	Mackey et al. 1985
48SW5815	Beta-9480	3120 ± 180 BP	Charcoal	Mackey et al. 1985
48SW5943 Powder Mtn. NE6	Beta-10123	960 ± 60 BP	Feature 1 Testing	Head 1984a/WWC
48SW5981 Lost Minkey Site	Beta-15730	3990 ± 80 BP (2040 BC)	Bulk med carbon/48CR4140	Grant, et al. 1986
48SW5981 Lost Minkey Site	Beta-16353	5265 ± 80 BP (3315 BC)	Bulk med carbon/48CR4140	Greer and Moore 1986b
48SW5981 Lost Minkey Site	Beta-17218	4810 ± 150 BP	Charcoal/poss. House Pit	Overland Associates, Inc.
48SW5981 Lost Minkey Site	Beta-17219	3460 ± 70 BP	Charcoal/poss. House Pit	Overland Associates, Inc.
48SW4981 15	Beta-19123	1350 ± 90 BP	Hearth Charcoal	OWSA
48SW5981 16	Beta-19124	1660 ± 100 BP	Hearth Charcoal	OWSA
48SW5982 Bald Knob Site	Beta-17220	5000 ± 80 BP	Charcoal/Poss. House Pit	Overland Associates, Inc.
48SW5982 Bald Knob Site	Beta-17221	4270 ± 70 BP	Charcoal/Poss. House Pit	Overland Associates, Inc.
48SW5982 Bald Knob Site	Beta-17222	3450 ± 70 BP	Charcoal/Poss. House Pit	Overland Associates, Inc.
48SW6007	Beta-14635	2640 ± 60 BP	Feature 3	McKern 1985
48SW6144	Beta-13101	3300 ± 110 BP	Feature 1	Creasman 1985a
48SW6153	Beta-13154	3570 ± 70 BP	Feature 2	Creasman 1985a
48SW6191 4	Beta-15949	1290 ± 70 BP	Hearth Charcoal	OWSA
48SW6191 5	Beta-15950	1720 ± 80 BP	Hearth charcoal	OWSA
48SW6191 6	Beta-15951	3800 ± 100 BP	Hearth charcoal	OWSA
48SW6191 7	Beta-15952	1720 ± 220 BP	.1 gram carbon, charcoal	OWSA
48SW6191 8	Beta-15953	4170 ± 115 BP	Hearth charcoal	OWSA

Site Name	Lab No.	Date	Comments	Reference
48SW6191 9	Beta-15954	2410 ± 180 BP	.2 gram carbon, charcoal	OWSA
48SW6220	Beta-12923	1240 ± 60 BP	Feature 1 CO_2 PO_4 monitor	Bower, in prep.
48SW6221	Beta-12922	1860 ± 90 BP	Feature 1 CO_2 PO_4 monitor	Bower, in prep.
48SW6238	Beta-13484	1560 ± 80 BP	Feature 1	Newberry et al. 1985
48SW6249	Beta-13667	820 ± 90 BP	Feature 2	Harrison 1985
48SW6253	Beta-14025	1630 ± 70 BP	Feature 4	Swenson in preparation
48SW6248 1	Beta-13760	1180 ± 50 BP		OWSA
48SW6248 2	Beta-13761	1150 ± 85 BP	Hearth charcoal	OWSA
48SW6275 Cully's Dump site	Beta-15139	1590 ± 70 BP (AD 360)	Bulk med carbon/Poss House Pit	Grant, et al. 1986
48SW6275 Cully's Dump site	Beta-17223	7330 ± 140 BP	Charcoal/Poss. House Pit	Overland Associates, Inc.
48SW6275 Cully's Dump site	Beta-17224	8060 ± 160 BP	Charcoal/Poss. House Pit	Overland Associates, Inc.
48SW6275 Cully's Dump site	Beta-17225	6980 ± 130 BP	Charcoal/Poss. House Pit	Overland Associates, Inc.
48SW6275 Cully's Dump site	Beta-17292	6380 ± 120 BP	Charcoal/Poss. House Pit	Overland Associates, Inc.
48SW6275 Cully's Dump site	Beta-17293	7670 ± 110 BP	Charcoal/Poss. House Pit	Overland Associates, Inc.
48SW6275 Cully's Dump site	Beta-17294	4060 ± 90 BP	Charcoal/Poss. House Pit	Overland Associates, Inc.
48SW6275 Cully's Dump site	Beta-17295	6330 ± 120 BP	Charcoal/Poss. House Pit	Overland Associates, Inc.
48SW6332	RL-1914	1540 ± ±30 BP (AD 430 ± 150)	was 48SW827	OWSA WY-78-82
48SW6332	RL-1915	1550 ± 110 BP (AD 430 ± 140)	was 48SW827	OWSA WY-78-82

UINTA COUNTY (48UT)

Site Name	Lab No.	Date	Comments	Reference
48UT130	Beta-8572	3760 ± 110 BP		WWC
48UT138	Beta-8572	3760 ± 100 BP		WWC
48UT199	Beta-7276	4890 ± 240 BP		Schroedl, 1984
48UT199	Beta-7277	1460 ± 90 BP		Schroedl, 1984
48UT199	Beta-7269	1260 ± 70 BP		Schroedl, 1984
48UT370	Beta-7270	6480 ± 340 BP		Schroedl, 1984
48UT370	Beta-7278	4290 ± 150 BP		Schroedl, 1984
48UT390 Austin Wash Site	Beta-7271	1370 ± 60 BP (AD 580)	Rock-filled firepit	Schroedl, 1984
48UT390 Austin Wash Site	Beta-7272	1250 ± 60 BP (AD 700)	Bone Midden Matrix	Schroedl, 1984
48UT390 Austin Wash Site	Beta-7273	1160 ± 50 BP (AD 790)	Rock-filled firepit	Schroedl, 1984
48UT390 Austin Wash Site	Beta-7274	1070 ± 80 BP (AD 880)	Large pit	Schroedl, 1984
48UT445	Beta-7337	1200 ± 90 BP		Schroedl, 1984
48UT445	Beta-7338	930 ± 60 BP		Schroedl, 1984
48UT779	Beta-6945	4670 ± 120 BP		Schroedl, 1984
48UT779	Beta-7275	1130 ± 80 BP		Schroedl, 1984
48UT918 375	Beta-15160	3870 ± 100 BP	Hearth charcoal	OWSA
48UT918 376	Beta-15490	1470 ± 80 BP	Hearth charcoal	OWSA
48UT919	Beta-13875	3180 ± 120 BP		Miller in preparation
48UT920 66	Beta-13062	1650 ± 60 BP	Hearth charcoal	OWSA
48UT920 67	Beta-13156	90 ± 60 BP	Juniper twigs burial	OWSA
48UT921 42	Beta-13288	3250 ± 90 BP	Hearth charcoal	OWSA
48UT921 158	Beta-15655	2120 ± 90 BP	.04 gram carbon	OWSA

Site Name	Lab No.	Date	Comments	Reference
WASHAKIE COUNTY (48WA)				
48WA324 Bush Shelter	UCR-2046	5450 ± 95	Charcoal	OWSA/Walker
48WA324 Bush Shelter	UCR-2047	3960 ± 80	Charcoal	OWSA/Walker
48WA324 Bush Shelter	UCR-2045	5700 ± 80	Charcoal	OWSA/Walker
48WA324 Bush Shelter	UCR-2048	9530 ± 100	Pack Rat Scat	OWSA/Walker

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THE SONG OF THE VOLUNTEER

WAIT for me -- I'm coming too!
Pick me up and tie my shoe.
Hold it now, not so fast,
I seem to have lost my hat!

Over hills over dale
Think I'm feeling awfully pale.
On we go, the mountains we forge
Wish I had wings to soar.

Almost there, only miles to go,
Those bugs must think that I'm their foe.
Fall down, get up. Fall down, get up.
Wish I'd known about this set-up!

Now we're there and it's time to work,
The sun's almost up, start digging dirt!
Deeper, deeper, down we go,
China is near, ho-ho-ho!

The sun is high and getting hot.
It bakes the brain and loosens the snot.
Careful now the dirt you scrape,
Precise measurements you must take!

Metric is the current style
(Those math notes sit in some closet pile).
Get out the lead and some paper,
(This vacation's quite the caper!)

There they are, those ancient tools
Left by some forgetful old fool.
Clean them off and brush them good,
'Cause here comes the rain, so get out your hood!

Slipping and sliding in the mud
I'd like an ale with some suds.
Bouncing and bouncing in the truck we go
DOG, you're sitting on my toe!
(NEXT vacation to Florida I'll go!

Think I'm done? No! No! There's more!
At least seven days in the pit are in store.
That early alarm really makes me seethe.
Someone please wait -- there's cactus needles in my teeth!

Finally I've dug to the bottom of my pit
Along she comes and says "cover up it."
"Dig it out," "shovel it in"
Somehow, I must have committed some great sin.

Please Lord let me go back to work!
I promise to never again ever smirk.
And I uphold that vacations are in contempt
All I want is air conditioning and a shower --- ah! content!

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A NEW TECHNIQUE IN ROCK ART ANALYSIS: THE QUADRATURE METHOD

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American prehistoric rock art offers an opportunity to study the Native American's way of graphically portraying the prehistoric world. Unfortunately, analytical techniques for analyzing rock art are not as well developed as those for the study of ceramics and lithic artifacts. Dating techniques are difficult and rock art terminology is lacking in both descriptive terms and consistency in term usage (Hranicky 1986). In this light, this paper offers a new technique for rock art analysis that can greatly enhance comparative methods and computer recording techniques. The proposed Quadrature method can be used on glyphs to analyze:

1 - A single glyph
2 - Any part (recognizable unit) of a glyph
3 - An entire glyph site
4 - Glyph colors as single entities.

The Quadrature (Q) Method of analyzing rock art glyphs involves a technique that determines a comparative weight (numerical coefficient) of a rock art glyph. This coefficient can be used to determine whether a glyph is animate or inanimate (living vs. nonliving) art. This is useful in dealing with abstract or design rock art. The technique was developed by the author and tested on both Baja California pictographs and French cave art. The technique was also tested on photographs of living wildlife. The test held true for most wildlife. However, some animals such as reptiles did not work.

At present, there is no way to code rock art other than by using factors such as color, size, topic, or geography. These factors do not lend themselves to scientific comparison other than coincidence of occurrence. They have often been considered as style or type in rock art analysis but fail in testing because these base factors tend to be universal and basic mechanistic procedures for producing any rock art.

As a side note, no study has been made to determine what glyphs are pan-Indian, for example: the thunderbird, sun glyph, and concentric circles. The term glyph is used in this paper to mean any single drawing or incising on a large boulder. Petroglyph is an incised style whereas pictograph is a painted style of drawing. Both are composed of (usually just one method was used) glyphs. The communication difference between these two styles (and this includes the cave mud-art of Tennessee) remains to be proven. I suggest that this medium was not all that important to Native Americans. However, this is only a conjecture on the author's part and remains to be proven.

The Q method can be used on an entire site that contains rock art to determine spatial relations and separate parts (colors) of glyphs, but for this paper, only individual glyph analysis is discussed. The rock art examples that are used to illustrate this paper are from Crosby (1975) and Lewis (1985). The Q method assumes that any glyph has form and structure that reflects the artist's cognitive processes that was used to produce the art and that any human response (behavior) can be coded. This coding always reflects two possibilities. First codes reflect the original behavior of the artist and second, codes reflect a pattern that can be analyzed.

The Q method creates a code that can be used to identify and analyze rock art. Also, the technique creates a drawing analysis that can be visually compared, such as determining the center of a piece of art. Both of these offer a technique to portray the artist's original intent, ability, and final product in a scientific way that can be used for cross-cultural studies and comparisons. These are more possibilities in using the Q method, but only the coefficient and animate/inanimate factor are discussed in this paper.

The Q method allows for any form of logic that produced the original art. For example, the Western world tends to use a linear form of logic, that is A before B before C, etc. The Native American form of logic tends to be a circular form of logic, that is with A as the center with B, C, and D, etc., somewhere around A. I suggest that any method of analysis that fails to include the Native American's form of logic as an analytical tool will fail in its archeological interpretation or "what does it mean."

The Q method uses four factors in the construction of a numerical coefficient. These are as follows:

1 - Quadrature (Q) = dividing any glyph into four sectors with each sector being (+ +), (+ -), (- +), and (- -).

2 - Point (P) = all glyphs have a starting point when they were drawn.

3 - Vector (V) = any position in the glyph in relation to P.

4 - Distance (D) = the distance of any position in the art which is measured from P.

The Q method divides any glyph into four sectors, named Sectors #1 = +X, #2 = +Y, #3 = -Y, and #4 = -X (see Figure 1). Q is the height (amplitude) or depth (deamplitude), or it is a vertical scale that has both plus (+) and minus (-) scalars. P is also a plus/minus scalar and represents the width (latitude) of a glyph. P also represents the starting point for the glyph. We will never know the actual starting point for the artist who drew the glyph. For these scalars, the original position of the glyph is used. Thus, P(0) can be placed randomly on the glyph, or it can be placed systematically on the glyph to be consistent with the placement of P(0) on other glyphs in the study. The latter is discussed under establishing P(0). P will have three values of (-n), (0), and (+n). The major reason for not establishing a variable for P(0), such as C = center, is that the center of the drawing is not a real variable. We have set P(0) arbitrarily and thus, P(0) does nothing more than establish a systematic starting point; whereas, P has dimensions that we can use.

The V factor is an angle off the basic P (center at 0). This angle can be measured in units of four, such as four, eight, sixteen, and so on. Four Vs are certainly not adequate; whereas, sixteen Vs tend to involve more measurements than I feel are necessary. Therefore, I suggest an octonary method, which is 360 degrees divided by eight (45 degrees for each V line).

The D factor is the actual distance along the V line. This distance (D) is measured from the center P(0) to the edge of the drawing. By using the octonary division, any mathematical relationship covers the entire area of the glyph. When a V line does not cross the edge to the glyph, a 0 (zero) is recorded for that V line. D is measured by using the same unit 1 scale which is the longest vertical or horizontal unit for the drawing. The unit 1 scale is discussed below.

Establishing P(0) involves finding the center of a glyph. The center of the drawing does not necessarily have to

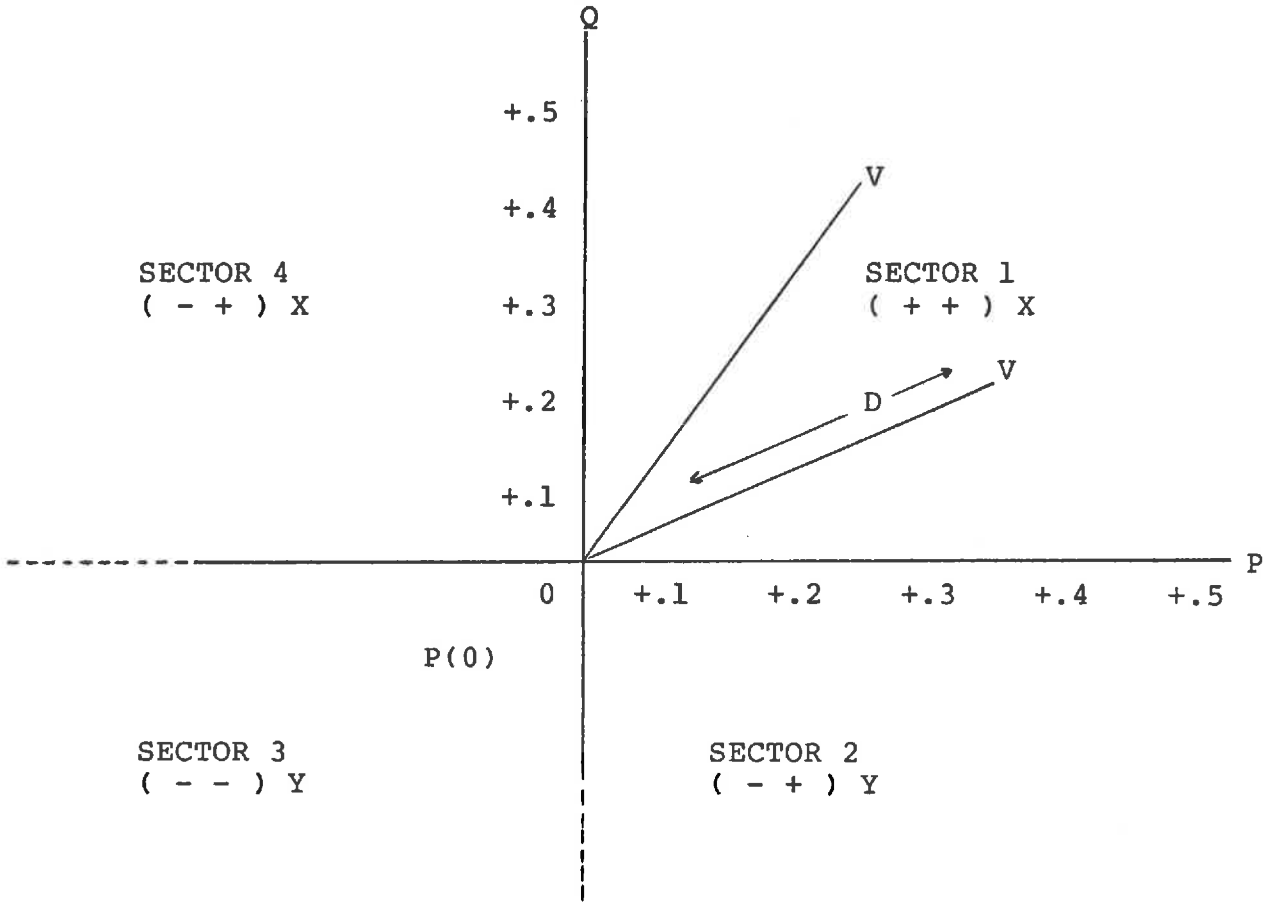


Figure 1: Q Method overlay for rock art.

be within the glyph. Solid drawings frequently will have P(0) inside the glyph's area. However, irregular drawings will sometimes have P(0) outside the glyph. For analytical purposes, the location of P(0) must be systematic, and its location falls where it falls.

The first step in establishing P(0) is to take the glyph and draw a line that is perpendicular to the earth's surface and another that is parallel to the earth's surface. Again, the original position of the glyph is used for the Q method; then the outermost point on the up/down and right/left lines (or edges) of the glyph must be established (see Figure 2). Using the point where the line crosses the edge of the drawing, take a compass and draw a half circle (use the same arc for both sides) that extend over what would be visually the natural center (NC) of the glyph. Where the right/ left semicircles cross, draw a line between the two points. The same is drawn for the up/down semicircles. Where these horizontal and vertical lines cross is P(0) or the center (0) of the glyph. This is also the NC of a glyph which will be discussed at the end of the paper.

The next step is to make and place a Q-P grid (see Figure 3) over the glyph with P(0) being placed at the center (0) that was found by the above paragraph. The vertical and horizontal axes are kept the same as the original vertical and horizontal planes of the glyph. Next, measure the D (distance) along the V lines (Q and P are not V lines) to the edge of the drawings. D is divided by 2 because D here represents only 1/2 the distance across the drawing. We assume any measurement within the glyph is "1." There will be eight measurements.

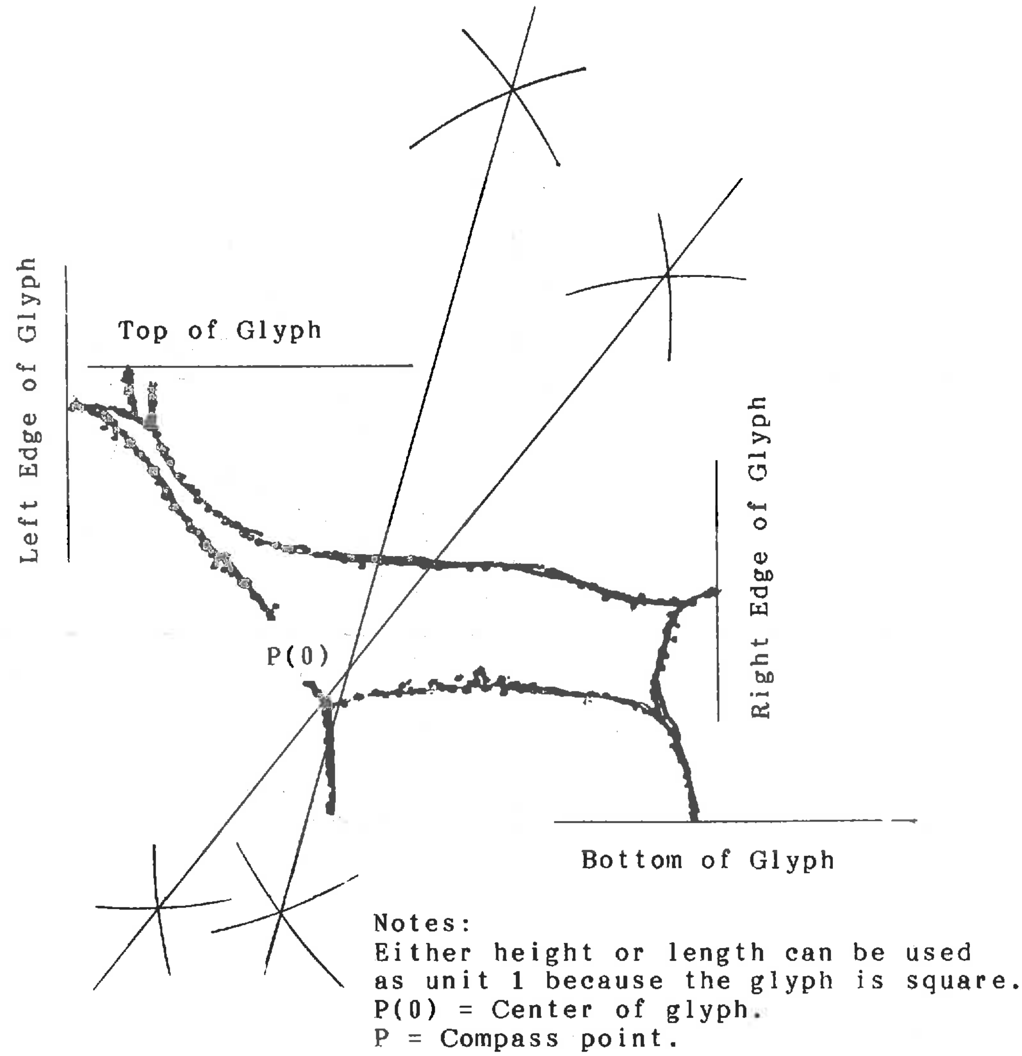


Figure 2: Establishing P(0) center of a glyph (Wyoming art from Lewis 1985).

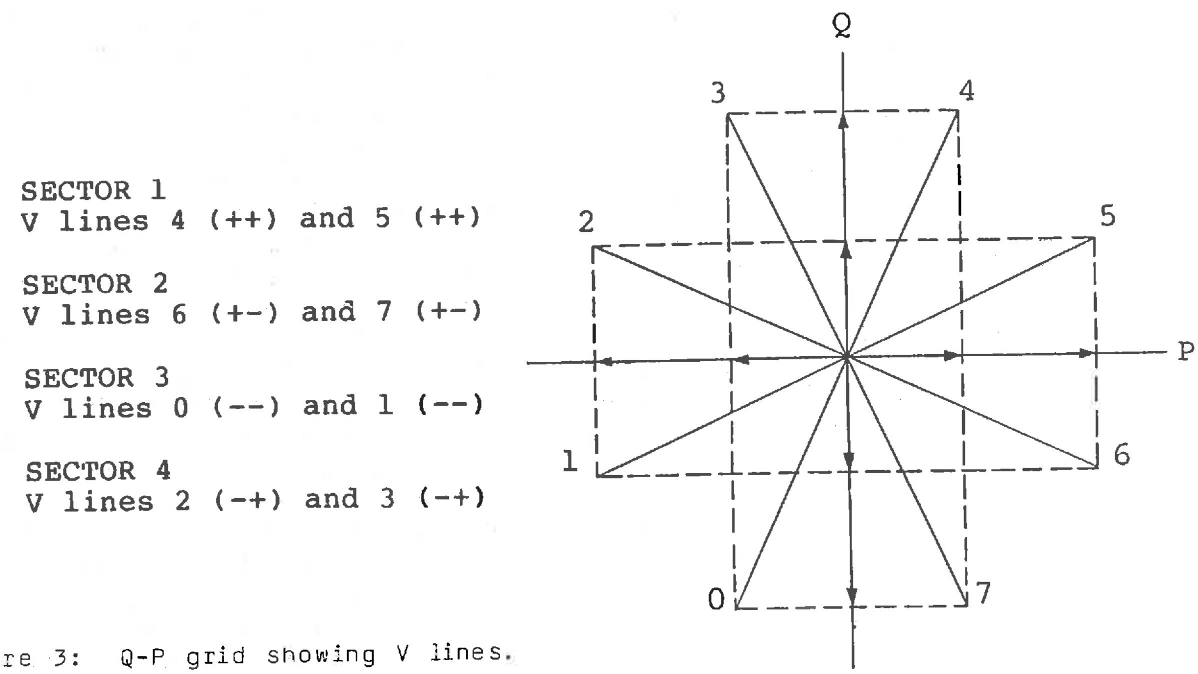


Figure 3: Q-P grid showing V lines.

The actual measurement of the V lines is not performed in feet (or inches) or in a metric system, but in the glyph itself; the distance on the vertical or horizontal axis (whichever is the longest) is classified as "1." The unit 1 is divided into 0.10 subunits (0.01 for extremely large glyphs). Remember that the unit 1 is the total distance of the longer of either the vertical or horizontal lines that was determined in creating the center of the art. Most important, one half of the unit 1 is used for the vertical "up" from P(0), and the other half is used for the lower part of the vertical axis. The same applies to the horizontal axis.

The unit 1 is used because it is the only number that can be used to define "whole" or "all" in the glyph. Any other number is a subjective division or assignment that skews the analysis. The unit 1 is not a real entity in the usual measurement sense. To facilitate measurement, the creation of a "measurement ruler" which has the glyph's unit 1 divided into tenths will greatly aid in making measurements and probably comes close to the measurement "mental" scale of the prehistoric artist.

There are four sets of V lines that consist of two lines per sector. Each number is recorded according to its sector value. That is, each number has two polarities. The upper right Sector #1 is + +, the lower right Sector #2 is + -, the lower left Sector #3 is - -, and the upper right Sector #4 is - +. Place the first number in each sector on the top two in the following equation. The second number goes on the bottom row. Now solve for Q.

The Q sector equation:

$$Q = \frac{(+) + (-) + (-) + (+)}{(+) + (+) + (-) + (-)}$$

Therefore:

$$Q = \frac{(+) \text{ or } (-)n}{(+) \text{ or } (-)n}$$

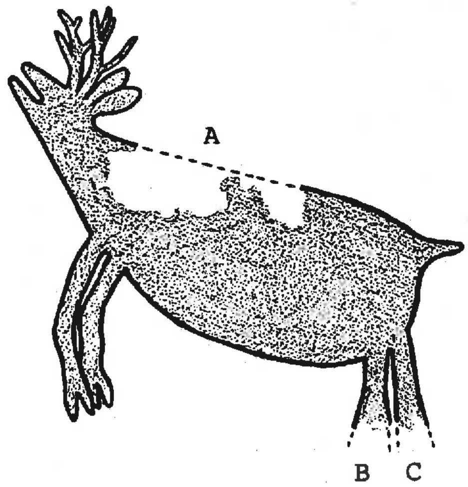
where n = the number of V lines that are used.

If the top number is positive, we know that the art is skewed to the upper right and by how much (.1 is low and .5 is high). A negative upper number indicates to the left and by how much. The lower numbers performs the same right (+) or left (-) functions in symmetry. The closer to 0 that both numbers are, the more symmetrical the glyph, but the higher numbers tend to be nonsymmetrical.

There are two major problems in determining the Q factor. The first problem is missing part(s) of glyphs that have been caused by weathering, vandalism, or intentional erasures. For glyphs, an estimate for the edge of the drawing can be made and noted in the Q factor (see Figure 4). Where no estimate can be made, the Q factor cannot be determined.

The second problem is dealing with cavalcading glyphs. A cavalcade is rock art that has multiple images, each on top of the other. If each glyph or component can be isolated, then the Q factor can be determined (see Figure 5). If isolating each glyph is impossible, then the entire art area is used with the appropriate notes. An example of cavalcade is shown in Figure 6. As a note, often color, difference in age will allow separation of the glyphs; however, personal inspection (or extremely accurate initial recordings) is needed.

The Q method can be used to check the animacy (animate vs. nonanimate objects) factor of a glyph. That is, most glyphs will represent something that occurs in Nature or the Native American artist's world. The objects can be classified broadly as either being animate or inanimate objects. The Q method will allow a quick test to determine this type of glyph distinction. The NC of a glyph is found as discussed above (see Figure 7). If the NC falls somewhere close to where the creature's heart (allow 10 percent of the glyph total size) should be, then



A = LINE CAN BE ESTIMATED

B = LINES CANNOT BE ESTIMATED

C = LINES CANNOT BE ESTIMATED

Figure 4: An example of a glyph with missing parts (Baja California art from Crosby 1975).

you have an animate object. If the NC is outside the glyph area or away from the heart area (then it is within a probability of about 85 to 90 percent) this is a correct assessment.

The Q test has proven reliable in Baja and French cave art sites, but it depends on the glyph selection. The researcher must recognize the types of glyphs that will work. It cannot be used on every glyph with any degree of certainty and only use will determine its usefulness. Any reference using the Q method in this fashion can be called the Q test.

The Q method is a systematic approach to rock art analysis. The method establishes a numerical coefficient or ratio for each glyph (or entire site) which can be coded for computer-assisted comparisons or searches for specific types of art. The P-Q relationship offers tremendous possibilities of reading rock art via a synthetic form of intelligence. Elsewhere, I have suggested that two factors which are used here are universal factors in human intelligence (Hranicky 1985). These are

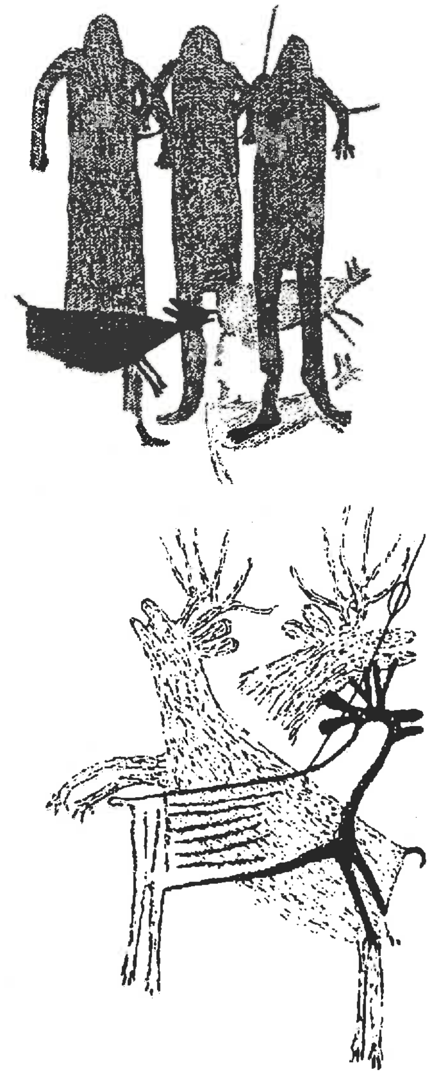


Figure 5: Examples of multiple image art (Baja California art from Crosby 1975).

the cognitive concept of up and down (down and up) and left and right (right and left). Both of these bipolar concepts involve a cognitive process to which we can easily assign binary values. Other bipolar cognitive processes include 1) hot or cold, 2) light or dark, 3) presence or absence, and possibly 4) love or hate. The suggestion here is that these factors can be used to analyze cultural behavior but is beyond the scope of this paper. However, the Q method was developed with these factor in mind. Other factors that can be used to analyze rock art are

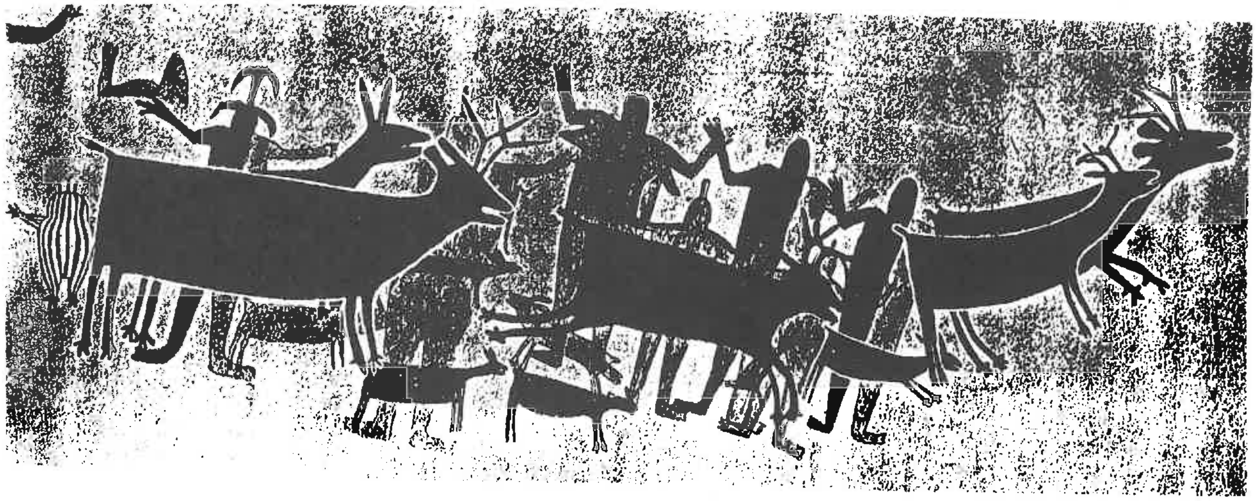


Figure 6: An example of cavalcade rock art (Baja California art from Crosby 1975).

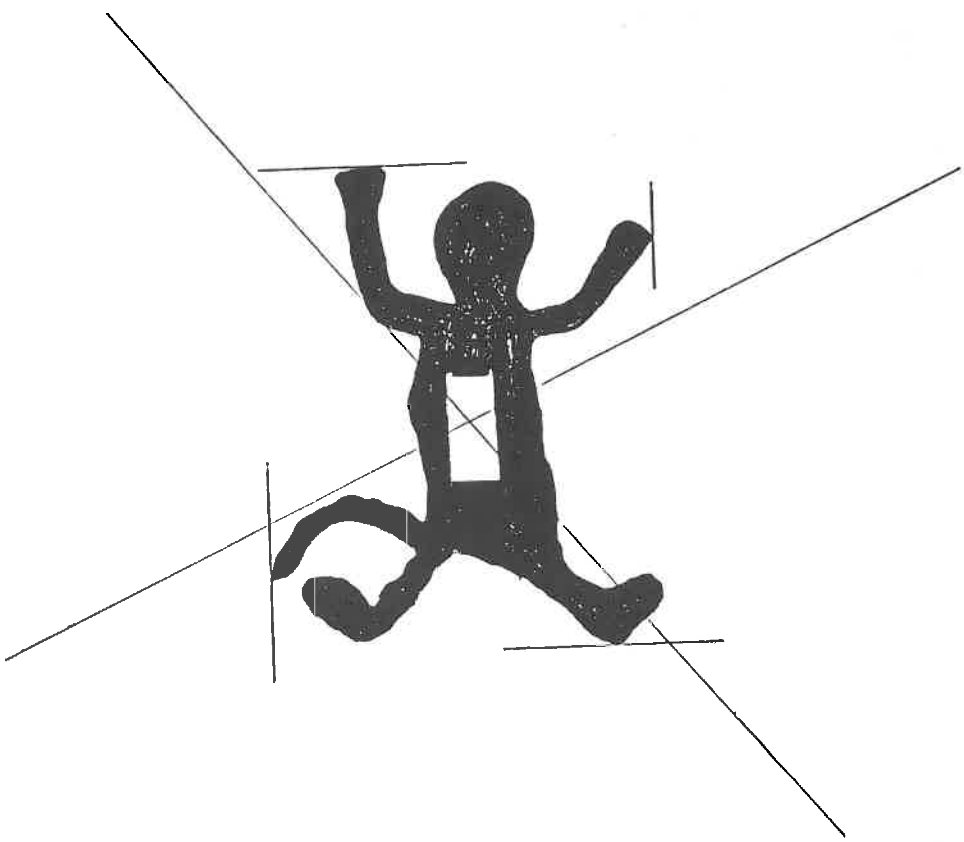


Figure 7: An NC example from Paint Lick Mountain (44TZ13), Virginia.

discussed in Hranicky (1986) which can be obtained by writing the author at the address below. In addition, a program for computerized statistics of rock art glyphs using the Q-method may also be obtained from the author.

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BOOK REVIEWS

Carlos Montezuma and the Changing World of American Indians. PETER IVERSON. University of New Mexico Press, Albuquerque, 1982. 222 pp., illustrations, bibliography, index. $9.95 (paper).

"Kill the Indian in him and save the man" is how Richard Pratt characterized the Americanization era in the evolution of United States political policy regarding Native North American peoples. Carlos Montezuma became a protege of Pratt after being educated at Carlisle Indian School, founded by Pratt. During the years following the Indian Wars of the late 1800s, Montezuma was an influential member of the so-called "educated Indians." Montezuma advocated full integration of Native peoples into Anglo-American culture. It would seem a proponent of this philosophy would surely be branded "an apple" (red outside - white inside) by contemporary Native American activists. This reason is why Iverson's biography of Carlos Montezuma is noteworthy.

Iverson presents a multifaceted individual who advocated abolition of the Bureau of Indian Affairs while voraciously fighting for retention of a land base and water rights by his people, the Yavapai of the Fort McDowell Reservation in southern Arizona. The complexity of Montezuma is all the more striking since this association with his homeland came late in Montezuma's life, following formative years spent in the East. Montezuma would have been a notable individual had he simply been a Native American who, at the turn of the century, became a respected Chicago physician. But he chose to return to his people, first figuratively as an advocate of pan-Indianism and native self determination, and later more literally when he returned to Arizona to learn the ways of the Yavapai and defend their land and water.

Iverson presents the many dimensions of Carlos Montezuma with the vitality that makes a historical figure come alive for the reader. This biography is especially recommended to readers desiring a more complete appreciation of the contemporary Native American situation. Today, Carlos Montezuma is considered not an apple, but the archetypical Native American activist. The importance of this book for the anthropologist lies in its analysis of the complexities of culture change which Iverson examines through the life of an individual near the epicenter of an overwhelming instance of acculturation in modern times.

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Yellow Jacket: A Four Corners Anasazi Ceremonial Center. FREDERICK LANGE, NANCY MAHANEY, JOE BEN WHEAT and MARK L. CHENAULT. Johnson Books, Boulder, Colorado, 1986. x + 62 pp. $5.95 (paper).

In Yellow Jacket: A Four Corners Anasazi Ceremonial Center, Frederick Lange, Nancy Mahaney, Joe Ben Wheat and Mark L. Chenault present a synopsis of over 30 yrs of excavations in the Yellow Jacket area of southwestern Colorado. Yellow Jacket Ruin (5MT-5) and related sites are less well known than surrounding sites in the Mesa Verde area. The main site complex contains "a great kiva, five intermediate sized kivas, 124 small kivas, multi-storied buildings, towers and indications of almost continuous occupation from about A.D. 500-1300" (p. 14). The main site complex has not been scientifically excavated. Since the 1950s, University of Colorado excavations have been concentrated on smaller sites, Stevenson and Porter Pueblos (5MT-1) and 5MT-3. The authors question the traditional notion that Yellow Jacket and surrounding sites are simply "Chacoan outliers." Instead, they assert that Yellow Jacket was a regional Anasazi ceremonial and trade center.

Yellow Jacket is an outgrowth of a traveling museum exhibit and is written for the lay reader. It provides straightforward synthesis and interpretations of archaeological research at Yellow Jacket without burdening the uninitiated reader with voluminous amounts of raw data. This book is clear, concise, and highly readable. The front matter provides some historical perspective. Yellow Jacket is dedicated to the landowners who first brought the site to the attention of Colorado University archaeologists and later assisted the Colorado University archaeology field school.

The main body of the book is organized into 11 short chapters. A key to the aerial infrared photograph on the cover, suggested readings, and a short glossary of terms conclude this volume. The initial chapters (Introduction, Yellow Jacket and the Greater Southwest, Yellow Jacket in Regional Context, History of Archaeology in the Region, the Yellow Jacket Area, and Natural Setting) provide background information about the sites, the traditional Southwestern chronology, and traditional interpretations of prehistory in the Mesa Verde area. The main chapter in the book (History of Research at Yellow Jacket) summarizes 30 yrs of Colorado University excavations before 1984. The chapter provides an excellent illustration of the complexity of the archaeological record and the importance of unexpected finds. Short chapters on mortuary practices, artifacts, and trade items pose interesting questions and offer directions for future research. The summary chapter focuses on accomplishments and the significance of Yellow Jacket in the regional context. Numerous photographs and maps are effectively used to demonstrate points made in the text.

This book will be of greatest interest to readers already familiar with Southwestern prehistory. Readers unacquainted with the archaeological record of the Southwest could have benefited by an expanded discussion of the chronology and how it was defined, and a larger glossary. Although by nature a publication such as this cannot present raw data, the authors could have used more comparative information to reinforce their assertion of Yellow Jacket as a regional ceremonial center. The questioning reader may wonder what specific types of evidence were used to derive this inference. A summary, including habitation room:kiva ratios, towers and other aspects of architecture, evidence for agricultural production, trade items, artifact types, etc., would have been useful to the reader. The text also hits that Yellow Jacket could have been a regional craft center for the production and trade of pendants. This is intriguing and may have strong implications for the reconstruction of past economic and political systems.

Despite these minor shortcomings, Yellow Jacket should be a useful educational volume for many people. This book nicely demonstrates the mutual benefits from interaction between avocational and professional archaeologists, and it clearly discusses the scientific aspects of archaeological research. As a professional archaeologist who has recently read too many cultural resource management reports, I found Yellow Jacket to be most enjoyable and a breath of fresh air.

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The Knife River Flint Quarries: Excavations at Site 32DU508. STANLEY A. AHLER. State Historical Society of North Dakota, Bismark, 1986. viii+117 pp., 39 figures, 37 tables, references. $20.00 (paper).

This short monograph is a published derivative of a contract report concerning brief exploratory excavations of a small quarry area within the greater Lynch Knife River Flint Quarry District. The monograph both suffers and benefits from a hybrid approach to presenting a descriptive contract report to a broader audience. In many ways, the informed lay public or trained archaeologists unaccustomed to the conventional Cultural Resource Management (CRM) format are likely to find much of the text cumbersome and difficult to read. On the other hand, this is a common problem with descriptive monographs in virtually any of the conventional formats. This monograph does read more smoothly and clearly than most, and much of the raw and descriptive data is presented in tables and diagrams. The use of photographs and drawings is also generous, although coordination of illustrations and text is weak. For the reader interested in related readings, abundant references are made to published and unpublished works including theoretical, general and detailed descriptive materials.

Editorial details aside, published descriptive works on lithic sources are scarce and constitute an important resource to the archaeological community. Archaeologists working in any part of North America need to be able to deal with lithic types, lithic technology and lithic sources. In some regions, this constitutes the backbone of archaeological analyses. By and large, the recognition of distinctive regional lithic sources is a skill obtained through informal apprenticeship, and lacks standardization or systematic verification. It is in this context that descriptive studies such as this, although admittedly narrow in scope, are important. This book does contain a great deal of potentially useful information. However, the book is not readably organized or indexed in such a way that specific classes of information are easily gleaned without reading widely scattered and disparate portions of the text. For the reader seeking selected information without extensive and detailed reading, the table of contents does provide some assistance.

The project discussed in this monograph was conceived and coordinated by a seasoned professional archaeologist and represents a well implemented exploratory field study. The extent and variety of descriptive analyses brought to bear on the limited field data is also commendable. One of the impressive aspects of the field study was the effective implementation of a systematic augering program and its immediate incorporation into a more intensive subsurface sampling design. This is a more organized and clearly presented area of the text and impressively illustrates the potential and inherent discrepancies between observable surface materials and actual subsurface distributions. Although the author states that it would be aside from the primary intent of this monograph, this work could have benefited positively from a summary discussion of potential future strategies and directions in this and related studies. Although this is a tangible contribution, it is not a definitive study on the Knife River Flint quarries. This study tells us more than was generally known before about the nature of the secondary deposits in which Knife River flint occurs and interesting aspects of the extractive technologies associated with those deposits. However, it can also illuminate a great deal about strategies and procedures for the systematic investigation of secondary lithic sources. For one thing, Ahler has demonstrated that quarry areas of intimidating extent and complexity can be monograph, both in field procedure and material remains. Although it contains useful, perhaps sometimes indispensable, comparative information, it cannot be considered a comprehensive reference work. At the same time, it touches on many theoretical issues, but is not a theoretical work. It mentions or discusses the potential application of theoretical issues to a specific field situation. Many of the issues are mentioned in little more than a token manner, with the acknowledgement that the data are inappropriate for addressing approached in feasible and manageable units, and that a great deal of useful information can be gleaned by expedient analytical procedures.

This is fundamentally a descriptive these issues. Perhaps there should be a stronger assertion concerning some of these issues that a larger body of comparable data from related contexts would be appropriate. Professional and avocational archaeologists could definitely benefit from more focused studies of lithic source areas such as this one. It could have been' made more readable, but that is something which can be said about most published or unpublished archaeological reports.

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Plains Indian Sculpture: A Traditional Art from America's Heartland. JOHN C. EWERS. Smithsonian Institution Press, Washington, D.C., 1986. 239 pp., 26 color plates, 220 black and white photographs and illustrations, Epilogue, Appendix, Bibliography. $39.95 (cloth), $24.95 (paper).

During fifty years of study on Plains Indian culture and history, and with twenty years of that period spent in intensive study of Plains Indian carvings, John C. Ewers, Smithsonian Ethnologist Emeritus, has developed understanding and respect for the arts created by Indian people. Readers familiar with Ewers' many publications may recall that over the years he has been particularly interested in, "the history of the Indians of the American West in terms of Indian-White confrontation," and the influence that such confrontation has had on the culture and art of the Plains Indians (Ewers, in Porter 1984:41).

It was from these Indian-white confrontations, especially in the nineteenth century, that military officers, army physicians, Indian agents, traders, scientists, artists and explorers recorded Indian life and culture, and began to collect and document many of the artifacts which now form the major museum collections in this country and abroad (p. 15). Ewers' long list of acknowledgements offers some idea of how extensive these collections are and what an immense, but pleasurable, task it must have been to select examples for the book.

The importance of good photography and illustrations in a book about art cannot be underestimated. Ewers' book is beautifully illustrated with 26 colorplates and 220 black and white photographs and illustrations. Ewers gives well-deserved credit for these to Smithsonian photographer Victor Krantz and illustrators Marcia Bakry and George R. Lewis.

In the opening paragraph of the Preface, Ewers states that the three reasons for producing the book were mainly concerned with showing that Plains Indian people created three dimensional art with great skill using stone, wood, and other materials. Ewers also wants to demonstrate how these carvings "served many useful functions in their religious and secular life" (p. 7). In the process of introducing his readers to an aesthetic perception valued in a different culture in a different time frame, a time frame shared with non-Indians, Dr. Ewers also provides historical, technical, archaeological and anthropological material intended for an audience including, but not limited to, archaeologists, anthropologists, Indian and non-Indian artists, art collectors and historians.

The book is a comprehensive study, divided into five chapters with the first one covering the antiquity and variety of carved stone effigies before 1830. Carved stone effigy tobacco pipes and pipestems are the major focus of the book, with Chapter two containing the definitive section on these. This chapter presents illustrations and information on the five basic forms of tobacco pipes (Fig. 16), with their tribal and historical affiliations and with information on sources of materials, methods of production and tools used.

Chapter two also gives some of the reasons Indian people carved various animals such as bears, bighorn sheep, buffalo, dogs, horses, eagles, crows, owls, turtles, snakes, frogs, fish, and human effigies on stone pipes. Human, or "person pipes" as Ewers refers to them, either full figure or heads only, were often intended as portraiture of known persons. A few of the portrait subjects are identified. After 1830, some person pipes were created as social comment. Some of the attitudes reflected in this group of carvings is discussed in Chapter two.

Ewers is recognized as the preeminent authority on pipes, pipe ceremonialism and the evolution of pipe forms during the nineteenth century. "Blackfoot Indian Pipes and Pipemaking" (Ewers 1963) and Indian Art in Pipestone: George Catlins' Portfolio in the British Museum (Ewers 1979) are two of his earlier publications on the subject.

Archaeologists excavating historic sites in Wyoming may find Chapter two of particular interest because the 1852 era, Camp Payne site recently excavated along the Platte River near Evansville, Wyoming, yielded 255 fragments and whole sections of clay pipes (Eckles 1985:63). Although the pipes found at Camp Payne are made of fired clay and are of non-Indian, mid-nineteenth century manufacture, many of those collected were effigy forms (Eckles 1985:76).

Art books are intended for individual enjoyment and readers will find personal favorites among the effigies pictured, but the carving skills demonstrated in creating the stone tobacco pipes will probably readily inspire reader appreciation, especially the animals.

Chapter three, "Religious, Magical and Ceremonial Effigies," discusses items made of wood, stone, bone, and antler. The items range from the abstract to the realistic. There are Sioux "tree dwellers" created for magical purposes and impressive war clubs with large nails or spikes or knives protruding.

The bodies of horses as part of horse dance sticks, were carved and painted to indicate swift movement, but there are imaginative exceptions such as one with a horse head on one end of the stick and a single hoof on the other (Figure 131, p. 141).

Wyoming is represented in this section by a small sculpture labeled "Buffalo hunting medicine of the historic period, Crow" (Plate 1, p. 18). This carving was found in the Wind River Valley in 1911. Ewers remarks that he knows of a "dozen other" examples of buffalo effigies found on the Great Plains and probably of the Historic Period.

Whistles and flutes with carved bird and elk heads appearing in Chapter three, are said to have once provided sounds which charmed the hearts of maidens being courted. A snipe effigy whistle (Plate 24, p. 30) shaped from a slender ash bough is hardly more than a bird's head with a long graceful open beak and brass tacks for eyes, but even without making the sounds for which it was intended, in the language of art, this whistle has presence.

Chapter four contains "Miscellaneous Effigies" with things like children's toys, gaming pieces, hair parters, and drum supports.

Chapter five, "Trends in Plains Indian Sculpture," briefly reviews the previous four chapters and explores development under stimulation from a non-Indian market from 1830-1875, and innovations introduced in the early reservation years. This chapter also brings us into the contemporary period of sculpture and other arts under governmental and tribal encouragement after 1934. Many contemporary Indian artists are identified.

Ewers writes of the two latter periods: "there were both survivals from buffalo days and there were some innovations" (p. 211). Ewers emphasizes the traditional aspects of Plains Indian carving as it evolved in the nineteenth century. His final words both in the preface (p. 8) and the last page of the text (p. 228) are significant for his encouragement addressed to present and future generations of Plains Indian people to continue to express themselves in the medium of sculpture. However, the "survivals" and "innovations" in the arts by Indian people represent a complex argument among Indian artists, conservative tribal members and non-Indian art collectors who validate Indian arts based on their interpretation of what is "Indianness." Readers interested in the argument and its influences should examine a recent publication on the topic edited by E. L. Wade (1986).

I endorse this book as a valuable pictorial and historical reference for carved effigy arts created by Plains Indian people. However, I would suggest additional reading of Ewers' publications for those unfamiliar with his works. I hasten to add that the suggestion for additional reading is not a criticism of this book, but is a means of understanding the years of background study from which the book Plains Indian Sculpture evolved. Many of Ewers' books and articles are listed in the bibliography.

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